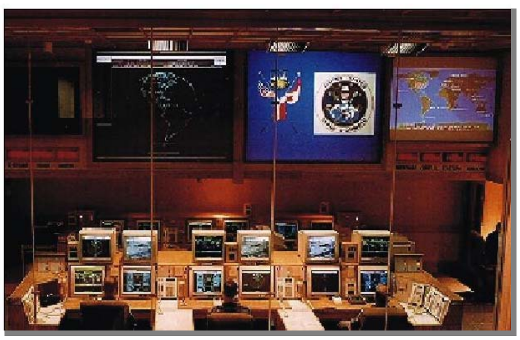
Missile Defense Agency
Ballistic Missile Defense System (BMDS)



Programmatic Environmental Impact Statement

January 2007

VOLUME 3
APPENDICES K - N

Department of Defense
Missile Defense Agency
7100 Defense Pentagon
Washington, DC 20301-7100

Volume 3
Table of Contents

Table of Exhibits

ACRONYMS AND ABBREVIATIONS

ABL	Airborne Laser
ADHD	Attention-deficit-hyperactivity disorder
AFB	Air Force Base
AFSPC	U.S. Air Force Space Command
Al_2O_3	Aluminum Oxide (alumina)
ANSI	American National Standards Institute
ASIP	Arrow System Improvement Program
BRAC	Base Realignment and Closure
BMD	Ballistic Missile Defense
BMDO	Ballistic Missile Defense Organization
BMDS	Ballistic Missile Defense System
BOA	Broad Ocean Area
C2BMC	Command and Control, Battle Management, and Communications
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CTF	Combined Test Force
dB	Decibel
dBA	A-weighted decibel
DISCOS	Database and Information System Characterizing Objects in Space
DNL	Day Night Average Noise Level
DoD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
EA	Environmental Assessment
EDWC	Estimated Drinking Water Concentrations
EIS	Environmental Impact Statement
EM	Electromagnetic
EMR	Electromagnetic Radiation
EO	Executive Order
EPA	Environmental Protection Agency
ETR	Extended Test Range
FAA	Federal Aviation Administration
FR	Federal Register
GBI	Ground-Based Interceptor
GEO	Geosynchronous Earth Orbit
GHz	Gigahertz
GIS	Geographic Information System
GMD	Ground-Based Midcourse Defense
HAP	Hazardous Air Pollutant
HF	High frequency
ICBM	Inter-Continental Ballistic Missile

IDOC	Initial Defensive Operations Capability
IDO	Initial Defensive Operations
IEEE	Institute of Electrical and Electronics Engineers
INF	Intermediate-Range Nuclear Forces
IPSC	Interagency Perchlorate Steering Committee
ISS	International Space Station
IWG	Interagency Working Group
KEI	Kinetic Energy Interceptor
KLC	Kodiak Launch Complex
kW	Kilowatts
L_{eq}	Equivalent Noise Level
LC_{50}	Lethal Concentration for 50 percent
LEO	Low Earth Orbit
LOAEL	Lowest Observed Adverse Effect Level
MDA	Missile Defense Agency
MEO	Medium Earth Orbit
mg/kg	Milligrams per kilogram
MHz	Megahertz
MPE	Maximum Permissible Exposure
MSL	Mean Sea Level
MSX	Midcourse Space Experiment
mW	Megawatts
mW/cm^2	Milliwatts per square centimeter
NASA	National Aeronautics and Space Administration
NAS	National Academy of Science
NEPA	National Environmental Policy Act
NEXRAD	Next Generation Weather Radar
NFIRE	Near-Field Infrared Experiment
NMD	National Missile Defense
NOA	Notice of Availability
NOAA	National Oceanic and Atmospheric Administration
NOAEL	No Observed Adverse Effect Level
NOEL	No Observed Effect Level
NOHD	Nominal Ocular Hazard Distance
NOTAM	Notice to Airmen
NRC	National Research Council
NRO	National Reconnaissance Organization
OCONUS	Outside the Continental United States
OSTP	Office of Scence and Technology Policy
PAC-3	PATRIOT Advanced Capability-3
PAVE PAWS	Position and Velocity Extraction Phased Array Warning System
PEIS	Programmatic Environmental Impact Statement
ppb	parts per billion
ppm	parts per million

PMRF	Pacific Missile Range Facility
POD	Point of Departure
PRST	Pacific Range Support Team
RCC	Range Commanders' Council
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
ROD	Record of Decision
SAR	Specific absorption rate
SBIRS	Space-Based Infrared Sensor
SBX	Sea-Based X-Band Radar
SEL	Sound Exposure Level
SHEL	Surrogate High Energy Laser
SRM	Solid Rocket Motor
SSN	Space Surveillance Network
START	Reduction and Limitation of Strategic Offensive Arms Treaty
STEPAL	System Test and Evaluation Planning Analysis Lab
T3	Triiodothyronine
T4	Thyroxine
THAAD	Terminal High Altitude Area Defense
TSH	Thyroid stimulating hormone
UF	Uncertainty factors
UHF	Ultrahigh frequency
U.S.	United States
USAF	United States Air Force
USFWS	United States Fish and Wildlife Service
U.S.C.	United States Code
USGS	United States Geological Survey
USSTRATCOM	United States Strategic Command
USSPACECOM	United States Space Command
VHF	Very high frequency
V/m	Volts per meter
VOC	Validation of Operational Concept
W/kg bw	Watts per kilogram body weight
XBR	X-Band Radar

This page intentionally left blank.

APPENDIX K
COMMENT RESPONSE

COMMENT RESPONSE

Introduction

The Missile Defense Agency (MDA) received approximately 8,500 comment documents on the Draft Ballistic Missile Defense System (BMDS) Programmatic Environmental Impact Statement (PEIS). These comment documents were received via phone (0.14 percent), facsimile (0.08 percent), e-mail and through the electronic form available on the BMDS PEIS web site (5 percent), and mail (94 percent). To further facilitate public comment, the MDA held four public hearings

- October 14, 2004, Arlington, Virginia;
- October 19, 2004, Sacramento, California;
- October 21, 2004, Anchorage, Alaska; and
- October 26, 2004, Honolulu, Hawaii.

Both oral and written comments were received at the hearings constituting 0.70 and 0.14 percent, respectively, of the total comments.

Methodology for Considering Comments and Comment Documents

A comment document is defined as a document that is submitted by a commenter (e.g., letter, postcard, e-mail, telephone message, oral comment at the public hearing, etc.), and a comment is defined as a distinct statement or question about a particular topic. A comment document may contain several comments. The MDA logged in and assigned individual numbers to each comment document based on how the comment document was received. Comment documents are numbered as follows.

- Phone – DC_P0001
- Facsimile – DC_F0001
- E-mail/Web site – DC_E0001
- Mail – DC_M0001
- Public Hearing Oral – DC_PHO0001
- Pubic Hearing Written – DC_PHW0001
- Other – DC_O0001

Comment document numbers are listed in Exhibit K-1, which is organized alphabetically by commenter name. All comment documents received during the comment period were given equal consideration during preparation of the Final PEIS, regardless of the delivery method or commenter.

When public comments are large in number and volume, the National Environmental Policy Act (NEPA) does not require Federal agencies to reprint all written comments in the Final Environmental Impact Statement (EIS). However, all comments must be considered in preparing the Final EIS. Council on Environmental Quality (CEQ) guidance states "if a number of comments are identical or very similar, agencies may group the comments and prepare a single answer for each group. Comments may be summarized if they are especially voluminous. The comments or summaries must be attached to the EIS regardless of whether the agency believes they merit individual discussion in the body of the final EIS."[1] For this PEIS, MDA included full text copies of all comment documents containing comments considered within the scope of the PEIS and specifically identified the comments requiring responses.

Template Letters

In sorting comment documents, MDA identified four distinct template letters that were submitted via e-mail, facsimile, or regular mail. These template letters, which are classified as Comment Template A, B, C, and D, are discussed in Section K.2. There were some variations of these template letters; therefore, Section K.2 provides randomly selected copies of variations of each of the four template letters.

Out of Scope Comments

NEPA requires Federal agencies to focus analysis and documentation on the significant issues related to a proposed action. Many of the comments received on the Draft PEIS were declarative statements not requiring a direct response, but which did need to be noted in the context of overall public review. Some of the comments received were related to budgetary or policy issues such as system cost, potential threat, and system effectiveness. These comments are considered outside the scope of this PEIS and require no revision to the PEIS and no direct response, except to note the comments for the record.

Section K.3 summarizes out of scope comments and provides the reasons why these comments do not require a substantive response. It should be noted that all comments were considered and the text of all comments and comment documents are included in the administrative record for the PEIS.

Comment Documents Containing In Scope Comments

Comment documents that contained substantive comments that were determined to be within the scope of this PEIS were identified. These comment documents are reproduced in Section K.4. In general, comments that addressed the resource areas analyzed in the Draft BMDS PEIS, feasible alternatives, relevant laws and regulations, and specific

---

[1] CEQ, Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations, March 16, 1981. (46 *FR* 18026, March 23, 1981, as amended in 51 *FR* 15618, April 25, 1986)

comments relating to the impacts analysis, were considered to be within the scope of the PEIS.

Section K.4 includes reproductions of the original comment documents containing in-scope comments that were received during the public comment period for the Draft BMDS PEIS. Section K.4 also includes relevant excerpts of the in-scope comments and a response to each. Where appropriate, revisions to the Final BMDS PEIS were made to address these comments.

Comments Submitted by Federal Agencies

Several comment documents were submitted by Federal agencies, such as the United States (U.S.) Environmental Protection Agency (EPA) and the Department of the Interior. These comment documents are reproduced in Section K.5. Section K.5 also includes responses to each comment. Where appropriate, revisions to the Final BMDS PEIS were made to address these comments.

K.1 Summary of Commenters

It is important that each commenter be able to clearly identify that their comments were considered and where and how their comments were addressed. Exhibit K-1 organizes all comment documents by commenter name, comment document number, commenter organization, and section in this Appendix where specific comments from each comment document are addressed. As noted earlier, template letters are addressed in Section K.2, out of scope comments are addressed in Section K.3, in-scope comments are addressed in Section K.4, and comments submitted by Federal agencies are addressed in Section K.5. This exhibit is organized alphabetically by commenter's last name. If multiple signatures were provided on a comment document, the comment document is listed under the first signatory's name.

Exhibit K-1. Location of Responses to Comments

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
"Not Given"	"Not Given"		DC_E0054		K.3.4, K.3.6, K.3.11, K.3.15
"Not Given"	"Not Given"		DC_E0064		K.3.2, K.3.10, K.3.12
"Not Given"	"Not Given"		DC_E0079		K.3.1
"Not Given"	"Not Given"		DC_E0163		K.3.14
"Not Given"	"Not Given"		DC_E0188		K.3.4, K.3.5, K.3.11, K.3.12, K.3.15
"Not Given"	"Not Given"		DC_E0240		K.3.12, K.3.15
"Not Given"	"Not Given"		DC_E0289	Sisters of Saint Joseph	K.3.12
"Not Given"	"Not Given"		DC_E0362		K.3.1, K.3.2, K.3.10, K.3.12, K.3.13, K.3.15
"Not Given"	Angie		DC_M0711	UCS	K.2.1
"Not Given"	Kerri		DC_E0049		K.3.1
"Not Given"	Murray		DC_E0261		K.3.2, K.3.4, K.3.12
"Not Given"	Peggy		DC_E0053		K.3.2, K.3.3, K.3.12
"Not Given"	Ruth		DC_M0054		K.3.3, K.3.12
"Not Given"	Sarah		DC_E0436		K.3.1, K.3.3, K.3.7, K.3.10
"Not Given"	Tane		DC_E0014		K.3.1
A	Barbara		DC_M3469	UCS	K.2.1
Aaron	Frank		DC_M7911	UCS	K.2.1
Abbot	Rachel		DC_M0056	UCS	K.2.1
Abbott	Elizabeth		DC_M0178	UCS	K.2.1
Abbott	Julie		DC_M7118	UCS	K.2.1
Abbott	Lynn		DC_M0652	UCS	K.2.1
Abrahamson	Mary		DC_M4850	UCS	K.2.1
Abram	Natalie		DC_M7020	UCS	K.2.1
Abramis	David		DC_M5227	UCS	K.2.1
Abricka	M.		DC_M5434	UCS	K.2.1
Acerro	Theresa		DC_M2481	UCS	K.2.1
Achee	Kristie		DC_M1072	UCS	K.2.1
Achin	Ginny		DC_M7817		K.2.3
Ackard	Christian		DC_M4135	UCS	K.2.1
Acker	John		DC_M7886	UCS	K.2.1
Acker	Lois		DC_M1891	UCS	K.2.1
Acker	Nancy		DC_M5883	UCS	K.2.1
Acker	Nancy		DC_M6321	UCS	K.2.1
Acker	Nancy		DC_M6404	UCS	K.2.1
Ackerman	Beverly		DC_M2331	UCS	K.2.1
Adam	Geoffrey		DC_M2034	UCS	K.2.1
Adam	Geoffrey		DC_M2035	UCS	K.2.1
Adame	Leonard		DC_M7243	UCS	K.2.1
Adame	M. Nicole		DC_M1817	UCS	K.2.1
Adams	Evelyn		DC_M0343	UCS	K.2.1
Adams	Gary		DC_M3850	UCS	K.2.1
Adams	Gloria		DC_E0003		K.2.2
Adams	Gordon		DC_M1989	UCS	K.2.1
Adams	Jon		DC_M1772	UCS	K.2.1
Adams	Kate		DC_M7821		K.2.3
Adams	Lily		DC_M4449	UCS	K.2.1
Adams	Steve		DC_M6577	UCS	K.2.1
Adams	Winn		DC_M6356	UCS	K.2.1
Adams	Spencer		DC_M5868	UCS	K.2.1
Adams-Welch	Koren		DC_M0334	UCS	K.2.1
Adams-Welch	Koren		DC_M0393	UCS	K.2.1
Adams-Welch	Koren		DC_M5866	UCS	K.2.1
Adams-Welch	Koren		DC_M6833	UCS	K.2.1
Ader	James		DC_M6934	UCS	K.2.1
Adler	Ashley		DC_M3827	UCS	K.2.1
Adler	Barbara		DC_M2705	UCS	K.2.1

Exhibit K-1. Location of Responses to Comments

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Admson	Colby		DC_M1886	UCS	K.2.1
Adney	Vicki		DC_M3832	UCS	K.2.1
Affsprung	Bruce		DC_M7920	UCS	K.2.1
Agee	Joel		DC_M3265	UCS	K.2.1
Agell	Charlotte		DC_E0174		K.3.7, K.3.12
Aggetta	Daryn		DC_M0402		K.2.1
Aghamiri	Rasoul		DC_M1338	UCS	K.2.1
Agius	Brad		DC_M3915	UCS	K.2.1
Agosto	Maria		DC_M6343	UCS	K.2.1
Aguilar	Fernando		DC_M3711	UCS	K.2.1
Ahearn	John		DC_M6980	UCS	K.2.1
Ahern	Doreen Ann		DC_M1877	UCS	K.2.1
Ahern	Larry		DC_M5409	UCS	K.2.1
Aherns	Tim		DC_M5505	UCS	K.2.1
Ahlin	Maria		DC_M4794	UCS	K.2.1
Aisha	Mashariki		DC_M5364	UCS	K.2.1
Aissatou	Djinguui		DC_M6257	UCS	K.2.1
Aitken	Gloria S		DC_M3232	UCS	K.2.1
Akelian	Lorraine		DC_M4574	UCS	K.2.1
Aker	Rebecca		DC_M3656	UCS	K.2.1
Akom	Denise		DC_M3447	UCS	K.2.1
Akram	Raisa		DC_M4657	UCS	K.2.1
Alam	Zena		DC_M6020	UCS	K.2.1
Alber	Catherine R.		DC_M2837	UCS	K.2.1
Albertini	John		DC_M6904	UCS	K.2.1
Albertson	Russell		DC_M5865	UCS	K.2.1
Albin	Woodrow		DC_M1625	UCS	K.2.1
Albu	Raluca		DC_M4132	UCS	K.2.1
Alcorn	Margaret D		DC_M0648		K.2.1
Alderfer	JoAnne		DC_M1359	UCS	K.2.1
Aldrich	Stanley		DC_M6567	UCS	K.2.1
Alenick	Colman		DC_M4317	UCS	K.2.1
Alexander	Janet T.		DC_M5467	UCS	K.2.1
Alexander	Jennifer		DC_M2642	UCS	K.2.1
Alexander	Jill		DC_M1811	UCS	K.2.1
Alexander	Laura		DC_M7370	UCS	K.2.1
Alexander	Mary		DC_M5352	UCS	K.2.1
Alexander-Brown	Karen		DC_M2904	UCS	K.2.1
Alexandra	Radbil		DC_M3377	UCS	K.2.1
Ali	Sheila		DC_M3804	UCS	K.2.1
Alicie	Lori		DC_M1513	UCS	K.2.1
Alitoto	P.		DC_M7142	UCS	K.2.1
Allan	Annie		DC_M2856	UCS	K.2.1
Allard	Diana		DC_M6142	UCS	K.2.1
Alldredge	Debra		DC_M1268	UCS	K.2.1
Allee	Pam		DC_M7839		K.2.3
Allemayehw	Louis		DC_M4189	UCS	K.2.1
Allen	C. E.		DC_M5938	UCS	K.2.1
Allen	Caron		DC_M4306	UCS	K.2.1
Allen	Delbert		DC_M1565	UCS	K.2.1
Allen	Helen		DC_M5548	UCS	K.2.1
Allen	Jennifer		DC_M4694	UCS	K.2.1
Allen	Jeremy		DC_M6140	UCS	K.2.1
Allen	Peter		DC_M5401	UCS	K.2.1
Allen	S.O.		DC_M6619	UCS	K.2.1
Allen	Tammy		DC_M3599	UCS	K.2.1
Allen	Vinit		DC_M6807	UCS	K.2.1
Allen	Dennis		DC_M1963	UCS	K.2.1
Allenson	Herbert		DC_M1889	UCS	K.2.1

Exhibit K-1. Location of Responses to Comments

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Allerton	George		DC_M5807	UCS	K.2.1
Allgood	Clarice		DC_M0280		K.2.1
Allison	Alix		DC_M6256	UCS	K.2.1
Allison	Jennifer		DC_M7247	UCS	K.2.1
Allison	Michael		DC_M1024	UCS	K.2.1
Allison	Sue		DC_M1892	UCS	K.2.1
Allred	Frances		DC_M3859	UCS	K.2.1
Alongi	Shelley		DC_M4032	UCS	K.2.1
Alpern	Robert		DC_PHO0007		K.3.1, K.3.2, K.3.3, K.3.4, K.3.11, K.3.13, K.3.15, K.4
Alpert	Emily		DC_M2739	UCS	K.2.1
Alsdorf	Henrietta		DC_M7333	UCS	K.2.1
Alston	Michaelene		DC_M1047	UCS	K.2.1
Altamura	Gina		DC_M5992	UCS	K.2.1
Altepeter	Michelle		DC_M3214	UCS	K.2.1
Alter	Judith		DC_M4983	UCS	K.2.1
Altman	Harold		DC_M0070		K.2.1
Alton	Adele		DC_M2895	UCS	K.2.1
Alukonis	Maryann		DC_M5995	UCS	K.2.1
Alukonis	Maryann		DC_M7389	UCS	K.2.1
Alvarez	Charles		DC_M1377	UCS	K.2.1
Alvarez-Jett	Rachael		DC_M2319	UCS	K.2.1
Alvear	Elsa		DC_M3590	UCS	K.2.1
Alves	Mary		DC_E0291		K.3.12
Aman	Mark		DC_M4318	UCS	K.2.1
Amandes	Sarah		DC_M5045	UCS	K.2.1
Amar	Andrea		DC_M5199	UCS	K.2.1
Ambrose	Kenneth		DC_M4675	UCS	K.2.1
Ambrose	Kenneth		DC_M6120	UCS	K.2.1
Ambrosia	Joe		DC_M3485	UCS	K.2.1
Ambrosini	Jacqueline		DC_M2556	UCS	K.2.1
Ames	Diane		DC_M1603	UCS	K.2.1
Amigon	Gudelia		DC_M3683	UCS	K.2.1
Amir	Berj		DC_M7500	UCS	K.2.1
Ammerman	Seth		DC_M2143	UCS	K.2.1
Ammon	Gregory		DC_M6398	UCS	K.2.1
Amnotte	David		DC_M3128	UCS	K.2.1
Amodio	Richard		DC_M2464	UCS	K.2.1
Amos	Jerry		DC_M1124	UCS	K.2.1
Anacleto	Dottie		DC_M4573	UCS	K.2.1
Anapol	Sherry		DC_M0189		K.2.1
Ancel	Joseph		DC_M2001	UCS	K.2.1
Anders	Tisa		DC_E0229	Executive Director New Foundations Nonviolence Center	K.2.2
Anderson	Cara		DC_M1969	UCS	K.2.1
Anderson	Carol		DC_M1868	UCS	K.2.1
Anderson	Charles		DC_M7022	UCS	K.2.1
Anderson	Charles E		DC_M2160	UCS	K.2.1
Anderson	Clifford		DC_M2322	UCS	K.2.1
Anderson	Constance		DC_M1743	UCS	K.2.1
Anderson	Constance		DC_M2330	UCS	K.2.1
Anderson	Contance		DC_M6529	UCS	K.2.1
Anderson	Debra		DC_M7396	UCS	K.2.1
Anderson	Jean		DC_M5734	UCS	K.2.1
Anderson	Joanne M.		DC_M7642	UCS	K.2.1
Anderson	Katherine		DC_M5027	UCS	K.2.1
Anderson	Meghan		DC_M1440	UCS	K.2.1
Anderson	Michelle		DC_M2788	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Anderson	Paul		DC_M4787	UCS	K.2.1
Anderson	Rebekah		DC_M6856	UCS	K.2.1
Anderson	Richard		DC_M0380		K.2.1
Anderson	Ruth		DC_M1879	UCS	K.2.1
Anderson	Ruth		DC_M3297	UCS	K.2.1
Anderson	Susan		DC_M1405	UCS	K.2.1
Anderson	Trisha		DC_M0925	UCS	K.2.1
Anderson	William		DC_M7770		K.2.1
Andrade	Paul S.		DC_M6606	UCS	K.2.1
Andrade	Paul S.		DC_M6618	UCS	K.2.1
Andre	Terry		DC_M1606	UCS	K.2.1
Andree	William		DC_M6837	UCS	K.2.1
Andree	William		DC_M7173	UCS	K.2.1
Andres	Thomas		DC_M2737	UCS	K.2.1
Andrew	David		DC_M7875		K.2.1
Andrew	Mark		DC_M3783	UCS	K.2.1
Andrews	Mary Anne		DC_M0384		K.2.1
Andrews	Michael		DC_M6118	UCS	K.2.1
Andrews	Theresa		DC_M4165	UCS	K.2.1
Andrews	Robert		DC_M7622	UCS	K.2.1
Andrus	Tom		DC_M1626	UCS	K.2.1
Anelli	Darla		DC_M7166	UCS	K.2.1
Anetakos	Mary		DC_M6077	UCS	K.2.1
Angell	Donald A.		DC_M3346	UCS	K.2.1
Angell	Donald A.		DC_M3879	UCS	K.2.1
Anhalt	Kimberly		DC_M5113	UCS	K.2.1
Annabel	Abrams		DC_M3890	UCS	K.2.1
Ano	Marion		DC_PHO0052		K.3.12
Ansevin	Allen		DC_M2812	UCS	K.2.1
Anthoney	Terence		DC_M4836	UCS	K.2.1
Antilla	Liisa		DC_M1508	UCS	K.2.1
Antoinette	Palmieri		DC_E0354	New Target Inc (client: missiledefenseadvocacy.org	K.3.9
Anton	Liz		DC_M2744	UCS	K.2.1
Anweiler	Bryan		DC_M5283	UCS	K.2.1
Appelbaum	Matthew		DC_M4064	UCS	K.2.1
Applegate	Boyd		DC_M7900		K.2.1
Aquilino	Christine		DC_M4153	UCS	K.2.1
Arand	William		DC_M3319	UCS	K.2.1
Aranita	Rosita		DC_M0826	UCS	K.2.1
Archard	Albert		DC_M2239	UCS	K.2.1
Archer	Benedict		DC_M5663	UCS	K.2.1
Ardinger	Nick		DC_M6001	UCS	K.2.1
Ard-Kelly	Sonya		DC_M2982	UCS	K.2.1
Arena	Andrea		DC_M4276	UCS	K.2.1
Argabright	Carol		DC_M5143	UCS	K.2.1
Argani	Sholey		DC_M4857	UCS	K.2.1
Arias	Eve		DC_E0260		K.3.1, K.3.3, K.3.12, K.3.15
Arias-Moffett	Martha		DC_M5121	UCS	K.2.1
Arikat	Amin		DC_M1535	UCS	K.2.1
Arkitekter	Urban Rabbe		DC_E0390		K.2.2
Armistead	Susan		DC_M2095	UCS	K.2.1
Armistead	Susan		DC_M6290	UCS	K.2.1
Armstrong	Ambre		DC_M1804	UCS	K.2.1
Armstrong	Desmond		DC_M7726		K.2.1
Armstrong	Joseph		DC_M3144	UCS	K.2.1
Armstrong	Keira		DC_M2671	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Armstrong	Marilee		DC_M7931		K.2.1
Armstrong	Mary		DC_M0224		K.3.14
Arnaout	Maya		DC_M3946	UCS	K.2.1
Arnemann	Cheryl		DC_M1851	UCS	K.2.1
Arnold	Carl		DC_M5070	UCS	K.2.1
Arnold	Gregory		DC_M4547	UCS	K.2.1
Arnold	John		DC_M6092	UCS	K.2.1
Arnold	John D.		DC_M6114	UCS	K.2.1
Arnold	Michelle		DC_M3868	UCS	K.2.1
Aronson	Marsha		DC_M6820	UCS	K.2.1
Aronson	Sylvia		DC_M4258	UCS	K.2.1
Arp-Adams	Heidi		DC_M2043	UCS	K.2.1
Arrington	Hillary		DC_M2860	UCS	K.2.1
Arrington	Julie		DC_M1690	UCS	K.2.1
Arroe	Cate		DC_M4359	UCS	K.2.1
Artley	Richard		DC_M7694		K.2.1
Arts	Tristan		DC_M0986	UCS	K.2.1
Arumugham	Vinu		DC_M3086	UCS	K.2.1
Arvin	Patricia		DC_M0875	UCS	K.2.1
Asbury	Craig		DC_M6402	UCS	K.2.1
Ashburn	James		DC_M2664	UCS	K.2.1
Ashley	Carol		DC_M2249	UCS	K.2.1
Ashley	Micheal		DC_M2898	UCS	K.2.1
Ashton	Linda		DC_M0903	UCS	K.2.1
Ashton	Linda		DC_M5342	UCS	K.2.1
Asselin	David		DC_M2414	UCS	K.2.1
Atayan	Sami		DC_M6037	UCS	K.2.1
Athanasiadis	Stefan		DC_M6369	UCS	K.2.1
Atkins	Ed		DC_M6897	UCS	K.2.1
Atkinson	Martha		DC_M4586	UCS	K.2.1
Atkinson	Patrick		DC_M7611	UCS	K.2.1
Atkinson	William		DC_M6753	UCS	K.2.1
Ator	Silvia		DC_M6057	UCS	K.2.1
Atwell	Julie		DC_M0787	UCS	K.2.1
Atwell	Thom		DC_M1084	UCS	K.2.1
Auerbach	Joanne		DC_M5172	UCS	K.2.1
Augsburger	Catherine		DC_M7106	UCS	K.2.1
Austerman	Darla		DC_M2545	UCS	K.2.1
Austin	Neal		DC_M7415	UCS	K.2.1
Avery	Charlotte		DC_M5341	UCS	K.2.1
Avery	Rachel		DC_M1082	UCS	K.2.1
Avila	Ron		DC_M2360	UCS	K.2.1
Axelrod	Evelyne		DC_M1029	UCS	K.2.1
Axelrod	Evelyne		DC_M4990	UCS	K.2.1
Aycock	Lauren		DC_M7522	UCS	K.2.1
Ayers	Lauren		DC_E0320		K.3.2, K.3.3, K.3.10, K.3.11, K.3.13, K.4
Ayers	Lauren		DC_E0423		K.3.2, K.3.3, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Aylor	Anne		DC_M7074	UCS	K.2.1
Ayres	Barbara		DC_M4086	UCS	K.2.1
Ayres	Gene		DC_M5634	UCS	K.2.1
B	Caitlin		DC_M0625		K.2.1
B	Deanna		DC_M3496	UCS	K.2.1
B	J		DC_M3175	UCS	K.2.1
B.	Caitlin		DC_M1314	UCS	K.2.1
Baas	Kimberly		DC_M0744		K.2.1
Babcock	Maria		DC_M5344	UCS	K.2.1
Babiak	Katherine		DC_M5353	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Babiak	Katherine		DC_M6624	UCS	K.2.1
Babst	Christina		DC_M1056	UCS	K.2.1
Bach	Liza		DC_M6259	UCS	K.2.1
Bacher	Dan		DC_PHO0013	Central American Action Committee	K.3.1, K.3.2, K.3.3, K.3.12, K.3.13, K.4
Bacher	Daniel		DC_M1687	UCS	K.2.1
Bachman	Fritz		DC_M7664	UCS	K.2.1
Bachman	James		DC_M7290	UCS	K.2.1
Bachman	Jerald		DC_M2194	UCS	K.2.1
Bachmann	Nancy		DC_M2736	UCS	K.2.1
Back	Barbara		DC_M7735		K.2.1
Backman	Rebecca		DC_M7809		K.2.3
Bacon	Christine		DC_M0497		K.2.1
Bader	Diane		DC_M2070	UCS	K.2.1
Bader	John		DC_M5247	UCS	K.2.1
Baer	Michael		DC_M7430	UCS	K.2.1
Baert	Robin		DC_M3102	UCS	K.2.1
Bafus	Marjean		DC_M6815	UCS	K.2.1
Bagby	Tiffany		DC_M4603	UCS	K.2.1
Baggs	Bo		DC_M6035	UCS	K.2.1
Bagley	L.		DC_M4138	UCS	K.2.1
Bagley-Marray	J.		DC_M3320	UCS	K.2.1
Bagnarol	Carolina		DC_M0151		K.2.1
Bahl	Suzan		DC_M1154	UCS	K.2.1
Bailey	Arlene		DC_M4853	UCS	K.2.1
Bailey	William		DC_M4013	UCS	K.2.1
Bailey-Pruc	Susan		DC_M5909	UCS	K.2.1
Bailis	Ishara	Tim Bowler	DC_M0109		K.2.1
Baillargeon	Monique		DC_M7613	UCS	K.2.1
Baily	Walter H.		DC_M3955	UCS	K.2.1
Bain	Jordan		DC_M7103	UCS	K.2.1
Bains	Betty		DC_M1477	UCS	K.2.1
Baird	Hope		DC_M2827	UCS	K.2.1
Baird	Valerie J.		DC_M4842	UCS	K.2.1
Bakenhus	Diane		DC_M2607	UCS	K.2.1
Baker	Arlene		DC_M4562	UCS	K.2.1
Baker	Caryn		DC_M2052	UCS	K.2.1
Baker	Douglas	Debra Baker	DC_M4923	UCS	K.2.1
Baker	Jennifer		DC_M3930	UCS	K.2.1
Baker	Sheila		DC_E0206		K.3.6, K.3.11
Baker	Stacey		DC_M0855	UCS	K.2.1
Baker	Steve		DC_M4286	UCS	K.2.1
Bakker	Tom		DC_M2611	UCS	K.2.1
Balch	Justin		DC_M3073	UCS	K.2.1
Baldocchi	Jim		DC_M6578	UCS	K.2.1
Baldomar	Lindsay		DC_M4352	UCS	K.2.1
Balducci	Louise		DC_M1098	UCS	K.2.1
Baldwin	Michelle		DC_M1102	UCS	K.2.1
Baldwin	Richard	Roberta Baldwin	DC_E0200		K.2.2
Baldyga	Helena		DC_M4518	UCS	K.2.1
Ball	Jason B		DC_M2983	UCS	K.2.1
Ball	Lon		DC_E0276		K.3.3, K.3.4, K.3.5, K.3.6, K.3.7, K.3.13
Ball	Jason B.		DC_M0697		K.2.1
Ballard	Jason		DC_M5413	UCS	K.2.1
Ballard	Phyllis M		DC_M3332	UCS	K.2.1
Ballator	Nada		DC_M4985	UCS	K.2.1
Ballender	Brooks		DC_M3357	UCS	K.2.1
Ballentine	Wanda		DC_M5002	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Balluff	Maureen		DC_M0666		K.2.1
Balluff	Maureen		DC_M5118	UCS	K.2.1
Balsai	Michael J.		DC_M3483	UCS	K.2.1
Balter	Jim		DC_M4319	UCS	K.2.1
Baltzer	Harry		DC_M2243	UCS	K.2.1
Banashek	Christel		DC_M2106	UCS	K.2.1
Banaski	Ada		DC_M4085	UCS	K.2.1
Baney	Brett		DC_M0322		K.2.1
Bankey	Michelle		DC_M4801	UCS	K.2.1
Banoczy	Mila		DC_M6949	UCS	K.2.1
Banyai	Steve		DC_M0539		K.2.1
Baptista	D.M.		DC_M7316	UCS	K.2.1
Barankovich	Amy L		DC_M3204	UCS	K.2.1
Barbas	Tom		DC_M1231	UCS	K.2.1
Barbour	Sharon		DC_M1186	UCS	K.2.1
Bard	David		DC_M2882	UCS	K.2.1
Bardell	Timothy		DC_M1010	UCS	K.2.1
Bardsley	Alta M.		DC_M3360	UCS	K.2.1
Barella	Frank		DC_M5732	UCS	K.2.1
Barfield	Ellen	Carol Urner	DC_M0266	Women's Intenational Leauge Peace and Freedom	K.3.1, K.3.2, K.3.3, K.3.4, K.3.5, K.3.10, K.3.11, K.3.13, K.3.15, K.4
Barfield	Ellen	Carol Urner	DC_M0267	Women's Intenational Leauge Peace and Freedom	K.3.1, K.3.6, K.3.11, K.3.12, K.3.15, K.4
Barfield	Ellen	Carol Urner	DC_M0268	Women's Intenational Leauge Peace and Freedom	K.3.1, K.3.11, K.3.15, K.4
Barfield	Ellen		DC_M0425		K.2.1
Barfield	Ellen		DC_M6260	UCS	K.2.1
Bargeron	Ellen		DC_M5658	UCS	K.2.1
Barile	Dominic		DC_M1202	UCS	K.2.1
Baris	Geraldine		DC_M1089	UCS	K.2.1
Barker	Bridget		DC_M4369	UCS	K.2.1
Barker	David		DC_M0204		K.2.1
Barker	Dwinna		DC_M4478	UCS	K.2.1
Barker	Jean		DC_E0349		K.2.2
Barker	Rie		DC_M4475	UCS	K.2.1
Barnard	Michele		DC_M4840	UCS	K.2.1
Barnard	Robert		DC_M3195	UCS	K.2.1
Barnard	Sylvia		DC_M6078	UCS	K.2.1
Barnes	Alicia		DC_M0502		K.2.1
Barnes	Christopher		DC_M1552	UCS	K.2.1
Barnes	Sophie		DC_M2831	UCS	K.2.1
Barnes	Steve		DC_M0640		K.2.1
Barnes	Zimryah		DC_M2304	UCS	K.2.1
Barnes	Zimryah		DC_M2305	UCS	K.2.1
Barnes	Zimryah		DC_M2306	UCS	K.2.1
Barnett	Elizabeth		DC_M6847	UCS	K.2.1
Barnhart	Patricia		DC_M4763	UCS	K.2.1
Barnhart	Patricia		DC_M6075	UCS	K.2.1
Barnhart	Richard		DC_E0135		K.3.2, K.3.3, K.3.7, K.3.10
Barnhart	Robert J.		DC_M2828	UCS	K.2.1
Barnum	Dan		DC_M4003	UCS	K.2.1
Barondes	Lisa		DC_M1373	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Barone	Linda		DC_M0870	UCS	K.2.1
Barouh	David		DC_M7440	UCS	K.2.1
Barrett	Creighton		DC_E0357		K.2.2
Barrett	Delia		DC_M0409		K.2.1
Barrett	Luv Lee		DC_M4034	UCS	K.2.1
Barrios	Sandy		DC_M4201	UCS	K.2.1
Barron	Keith Reeves		DC_M7739		K.3.17
Barron	Maureen		DC_M0126		K.2.1
Barry	Bruce		DC_M4175	UCS	K.2.1
Barry	Kevin J.		DC_M4440	UCS	K.2.1
Barry	Marina		DC_M1075	UCS	K.2.1
Bartczak	Andi Weiss		DC_M2808	UCS	K.2.1
Bartell	Ann		DC_M1670	UCS	K.2.1
Bartell	Karen		DC_M4204	UCS	K.2.1
Barth	Norma		DC_M0248		K.3.2, K.3.7, K.3.11, K.3.15
Bartholome	Sandra		DC_M5370	UCS	K.2.1
Bartholomew	Alice		DC_E0312		K.3.7, K.3.14
Bartlett	Denise		DC_M6016	UCS	K.2.1
BartlettPalmer	Gwen		DC_M2993	UCS	K.2.1
Barton	Roberta		DC_M7537	UCS	K.2.1
Bartz	Sarah		DC_M1239	UCS	K.2.1
Barwig	Juliana		DC_M7656	UCS	K.2.1
Bash	Roberta		DC_M3897	UCS	K.2.1
Basinet	Cynthia		DC_M2639	UCS	K.2.1
Baskin	Martin		DC_M0801	UCS	K.2.1
Bassein	Susan		DC_E0359		K.3.7, K.3.14
Bassein	Susan		DC_M5235	UCS	K.2.1
Bassett	Anne		DC_M1032	UCS	K.2.1
Bastasch	Beth		DC_M1026	UCS	K.2.1
Bastian	Jaime		DC_M3522	UCS	K.2.1
Bastron	Malcom		DC_M3404	UCS	K.2.1
Bate	Rosalie		DC_M4041	UCS	K.2.1
Bateman	Kathy		DC_M4185	UCS	K.2.1
Bates	Chris		DC_M3875	UCS	K.2.1
Batres	Karen		DC_M2391	UCS	K.2.1
Batson	Virginia		DC_M5947	UCS	K.2.1
Batt	Kay		DC_M0900	UCS	K.2.1
Bauer	Crystal		DC_M2376	UCS	K.2.1
Bauer	Isabel		DC_M3507	UCS	K.2.1
Bauer	Michel		DC_M7819		K.2.1
Baugher	Anne Marie		DC_M2151	UCS	K.2.1
Bauman	Rae		DC_M2572	UCS	K.2.1
Baumgartner	Ellen		DC_M6413	UCS	K.2.1
Baumgartner	Kay		DC_M7390	UCS	K.2.1
Baumli	Francis		DC_E0342	Abbe Sudvarg	K.3.1, K.3.2, K.3.7, K.3.10, K.3.12, K.3.11, K.3.13
Baurer	Pattie		DC_M0372		K.2.1
Baustian	Joan		DC_M2421	UCS	K.2.1
Bava	Michelle		DC_M3545	UCS	K.2.1
Baxter	Martha		DC_M5005	UCS	K.2.1
Bayley	Ray		DC_E0442		K.3.1, K.3.2, K.3.10, K.3.14
Bayne	Kris		DC_M4151	UCS	K.2.1
Beach	Carrie		DC_M1939	UCS	K.2.1
Beach	Craig R.		DC_M1489	UCS	K.2.1
Beagan	Colleen		DC_M6987	UCS	K.2.1
Beal	Glenda		DC_M6603	UCS	K.2.1
Beam	Carolyn		DC_M6712	UCS	K.2.1
Beams	Kay		DC_M2614	UCS	K.2.1
Bean	Jerralyn		DC_M3812	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Bean	Heather		DC_M5764	UCS	K.2.1
Bear	Richard G.		DC_M3559	UCS	K.2.1
Bear	White		DC_M4659	UCS	K.2.1
Beardsley	Claire		DC_M5652	UCS	K.2.1
Beatini	Tom		DC_M6582	UCS	K.2.1
Beattie	Willard		DC_M4176	UCS	K.2.1
Beatty	Jamie		DC_M7399	UCS	K.2.1
Beatty	Lorne		DC_M0975	UCS	K.2.1
Beaudin	Briand		DC_M1985	UCS	K.2.1
Beaulieu	Dianne		DC_M1170	UCS	K.2.1
Beaver	Wendy		DC_M0960	UCS	K.2.1
Beavers	Nancy		DC_M4776	UCS	K.2.1
Bechard	Michele		DC_M4958	UCS	K.2.1
Bechner	Azel		DC_M0916	UCS	K.2.1
Beck	Holly		DC_M1449	UCS	K.2.1
Becker	Anna		DC_M3076	UCS	K.2.1
Becker	Clark		DC_M7766		K.2.1
Becker	Jill		DC_M5970	UCS	K.2.1
Becker	John		DC_E0258		K.2.2
Becker	Karen		DC_M4490	UCS	K.2.1
Becker	Kerstin		DC_M3376	UCS	K.2.1
Becker	Michael		DC_E0278		K.3.10, K.3.13, K.3.15
Becker	Michael		DC_M4612	UCS	K.2.1
Beckner	Azel		DC_M6671	UCS	K.2.1
Beckner	Azel Hill		DC_M3435	UCS	K.2.1
Beckwith	Blane		DC_M3324	UCS	K.2.1
Beckwith	Nan		DC_M7777		K.2.1
Bedard	Marlene		DC_M7788		K.2.1
Beebe	Russell		DC_M1855	UCS	K.2.1
Beeler	A. George		DC_M4216	UCS	K.2.1
Beels	Christian		DC_M5239	UCS	K.2.1
Beeny	Diane		DC_M7796		K.2.3
Beers	Skip		DC_M1959	UCS	K.2.1
Behrens	Charles		DC_M5153	UCS	K.2.1
Behrens	Elizabeth		DC_M6385	UCS	K.2.1
Behrens	Joanna		DC_M1478	UCS	K.2.1
Behrens	Nancy		DC_M4991	UCS	K.2.1
Behrman	Jeri		DC_M2887	UCS	K.2.1
Beitrusten	Brittany		DC_M3097	UCS	K.2.1
Belcher	Edith		DC_M6928	UCS	K.2.1
Bell	Ann		DC_M3596	UCS	K.2.1
Bell	B.J.		DC_M3445	UCS	K.2.1
Bell	Joyce		DC_M6212	UCS	K.2.1
Bell	Patricia		DC_M3598	UCS	K.2.1
Bell	Ray		DC_M1570	UCS	K.2.1
Bellamy	Winthrop Dexter		DC_M4007	UCS	K.2.1
Bellofatto	Gloria		DC_M0878	UCS	K.2.1
Bellofatto	Gloria		DC_M0879	UCS	K.2.1
Bellomy	Barbara		DC_M5864	UCS	K.2.1
Benarroch	Sue		DC_M4001	UCS	K.2.1
Bendix	Peyton		DC_M1510	UCS	K.2.1
Bendorf	Jeane K.		DC_M0471		K.2.1
Benioff	Jeanne		DC_M5690	UCS	K.2.1
Benjamin	Donna		DC_M3391	UCS	K.2.1
Benner	Dave		DC_M4019	UCS	K.2.1
Bennett	Darby		DC_M7134	UCS	K.2.1
Bennett	Henry J.		DC_M6401	UCS	K.2.1
Bennett	Jami		DC_M2704	UCS	K.2.1
Bennett	Katherine		DC_M2436	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Bennett	Kirbie		DC_M3616	UCS	K.2.1
Bennett	Lois		DC_M2384	UCS	K.2.1
Bennett	Micheal		DC_M2626	UCS	K.2.1
Bennett	William		DC_M6329	UCS	K.2.1
Benredjem	Alicia		DC_M2392	UCS	K.2.1
Bensinger	Irene		DC_M3056	UCS	K.2.1
Benson	Richard		DC_M2345	UCS	K.2.1
Bentley	Sean		DC_M6743	UCS	K.2.1
Bercan	A		DC_M3638	UCS	K.2.1
Berdeen	Joanne		DC_M4610	UCS	K.2.1
Beretta	Jeanne		DC_M5780	UCS	K.2.1
Berg	Elaine		DC_M5942	UCS	K.2.1
Berg	Joyce		DC_M7701		K.2.1
Berg	Kurt		DC_M1901	UCS	K.2.1
Bergamini	Miriam		DC_E0421		K.2.2
Berghofer	Richard		DC_M5397	UCS	K.2.1
Bergman	Mikey		DC_M2699	UCS	K.2.1
Bergmann	Fred		DC_M3761	UCS	K.2.1
Berke	Claire		DC_M1788	UCS	K.2.1
Berkowitz	Henry		DC_M3211	UCS	K.2.1
Berley	William		DC_M0133		K.3.14
Berlin	Susan		DC_M2224	UCS	K.2.1
Berman	Lila		DC_M1198	UCS	K.2.1
Berman	Lila	Irv Berman	DC_M1200	UCS	K.2.1
Berman	Nancy		DC_M0606		K.2.1
Berman	Nancy		DC_M0694		K.2.1
Berman	Nancy		DC_M7459	UCS	K.2.1
Bermingham	Bryce		DC_M6056	UCS	K.2.1
Bermudez	Pamela		DC_M6857	UCS	K.2.1
Bermudez	Pamela		DC_M7202	UCS	K.2.1
Bernacchi	Carol		DC_M6183	UCS	K.2.1
Bernal	Athena		DC_M2921	UCS	K.2.1
Bernard	Doris		DC_M1666	UCS	K.2.1
Bernard	Larry		DC_M6886	UCS	K.2.1
Bernardi	Sara		DC_M7574	UCS	K.2.1
Bernd-Steffes	Dawn E.		DC_M0534		K.2.1
Bernet	Maurita		DC_M4091	UCS	K.2.1
Bernet	Maurita		DC_M4092	UCS	K.2.1
Bernet	Maurita		DC_M4093	UCS	K.2.1
Bernhardt	Jill		DC_M1826	UCS	K.2.1
Bernhardt	Laura		DC_M0307		K.2.1
Bernini-Galup	Tshilo		DC_M1783	UCS	K.2.1
Bernstein	Alison		DC_M2794	UCS	K.2.1
Bernstein	James		DC_M0798	UCS	K.2.1
Bernstein	Linda		DC_M4210	UCS	K.2.1
Bernstein	Marion		DC_E0438		K.3.1, K.3.2, K.3.13, K.3.14
Bernstein	Marion		DC_M7833		K.2.1
Bernstein	Sheryl		DC_M2807	UCS	K.2.1
Bernstock	Jennifer		DC_M0378		K.2.1
Bernucca	Greg		DC_M6909	UCS	K.2.1
Berry	Robert		DC_M1563	UCS	K.2.1
Berryman	Jean		DC_M0552		K.2.1
Berti	Ron		DC_M4115	UCS	K.2.1
Berti	Ron		DC_M4883	UCS	K.2.1
Bertman	Renee		DC_M1315	UCS	K.2.1
Berube	Matthew		DC_M6482	UCS	K.2.1
Bessman	Marcelle		DC_M2984	UCS	K.2.1
Bethel	James A.		DC_M4873	UCS	K.2.1
Bethune	John		DC_M4636	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Betz	John		DC_M0292		K.2.1
Beugless	Virginia		DC_M5366	UCS	K.2.1
Bevan	Heather		DC_M3262	UCS	K.2.1
Bezella	Andrew		DC_M7361	UCS	K.2.1
Bhakti	Sara		DC_E0171	member UCS	K.3.14
Bhakti	Sara		DC_M6520	UCS	K.2.1
Bhakti	Sara		DC_M6521	UCS	K.2.1
Bhutani	Gundl		DC_M1998	UCS	K.2.1
Biasci	Laura		DC_M1431	UCS	K.2.1
Biava	Peter		DC_M3246	UCS	K.2.1
Bielefeld	Ruth		DC_M5972	UCS	K.2.1
Bigler	Annette		DC_M7775		K.2.1
Bilecki	Michael		DC_M1323	UCS	K.2.1
Billau	Kenneth		DC_M3317	UCS	K.2.1
Bills	Brian		DC_M4334	UCS	K.2.1
Bilowus	Helen		DC_M4719	UCS	K.2.1
Bindrim	Erica		DC_M1719	UCS	K.2.1
Birchem	Regina		DC_E0407		K.3.9
Birchem	Regina	Edel Havin Beukes	DC_E0433	Women's International League for Peace and Freedom	K.3.1, K.3.5, K.3.14, K.3.15
Bircumshaw	Kristie		DC_M2636	UCS	K.2.1
Bird	Kenneth		DC_M5547	UCS	K.2.1
Bird	Stonewall		DC_M7294	UCS	K.2.1
Birdsey	Barbara		DC_M7721		K.3.10, K.3.15
Birdwell	Tom		DC_M6597	UCS	K.2.1
Birger	Sarah		DC_E0397		K.3.1, K.3.2, K.3.3, K.3.12, K.3.15
Birnbaum	David		DC_M6574	UCS	K.2.1
Birnbaum	Shelley		DC_M1583	UCS	K.2.1
Birnie	Patricia		DC_M0234	Tucson Branch, Women's International League for Peace and Freedom	K.3.1, K.3.2, K.3.3, K.3.4, K.3.12, K.3.13, K.3.15, K.4
Bisbing	John		DC_M1524	UCS	K.2.1
Bischoff	Carol		DC_M4458	UCS	K.2.1
Bischoff	Mary		DC_M1115	UCS	K.2.1
Biscotti	Shirley		DC_M3562	UCS	K.2.1
Biser	David		DC_M4824	UCS	K.2.1
Bishop	Carolyn		DC_M7784		K.3.2, K.3.4, K.3.5, K.3.7, K.3.10, K.3.11
Bishop	Dan		DC_M2653	UCS	K.2.1
Bishop	Justin		DC_M1730	UCS	K.2.1
Bishop	Lynn		DC_M4014	UCS	K.2.1
Bishop-Henry	Karyn		DC_M2278	UCS	K.2.1
Bissonnette	Rick		DC_M4775	UCS	K.2.1
Bissonnnette	Raymond		DC_M2613	UCS	K.2.1
Biswas	Auri		DC_M5092	UCS	K.2.1
Bittler	S.		DC_M7449	UCS	K.2.1
Bittler	S.		DC_M0699		K.2.1
Bixter	Pamela		DC_M4566	UCS	K.2.1
Bixter	Pamela		DC_M6101	UCS	K.2.1
Black	Janet		DC_M6178	UCS	K.2.1
Black	Karina		DC_M3300	UCS	K.2.1
Black	Mary		DC_E0288		K.3.3, K.3.10, K.3.12
Black	Nancy		DC_M7570	UCS	K.2.1
Black	Patricia		DC_M0358		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Black	Patricia		DC_M5179	UCS	K.2.1
Black	Patricia		DC_M5818	UCS	K.2.1
Blackwell	Christopher		DC_M1979	UCS	K.2.1
Blackwood	Kimathi		DC_M4403	UCS	K.2.1
Blahut	Natalie H.		DC_M7218	UCS	K.2.1
Blair	Kathie L		DC_M3274	UCS	K.2.1
Blaisdell	Jill		DC_M2677	UCS	K.2.1
Blaisdell	Steven		DC_M5728	UCS	K.2.1
Blake-Collins	Brian		DC_M0686		K.2.1
Blakely	Carmen		DC_M2881	UCS	K.2.1
Blakemore	Bud		DC_M1607	UCS	K.2.1
Blanchard	Charles M.		DC_M1771	UCS	K.2.1
Blanchette	Tim		DC_M0006		K.2.2
Blanchford	Pheobe		DC_M2746	UCS	K.2.1
Blanco	Sebastian		DC_PHO0061		K.3.12
Bland	Dean	Emilia Bland	DC_M0281		K.2.1
Blankenhorn	Roland		DC_M0579		K.2.1
Blaski	Barbara		DC_M5549	UCS	K.2.1
Blaszczak	Joe		DC_M6972	UCS	K.2.1
Blau	Deborah		DC_M6912	UCS	K.2.1
Blavin	Eli		DC_M3792	UCS	K.2.1
Blecker	Catherine		DC_M7061	UCS	K.2.1
Bledsoe	Jessica		DC_M2448	UCS	K.2.1
Bleu	Joan		DC_M3491	UCS	K.2.1
Blevins	Frances		DC_M1751	UCS	K.2.1
Blickens	Donald		DC_M1872	UCS	K.2.1
Blier	Robin		DC_M0886	UCS	K.2.1
Blobel	Carl		DC_M5308	UCS	K.2.1
Block	Trent		DC_M3791	UCS	K.2.1
Blomberg	Craig		DC_E0324		K.3.1, K.3.13, K.3.15
Blomquist	Karen		DC_E0381		K.3.10, K.3.12, K.3.15
Blomquist	Karen		DC_PHO0008		K.3.11, K.3.12, K.3.15
Bloom	Cheryl		DC_M5801	UCS	K.2.1
Bloomer	Jerry		DC_E0013		K.2.2
Bloomer	Jerry		DC_E0192		K.2.2
Bloomfield	Hartley		DC_M0980	UCS	K.2.1
Blossy	Christine		DC_M3432	UCS	K.2.1
Blough	Milton F.		DC_M1104	UCS	K.2.1
Blue	Malcom J.		DC_M4040	UCS	K.2.1
Blue	Marilyn		DC_M7398	UCS	K.2.1
Bluhm	Phyllis		DC_M0005		K.3.1, K.3.2, K.3.11, K.3.13, K.3.15
Blum	Robin		DC_M2020	UCS	K.2.1
Blythe	Judy		DC_E0384	Medial Association for Prevention of War (Western Australian Branch)	K.3.2, K.3.3, K.3.4, K.3.6, K.3.7, K.3.10, K.3.11, K.3.12, K.3.15
Blythe	Mary		DC_E0336		K.3.14
Boardman	William		DC_E0182		K.3.1, K.3.2, K.3.10, K.3.12, K.3.13, K.3.14
Boast	Keith		DC_M1174	UCS	K.2.1
Bobbitt	Rachel		DC_M2803	UCS	K.2.1
Bobrick	Heather		DC_M5768	UCS	K.2.1
Bobroff	Alex A.		DC_M5662	UCS	K.2.1
Bodah	Brian		DC_M0031		K.2.1
Bodah	Brian		DC_M4126	UCS	K.2.1
Bodden	Joshua B.		DC_M1936	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Bodeau	Jean		DC_PHO0037		K.3.1, K.3.2, K.3.3, K.3.4, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Bodemar	Jeri		DC_M6963	UCS	K.2.1
Bodmer	Paul		DC_M2749	UCS	K.2.1
Bodry	Theolet		DC_M6976	UCS	K.2.1
Boeck	Lara		DC_M5144	UCS	K.2.1
Boehm	Marjorie		DC_PHO0020	Women's International League for Peace and Freedom, United States Section	K.3.2, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15
Boelling	Gary		DC_M4759	UCS	K.2.1
Boes	Gregory		DC_M5040	UCS	K.2.1
Bogart	Brian		DC_M5555	UCS	K.2.1
Bogert	Tracy		DC_M2417	UCS	K.2.1
Bogiani	Bernard		DC_M2795	UCS	K.2.1
Bohn	David		DC_M0071		K.2.1
Bois	Bill		DC_M4682	UCS	K.2.1
Boisselle	Marie-France		DC_M0091		K.2.1
Boitano	Connie		DC_M1941	UCS	K.2.1
Boivin	Jacque		DC_M1219	UCS	K.2.1
Bojo	Jan		DC_M4120	UCS	K.2.1
Boka	Madeleine		DC_M5175	UCS	K.2.1
Boka	Madeleine		DC_M5176	UCS	K.2.1
Boldenow	Kevin		DC_M3981	UCS	K.2.1
Bolema	Tom		DC_E0226		K.3.1, K.3.3, K.3.4, K.3.5
Bolia	Donna		DC_M4028	UCS	K.2.1
Bolin	Amy		DC_M0710		K.2.1
Bolin	Amy		DC_M0789	UCS	K.2.1
Boller	Robert		DC_M3481	UCS	K.2.1
Bologna	Maria		DC_M5870	UCS	K.2.1
Bommer	Betsy		DC_M5484	UCS	K.2.1
Bonasera	Michael		DC_M0434		K.2.1
Bonaventure	Debbie		DC_M4450	UCS	K.2.1
Bond	Julie		DC_M5398	UCS	K.2.1
Bond	RD		DC_M1407	UCS	K.2.1
Boneck	Tamara		DC_M0357		K.2.1
Boniske	Nathan		DC_M2787	UCS	K.2.1
Bonk	Marliese		DC_M0946	UCS	K.2.1
Bonner	Francis		DC_M7128	UCS	K.2.1
Bonner	V. John		DC_M0680		K.2.1
Bonner	V. John		DC_M4816	UCS	K.2.1
Bonomo	Dan		DC_M6471	UCS	K.2.1
Bookidis	Paul		DC_M1481	UCS	K.2.1
Books	Jennifer		DC_M5258	UCS	K.2.1
Boone	Rodney		DC_M5713	UCS	K.2.1
Boorn	T		DC_M5038	UCS	K.2.1
Booth	Elaine		DC_M4624	UCS	K.2.1
Booth	James		DC_M3434	UCS	K.2.1
Borden	Gina Maslow		DC_M6918	UCS	K.2.1
Bordenave	M		DC_M4761	UCS	K.2.1
Borelli	Elizabeth		DC_M4914	UCS	K.2.1
Borg	Donald		DC_M3971	UCS	K.2.1
Borgo	Rob		DC_M6262	UCS	K.2.1
Born	Meredith		DC_M6547	UCS	K.2.1
Bornemann	Michael		DC_M1994	UCS	K.2.1
Borovski	Conrad		DC_M1052	UCS	K.2.1
Borrowman	Ellen		DC_M5731	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Borske	Cindy		DC_M0228		K.2.1
Bortner	Jim		DC_M1408	UCS	K.2.1
Boruck	Holly		DC_M5684	UCS	K.2.1
Borum	E		DC_M7610	UCS	K.2.1
Bosbach	Crystal		DC_M6403	UCS	K.2.1
Bosch	Ronald		DC_E0011		K.3.11, K.3.12, K.3.13
Boschert	Carol		DC_E0287		K.2.2
Bosco	Joanne		DC_M7466	UCS	K.2.1
Bostic	Marie		DC_E0218		K.2.2
Boswell	Julie		DC_M6813	UCS	K.2.1
Botani	BZ		DC_M6392	UCS	K.2.1
Bote	Maryl		DC_M2457	UCS	K.2.1
Bott	Terry		DC_M4389	UCS	K.2.1
Bottesch	Marnie		DC_M2755	UCS	K.2.1
Bottner	Rob		DC_M7658	UCS	K.2.1
Botto	Tancredi		DC_M7513	UCS	K.2.1
Bottomly	Lewis		DC_M6610	UCS	K.2.1
Botwinick	Joan		DC_M0042		K.3.1, K.3.2, K.3.3, K.3.6, K.3.7, K.3.10, K.3.13, K.3.15
Bouajila	Christina		DC_M6058	UCS	K.2.1
Boucher	Fred		DC_M4430	UCS	K.2.1
Boucher	Micheal		DC_M2937	UCS	K.2.1
Boudin	Rachel		DC_M0760		K.2.1
Boughan	Tom		DC_M3895	UCS	K.2.1
Boule	Michael		DC_M5296	UCS	K.2.1
Bourne	Marcia		DC_M4018	UCS	K.2.1
Bowen	Neal		DC_M0485		K.2.1
Bowers	James		DC_M1822	UCS	K.2.1
Bowers-Janowicz	Seneca		DC_M6982	UCS	K.2.1
Bowling-Schaff	Kristin		DC_M7907		K.2.1
Bowlus	Mark		DC_M2729	UCS	K.2.1
Bowman	Katherine		DC_M7648	UCS	K.2.1
Bowman	Kenneth		DC_M1113	UCS	K.2.1
Bowman	Margaret M.		DC_M0932	UCS	K.2.1
Bowman	Nan Singh		DC_M4843	UCS	K.2.1
Boyce	Eric		DC_M2247	UCS	K.2.1
Boyd	Christin		DC_M5064	UCS	K.2.1
Boyd	Kathleen		DC_M7741		K.2.1
Boye	Barbara		DC_M3209	UCS	K.2.1
Boyle	Mary		DC_M3018	UCS	K.2.1
Boyle	Mary		DC_M4279	UCS	K.2.1
Boyle	Roxanne		DC_M5187	UCS	K.2.1
Boyle	Tamara		DC_M5082	UCS	K.2.1
Boyles	Glenn		DC_M5853	UCS	K.2.1
Boyne	Hal		DC_M1117	UCS	K.2.1
Boynton	Lisa		DC_M1697	UCS	K.2.1
Bracamonte	Sam		DC_M7217	UCS	K.2.1
Brace	Conor		DC_M2091	UCS	K.2.1
Bradburn	Steve	Sarah Bradburn	DC_M6504	UCS	K.2.1
Bradley	Kit		DC_M1953	UCS	K.2.1
Bradley	Priscilla		DC_M7085	UCS	K.2.1
Bradshaw	Mary		DC_M3772	UCS	K.2.1
Bradus	Richard		DC_M5379	UCS	K.2.1
Brady	Clare		DC_M5004	UCS	K.2.1
Brady	Matthew		DC_M2264	UCS	K.2.1
Brady	Matthew		DC_M2593	UCS	K.2.1
Brady	Sarah		DC_M1071	UCS	K.2.1
Bragga	Elisa		DC_M3343	UCS	K.2.1
Bragonier	Emily		DC_M5676	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Brainard II	Edward		DC_M2212	UCS	K.2.1
Brainerd	Lee		DC_M5603	UCS	K.2.1
Bralek	Rebecca		DC_M2429	UCS	K.2.1
Bramscher	Paul		DC_M3813	UCS	K.2.1
Branagan	Laura		DC_M0352		K.2.1
Branch	Katey		DC_E0042		K.2.2
Branch	Steven		DC_M0512		K.2.1
Brandariz	Anita		DC_M0679		K.2.1
Brandhorst	Kurt		DC_M2946	UCS	K.2.1
Brandt	Bruce		DC_M1099	UCS	K.2.1
Brandt	Jerri		DC_M6967	UCS	K.2.1
Brandy	Rebecca		DC_M3752	UCS	K.2.1
Brandy	Thomas		DC_M4281	UCS	K.2.1
Branham	Barbara		DC_M1873	UCS	K.2.1
Branham	Julia		DC_M3972	UCS	K.2.1
Brantlinger	Patrick		DC_M5074	UCS	K.2.1
Brantmeier	Tom		DC_M1529	UCS	K.2.1
Brasaemle	Joan		DC_M1869	UCS	K.2.1
Braverman	Michael		DC_M1536	UCS	K.2.1
Bray	Patricia		DC_M5619	UCS	K.2.1
Brazis	Chris		DC_M7349	UCS	K.2.1
Brecher	Aviva		DC_M2000	UCS	K.2.1
Breen	Salley		DC_E0196		K.2.2
Breen	Sally		DC_E0016		K.3.3, K.3.6, K.3.7, K.3.11, K.3.12, K.3.15
Breeze	Jeannie		DC_M6363	UCS	K.2.1
Breeze	Tim		DC_M0802	UCS	K.2.1
Brehm	Kristy		DC_M1245	UCS	K.2.1
Breiby	Wendy		DC_M5361	UCS	K.2.1
Breitbart	Todd		DC_M4063	UCS	K.2.1
Bremer	Naomi		DC_M7469	UCS	K.2.1
Bremner	Steven		DC_M6533	UCS	K.2.1
Brennan	Holley		DC_M0461		K.2.1
Brennan	Mary		DC_M5466	UCS	K.2.1
Brennan	Sherman		DC_M3774	UCS	K.2.1
Brenneisen	Scott		DC_M6735	UCS	K.2.1
Brenner	Deborah		DC_M6998	UCS	K.2.1
Brenner	Esther		DC_M7063	UCS	K.2.1
Brenner	Lisa		DC_M5999	UCS	K.2.1
Brenner	Natasha	Noah Brenner	DC_M7473	UCS	K.2.1
Brennis	Robert		DC_M5339	UCS	K.2.1
Brentjens	Vero		DC_M6599	UCS	K.2.1
Brenton	Petricia		DC_M5382	UCS	K.2.1
Breslin-Romano	Danielle		DC_E0028		K.3.9
Breuninger	Maria		DC_M1016	UCS	K.2.1
Breuninger	Maria		DC_M6703	UCS	K.2.1
Brewer	Alex		DC_M0621		K.2.1
Brewer	Jeannine		DC_M4977	UCS	K.2.1
Brewster	Emily		DC_M5000	UCS	K.2.1
Brewwer	George		DC_M7925		K.3.2, K.3.7, K.3.10, K.3.13, K.3.15
Brickell	Arthur		DC_M0338		K.2.1
Brill	Scott		DC_M3721	UCS	K.2.1
Brillon	Maurice		DC_M4921	UCS	K.2.1
Brindel	Carrie		DC_M7419	UCS	K.2.1
Briney	Michael		DC_M7948		K.3.1, K.3.2, K.3.3, K.3.4, K.3.5, K.3.7, K.3.10, K.3.11, K.3.13, K.3.14, K.3.15
Brinkmeyer	Linda		DC_M7719		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Brissette	Peggy		DC_M2822	UCS	K.2.1
Britfeld	K		DC_M2271	UCS	K.2.1
Brito	Ana		DC_M0678		K.2.1
Brito	Ana		DC_M2491	UCS	K.2.1
Brittain	Susan		DC_M3084	UCS	K.2.1
Britton	Joanne		DC_M1267	UCS	K.2.1
Britton	William		DC_M4745	UCS	K.2.1
Broadbent	Catherine		DC_M1807	UCS	K.2.1
Broadbent	Jerry		DC_M2497	UCS	K.2.1
Broberg	Paul		DC_M0072		K.2.1
Brock	Suzanne		DC_M5431	UCS	K.2.1
Brockway	Christi Michelle		DC_M0825	UCS	K.2.1
Brodbar	Barbara		DC_M0012		K.3.3, K.3.7, K.3.13
Broderick	Alfa		DC_M6246	UCS	K.2.1
Brofman	Peter		DC_M6378	UCS	K.2.1
Brogan	Loretta		DC_M7167	UCS	K.2.1
Bromer	John		DC_M6044	UCS	K.2.1
Bronk	James		DC_M4626	UCS	K.2.1
Brooker	Mark		DC_M6598	UCS	K.2.1
Brookes	S.C.		DC_M3717	UCS	K.2.1
Brookner	Jacalyn		DC_M2862	UCS	K.2.1
Brooks	Allen		DC_M7515	UCS	K.2.1
Brooks	Frank		DC_M5994	UCS	K.2.1
Brooks	Jo M		DC_M1149	UCS	K.2.1
Brooks	Sky		DC_M6308	UCS	K.2.1
Brooks			DC_M7304	UCS	K.2.1
Brosen	Alexis		DC_M2811	UCS	K.2.1
Brostrom	Elaine		DC_M6059	UCS	K.2.1
Brotherton	Anne		DC_E0233		K.3.1, K.4
Brown	Ann		DC_M5019	UCS	K.2.1
Brown	Bob		DC_M0110		K.2.1
Brown	Bonnie		DC_M0632		K.2.1
Brown	Bonnie		DC_M1756	UCS	K.2.1
Brown	Carol		DC_M0177		K.3.14
Brown	Diane		DC_M0719		K.2.1
Brown	Diane		DC_M7718		K.2.1
Brown	Elizabeth		DC_M0048		K.2.2
Brown	Ken		DC_M2591	UCS	K.2.1
Brown	Ken		DC_M7394	UCS	K.2.1
Brown	Kevin		DC_M4191	UCS	K.2.1
Brown	Kevin		DC_M6071	UCS	K.2.1
Brown	Kimberly		DC_M7938		K.3.2, K.3.3
Brown	Leila		DC_E0420		K.2.2
Brown	Linda K.		DC_M3924	UCS	K.2.1
Brown	Linda M.		DC_M1569	UCS	K.2.1
Brown	Mary	Ed Rutherford	DC_M0500		K.2.1
Brown	Myrna		DC_M5302	UCS	K.2.1
Brown	Patria		DC_M6865	UCS	K.2.1
Brown	Renate		DC_M2231	UCS	K.2.1
Brown	Ronald		DC_M3540	UCS	K.2.1
Brown	Ronald E.		DC_M1937	UCS	K.2.1
Brown	Sandra		DC_M1784	UCS	K.2.1
Brown	Sharon		DC_M7810		K.2.1
Brown	Timothy		DC_M6219	UCS	K.2.1
Brown	Wendy		DC_M1741	UCS	K.2.1
Brown	Wendy		DC_M7899		K.2.3
Brown	Wolstan		DC_M2098	UCS	K.2.1
Brown	Niyati		DC_M4532	UCS	K.2.1
Brown	V.K.		DC_M4950	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Browne	RJ		DC_M2064	UCS	K.2.1
Browning	Mary		DC_M6139	UCS	K.2.1
Brownlee	Victoria		DC_M5736	UCS	K.2.1
Brown-Nolan	Virginia		DC_M0449		K.2.1
Brown-Nolan	Virginia		DC_M7235	UCS	K.2.1
Brown-Roth	Georgean		DC_M4432	UCS	K.2.1
Brownscombe	Robert		DC_M3526	UCS	K.2.1
Brownstein	Shale		DC_M4860	UCS	K.2.1
Bruce	Leslie		DC_M3508	UCS	K.2.1
Bruce-Munro	Jane		DC_M4239	UCS	K.2.1
Bruell	Marc J		DC_M0702		K.2.1
Bruml	Bill		DC_M7848		K.2.3
Brumm	Margaret		DC_M2255	UCS	K.2.1
Brumson	April		DC_M4506	UCS	K.2.1
Bruner	David		DC_M1966	UCS	K.2.1
Bruner	Scott M.		DC_M4471	UCS	K.2.1
Bruno	David		DC_M1180	UCS	K.2.1
Brunson	Dr. Kathryn		DC_M1709	UCS	K.2.1
Brussel	Morton		DC_E0092	Professor emeritus of physics, UIUC	K.3.1, K.3.2, K.3.4, K.3.10, K.3.13, K.3.14
Brust	Amy		DC_M1971	UCS	K.2.1
Bruton	Harry		DC_M6588	UCS	K.2.1
Brutscher	David		DC_M3676	UCS	K.2.1
Bryan	Melissa		DC_M1062	UCS	K.2.1
Bryant	Anne		DC_M0737		K.2.1
Bryant	Ben		DC_M4130	UCS	K.2.1
Bryant	Billy	Loretta Bryant	DC_M6887	UCS	K.2.1
Bryant	Jay		DC_M3079	UCS	K.2.1
Bryant	Lori		DC_M5273	UCS	K.2.1
Bryant	Lori		DC_M5439	UCS	K.2.1
Bryce	Carol		DC_M7407	UCS	K.2.1
Brzeczek	Amy		DC_M2227	UCS	K.2.1
Bubala	Lou		DC_M1253	UCS	K.2.1
Bubsey	Julian		DC_M3623	UCS	K.2.1
Bucci	Doreen		DC_M5168	UCS	K.2.1
Buch	Sandra		DC_M7215	UCS	K.2.1
Buchan	Kara		DC_M1413	UCS	K.2.1
Buchen	Tony		DC_M2519	UCS	K.2.1
Buchholz	Myron		DC_M3757	UCS	K.2.1
Bucki	John		DC_M4381	UCS	K.2.1
Bucki	John		DC_M5221	UCS	K.2.1
Buckles	Ron		DC_M5107	UCS	K.2.1
Buckley	Barbara		DC_M1737	UCS	K.2.1
Buckley	Laura		DC_M6311	UCS	K.2.1
Buckner	Janice		DC_M2884	UCS	K.2.1
Buckner	Robert		DC_M1346	UCS	K.2.1
Buddenbaum	Bethann		DC_M4110	UCS	K.2.1
Budding	Kelley		DC_M5216	UCS	K.2.1
Buechler	Paul		DC_M2635	UCS	K.2.1
Bugay	John		DC_M6761	UCS	K.2.1
Bugliarelli	Diane		DC_M7372	UCS	K.2.1
Buhr	Gene	Kathleen Ferrerborn, Cindy David, Freline Morelez, Belen Stanley	DC_M0272	St. Joseph Church	K.2.1
Buikema	Janine		DC_M1948	UCS	K.2.1
Bukoski	Stacy		DC_M0894	UCS	K.2.1
Bullock	Erin		DC_M6119	UCS	K.2.1
Bulter	Nora		DC_M6914	UCS	K.2.1
Bunch	Christopher		DC_M2734	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Bunch	Terry		DC_M6040	UCS	K.2.1
Bunkin	Scott		DC_M6945	UCS	K.2.1
Burch	Candace		DC_M7679	UCS	K.2.1
Burch	Julia		DC_M7295	UCS	K.2.1
Burde	James		DC_M0586		K.2.1
Burdge	Nancy		DC_M4397	UCS	K.2.1
Burge	Margaret Rose		DC_M0901	UCS	K.2.1
Burgess	Bonnie		DC_M3207	UCS	K.2.1
Burgess	Christine		DC_E0067		K.2.2
Burgett	Jessica		DC_M2031	UCS	K.2.1
Burke	Bonnie		DC_M7000	UCS	K.2.1
Burke	Dan		DC_M4368	UCS	K.2.1
Burke	Mark		DC_M0481		K.2.1
Burke	P.A.		DC_M6755	UCS	K.2.1
Burke	William		DC_M3168	UCS	K.2.1
Burkhart	David		DC_M4733	UCS	K.2.1
Burks	Bill		DC_M5643	UCS	K.2.1
Burks	Paul		DC_M2077	UCS	K.2.1
Burks	Paul		DC_M4394	UCS	K.2.1
Burks	Susan		DC_M2104	UCS	K.2.1
Burman	Karen		DC_M6508	UCS	K.2.1
Burnet	Marie		DC_M4740	UCS	K.2.1
Burnett	Barbara N.		DC_M3966	UCS	K.2.1
Burnett	Caryl F.		DC_M4374	UCS	K.2.1
Burnett	Joel		DC_M1461	UCS	K.2.1
Burnett	Lynda		DC_M6180	UCS	K.2.1
Burnianek	Linda		DC_M7835		K.2.1
Burns	Bridgit		DC_M7124	UCS	K.2.1
Burns	Catherine		DC_M7039	UCS	K.2.1
Burns	D		DC_M5625	UCS	K.2.1
Burns	Dana		DC_M2262	UCS	K.2.1
Burns	John		DC_M1305	UCS	K.2.1
Burns	R. Micheal		DC_M2218	UCS	K.2.1
Burns	Rikhael		DC_M5556	UCS	K.2.1
Burnside	Ellen		DC_M4149	UCS	K.2.1
Burnside	Sylvia		DC_M4848	UCS	K.2.1
Burr	Lucinda		DC_M4357	UCS	K.2.1
Burris	Judy		DC_M5529	UCS	K.2.1
Burroughs	Rain		DC_M7098	UCS	K.2.1
Burrow	Jack		DC_M0145		K.2.1
Burrow	Jack Robert		DC_M0125		K.2.1
Burrow	Kim		DC_M5442	UCS	K.2.1
Burrows	Robert		DC_M3776	UCS	K.2.1
Burton	Linda		DC_M5515	UCS	K.2.1
Busan	DB		DC_M7455	UCS	K.2.1
Busch	David		DC_M1580	UCS	K.2.1
Busch	Nancy		DC_M4708	UCS	K.2.1
Buselmeier	Robert		DC_M3074	UCS	K.2.1
Bushnell	Martha		DC_M6891	UCS	K.2.1
Businger	J.A.		DC_M0961	UCS	K.2.1
Butch	Lisa		DC_M1956	UCS	K.2.1
Butcher	Audrey		DC_M5167	UCS	K.2.1
Butler	Clay		DC_M5417	UCS	K.2.1
Butler	Doug		DC_M2380	UCS	K.2.1
Butler	John		DC_M0491		K.2.1
Butler	John		DC_M3626	UCS	K.2.1
Butler	John		DC_M4277	UCS	K.2.1
Butler	Ron		DC_M5675	UCS	K.2.1
Butler	Thomas		DC_M7086	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Buttel	Helen	Robert Buttel	DC_M6081	UCS	K.2.1
Butterfield	Lisa		DC_M5604	UCS	K.2.1
Butterworth	Chaula		DC_M4139	UCS	K.2.1
Buttner	Charlene		DC_M2347	UCS	K.2.1
Buttrey	L.		DC_M7338	UCS	K.2.1
Butts	Debbie		DC_M5986	UCS	K.2.1
Butz	Nathan		DC_M5846	UCS	K.2.1
Buzil	Devorah		DC_M4056	UCS	K.2.1
Buzz	M.		DC_M1629	UCS	K.2.1
Byington	Tammie		DC_M5627	UCS	K.2.1
Byrd	Barbara		DC_M2060	UCS	K.2.1
Byrdkatz			DC_M5049	UCS	K.2.1
Byrne	Margo		DC_M6655	UCS	K.2.1
Byrum	Patrick		DC_M3502	UCS	K.2.1
C.	E.		DC_M6748	UCS	K.2.1
Cabrera	John		DC_M2011	UCS	K.2.1
Cabrera	Magdalena		DC_M4937	UCS	K.2.1
Cadieux	Gregory		DC_M2859	UCS	K.2.1
Cadora	Eric		DC_M2343	UCS	K.2.1
Cady	Beth		DC_M3600	UCS	K.2.1
Caffrey	Frank		DC_M3762	UCS	K.2.1
Cagney	Tim		DC_M2915	UCS	K.2.1
Cahn	Alma		DC_M3467	UCS	K.2.1
Cahoon	Ruth		DC_M3880	UCS	K.2.1
Cain	Art		DC_M3371	UCS	K.2.1
Calabria	Antonio		DC_M0629		K.2.1
Calabria	Antonio		DC_M4089	UCS	K.2.1
Calabria	Antonio		DC_M4096	UCS	K.2.1
Calderon	Sheila		DC_M7514	UCS	K.2.1
Caldwell	Kathryn		DC_M4556	UCS	K.2.1
Caldwell	Mary Ellen		DC_E0302		K.2.2
Calhoum	Mary Laura		DC_M7479	UCS	K.2.1
Cali	Lee		DC_M6176	UCS	K.2.1
Calkins	Allegra		DC_M6432	UCS	K.2.1
Callaway	Mary		DC_M6104	UCS	K.2.1
Callazo	Jamie		DC_M3691	UCS	K.2.1
Callbeck	Helen		DC_M5763	UCS	K.2.1
Calos	Matt		DC_M3965	UCS	K.2.1
Calswell	Ellen		DC_M2888	UCS	K.2.1
Calvillo	Lucy		DC_M3755	UCS	K.2.1
Camenzind	Carl		DC_M0707		K.2.1
Camhi	Lynn		DC_M5067	UCS	K.2.1
Camillieri	Cynthia		DC_M0793	UCS	K.2.1
Camp	Brian		DC_M7314	UCS	K.2.1
Campbell	Carol		DC_M1318	UCS	K.2.1
Campbell	Cindy		DC_M6591	UCS	K.2.1
Campbell	Connie		DC_M1659	UCS	K.2.1
Campbell	D.J		DC_M0293		K.3.1, K.3.7
Campbell	Deborah		DC_M1777	UCS	K.2.1
Campbell	Deborah		DC_M2608	UCS	K.2.1
Campbell	James		DC_M2776	UCS	K.2.1
Campbell	Julie A.		DC_M1799	UCS	K.2.1
Campbell	Louis		DC_M0161	Union of Concerned Scientists	K.3.1, K.3.2, K.3.10, K.3.12, K.3.13, K.3.14, K.4
Campbell	Patricia		DC_M5388	UCS	K.2.1
Campbell	Richard		DC_M2062	UCS	K.2.1
Campbell	Scott		DC_E0040		K.3.2, K.3.4, K.3.7, K.3.12, K.3.15
Campbell	Therese		DC_M4999	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Canady	Larkellen		DC_M7269	UCS	K.2.1
Cannata	Amy		DC_M3270	UCS	K.2.1
Cannella	Joe		DC_M2805	UCS	K.2.1
Cannon	Frank		DC_M5765	UCS	K.2.1
Cannon	Peggy		DC_M2781	UCS	K.2.1
Cape	John		DC_M4399	UCS	K.2.1
Capece	Paula		DC_M6519	UCS	K.2.1
Capers	Robert		DC_M3519	UCS	K.2.1
Capezzuto	Valerie		DC_M2533	UCS	K.2.1
Capozzelli	J.		DC_M0033		K.2.1
Capozzelli	J.		DC_M0788	UCS	K.2.1
Capozzelli	J.		DC_M3494	UCS	K.2.1
Capozzelli	Rose		DC_M1432	UCS	K.2.1
Cappelletti	Nancy		DC_M2240	UCS	K.2.1
Caputo	Scott		DC_M3051	UCS	K.2.1
Carabine	John		DC_M7289	UCS	K.2.1
Cardell	Mona		DC_M6461	UCS	K.2.1
Carden	Helga		DC_M1006	UCS	K.2.1
Cardinal	Enid		DC_M2475	UCS	K.2.1
Cardwell	Zachariah		DC_M1878	UCS	K.2.1
Carey	John	Cathy O'Leary	DC_M0261		K.3.14
Cariou	Raphael		DC_M6279	UCS	K.2.1
Carl	Philip		DC_M0685		K.2.1
Carleton	Clovis		DC_M5860	UCS	K.2.1
Carlino	Doris		DC_M4466	UCS	K.2.1
Carlisle	Marilyn		DC_M0082		K.2.1
Carlson	Benjamin		DC_M2507	UCS	K.2.1
Carlson	Cathleen		DC_M0728		K.2.1
Carlson	Cathleen A.		DC_M4180	UCS	K.2.1
Carlson	Karin J.		DC_M0199		K.2.1
Carmack	Darryl		DC_M4947	UCS	K.2.1
Carman	Margery		DC_M1194	UCS	K.2.1
Carneal	Pat		DC_M5265	UCS	K.2.1
Carnicom	Lisa		DC_M1974	UCS	K.2.1
Carol	Yost		DC_M1011	UCS	K.2.1
Carpenter	Ann		DC_M0083		K.2.1
Carpenter	Linda		DC_M7080	UCS	K.2.1
Carpenter	Maxine		DC_E0220		K.3.10, K.3.11, K.3.12
Carpenter	Phillip		DC_M0941	UCS	K.2.1
Carpenter	Wayne L		DC_M3221	UCS	K.2.1
Carr	Barbara		DC_M1890	UCS	K.2.1
Carr	David		DC_M6594	UCS	K.2.1
Carr	Gaile		DC_M0911	UCS	K.2.1
Carr	James V		DC_M2719	UCS	K.2.1
Carr	Laurie		DC_M6602	UCS	K.2.1
Carr	Sherry		DC_M5990	UCS	K.2.1
Carrello	Julio		DC_M0880	UCS	K.2.1
Carroll	Brad		DC_M7706		K.2.1
Carroll	David		DC_M6716	UCS	K.2.1
Carroll	Glen L.		DC_M4964	UCS	K.2.1
Carroll	Mike		DC_M3093	UCS	K.2.1
Carrow	Steve		DC_M7926		K.3.7, K.3.10, K.3.13, K.3.15
Carrubba	Sandra J.		DC_M0457		K.2.1
Carsten	Barbara		DC_M2760	UCS	K.2.1
Carter	Amanda		DC_M3839	UCS	K.2.1
Carter	Cindy		DC_M4614	UCS	K.2.1
Carter	Frances		DC_M5665	UCS	K.2.1
Carter	Jenny	Francis X. Finigan	DC_E0208		K.3.3, K.3.11, K.3.15
Carter	Joni		DC_M6459	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Carter	Judith		DC_M7168	UCS	K.2.1
Carter	Julie B.		DC_M7329	UCS	K.2.1
Carter	Margaret		DC_M0152		K.3.14
Carter	Rand		DC_M1705	UCS	K.2.1
Cartney	Larry		DC_M4989	UCS	K.2.1
Cartwright	Barbara		DC_M0274		K.3.2, K.3.3, K.3.12, K.4
Caruso	Stephen & Connie		DC_M3306	UCS	K.2.1
Carvell	Tracy		DC_M4254	UCS	K.2.1
Carver	Alexandra		DC_M4289	UCS	K.2.1
Carver	Calvin		DC_M1358	UCS	K.2.1
Casanova	Ursula		DC_M4382	UCS	K.2.1
Casey	Echo		DC_M2521	UCS	K.2.1
Casey	Julia		DC_M7838		K.2.1
Cashner	Frances		DC_M5025	UCS	K.2.1
Caso	Mark		DC_M1372	UCS	K.2.1
Cason	Cynthia		DC_M5659	UCS	K.2.1
Cason	Sherol		DC_M6129	UCS	K.2.1
Casper	Christine		DC_M2731	UCS	K.2.1
Cassidey	Lewis		DC_M2040	UCS	K.2.1
Cassidy	Doris		DC_M6633	UCS	K.2.1
Cassini	Carol		DC_M0327		K.2.1
Cassity	Janet		DC_M3853	UCS	K.2.1
Castillo	Andrew		DC_M3035	UCS	K.2.1
Castle	Elenor		DC_M5262	UCS	K.2.1
Castor	Rachel		DC_M0217		K.2.1
Cathcart	Mary		DC_M4026	UCS	K.2.1
Caton	Barney		DC_M1750	UCS	K.2.1
Catrambone	Natalie		DC_M3934	UCS	K.2.1
Caturegli	Kathryn		DC_M2435	UCS	K.2.1
Caulfield	Sunshine A		DC_M7052	UCS	K.2.1
Caulum	Bob		DC_M2007	UCS	K.2.1
Cavallero	Dana		DC_M7021	UCS	K.2.1
Cavanaugh	Peggy		DC_M2443	UCS	K.2.1
Cave	Brendan		DC_M4943	UCS	K.2.1
Caverhill	Brennan		DC_E0177		K.2.2
Caves	Mary g.		DC_M1707	UCS	K.2.1
Cegielski	Peter		DC_M3363	UCS	K.2.1
Cerello	Robert		DC_M7917		K.2.3
Cerkoney	Jim		DC_M5689	UCS	K.2.1
Cerkowski	Michael		DC_M4768	UCS	K.2.1
Cernohlavek	Leemer G.		DC_M1161	UCS	K.2.1
Cerruti	Kathleen		DC_M5224	UCS	K.2.1
Cerullo	Nancy		DC_M6181	UCS	K.2.1
Cervin	Nichole		DC_M0996	UCS	K.2.1
Cessaro	J Paul		DC_M7420	UCS	K.2.1
Cevasco	John		DC_M3461	UCS	K.2.1
Chadbourne	Jill		DC_M4928	UCS	K.2.1
Chaifetz	Jill		DC_M6915	UCS	K.2.1
Chamberlynn	Alexia		DC_M1401	UCS	K.2.1
Chambers	Angy		DC_O0002	Environmental Impact Analysis Process (EIAP) Working Group (45 CES/CEV)	K.4
Chambers	J		DC_M2214	UCS	K.2.1
Chambers	Kate		DC_M2516	UCS	K.2.1
Chambers	Nathaniel		DC_M4479	UCS	K.2.1
Champagne	Donald		DC_M2014	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Champagne	Jenette		DC_M1155	UCS	K.2.1
Champion	Willie L.		DC_M7880		K.2.1
Champlin	Kit		DC_M0438		K.2.1
Chan	Sonja	Wallace Chan	DC_M5520	UCS	K.2.1
Chandler	Philip		DC_M7492	UCS	K.2.1
Chaney	Trish		DC_M4123	UCS	K.2.1
Chang	John		DC_M1277	UCS	K.2.1
Chantaramungkorn	Orakarn		DC_M6861	UCS	K.2.1
Chapanis	Roger		DC_M4142	UCS	K.2.1
Chapin	Kristi		DC_M4437	UCS	K.2.1
Chapli	Christine		DC_M6047	UCS	K.2.1
Chapman	Douglas		DC_M3160	UCS	K.2.1
Chapman	Mary		DC_M6844	UCS	K.2.1
Chapman	Robert		DC_M6620	UCS	K.2.1
Chappell	David W.		DC_M7633	UCS	K.2.1
Chappell	Donna		DC_M7196	UCS	K.2.1
Chapunoff	Alex		DC_M7894		K.2.3
Charters	Gilly		DC_E0080		K.3.4, K.3.7, K.3.11
Chary	Kaatz		DC_M6015	UCS	K.2.1
Chase	Martha		DC_M6996	UCS	K.2.1
Chase	Michael		DC_M1829	UCS	K.2.1
Chase	Tim		DC_M7040	UCS	K.2.1
Chatman	Faye		DC_M0763		K.2.1
Chattopadhyay	Rita		DC_M2555	UCS	K.2.1
Chavez-Rock	Barbara		DC_M3244	UCS	K.2.1
Chavoya	Florence		DC_M4725	UCS	K.2.1
Chay	Elysse		DC_M7055	UCS	K.2.1
Chen	Cliff		DC_M7573	UCS	K.2.1
Cheng	Mary		DC_E0243		K.2.2
Cherin	Marise		DC_M7226	UCS	K.2.1
Chernushin	Mary		DC_M6124	UCS	K.2.1
Chesebro	Michelle		DC_M5237	UCS	K.2.1
Chesek	Frank		DC_M0174		K.2.1
Chess	Deborah		DC_M5231	UCS	K.2.1
Chess	Katherine		DC_M4542	UCS	K.2.1
Cheyne	Jennifer		DC_M1525	UCS	K.2.1
Chianese	George		DC_M5911	UCS	K.2.1
Chibucos	Marcus		DC_M3236	UCS	K.2.1
Chifari	Jerry		DC_M0435		K.2.1
Child	Marilyn		DC_M7355	UCS	K.2.1
Childers	Barry		DC_E0085		K.3.2, K.3.3
Childress	Janet		DC_M4711	UCS	K.2.1
Chilton	Harrison		DC_M7731		K.2.1
Chin	Marilyn		DC_M6172	UCS	K.2.1
Chischilly	Jane		DC_M2583	UCS	K.2.1
Chisholm	Calum		DC_M0645		K.2.1
Chism	Stephen		DC_M2434	UCS	K.2.1
Chisolm	Ann		DC_M1066	UCS	K.2.1
Chitty	Wendy		DC_M3414	UCS	K.2.1
Chivers	Carol		DC_M3836	UCS	K.2.1
Chmieleski	Marian		DC_M3296	UCS	K.2.1
Choi	Irene		DC_M1276	UCS	K.2.1
Cholewa	Mitch		DC_M6063	UCS	K.2.1
Cholmar	Eve		DC_M2823	UCS	K.2.1
Cholson	Kirsti		DC_E0250		K.2.2
Chomat	Catherine		DC_M7111	UCS	K.2.1
Choplin	Diane		DC_M4193	UCS	K.2.1
Chou	Ya-Nan		DC_M1370	UCS	K.2.1
Chowdhury	Hamid		DC_M4137	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Christensen	Andrea		DC_M6789	UCS	K.2.1
Christensen-Burgess	Kevin	Tracy Christensen-Burgess	DC_M0092		K.2.1
Christiansen	David		DC_M3936	UCS	K.2.1
Christie	Paul		DC_M7499	UCS	K.2.1
Christie	Ruth		DC_E0047		K.3.1, K.3.2, K.3.12
Christman	Glenn		DC_M5090	UCS	K.2.1
Christopher	Bruce		DC_M3715	UCS	K.2.1
Christy	Alan		DC_M2093	UCS	K.2.1
Christy	Eileen		DC_M5823	UCS	K.2.1
Chu	Jon		DC_M4687	UCS	K.2.1
Chung	Christine		DC_M4596	UCS	K.2.1
Chung	Jeffrey		DC_M4128	UCS	K.2.1
Churchman	Pat		DC_M5876	UCS	K.2.1
Chynoweth	George		DC_M2688	UCS	K.2.1
Ciaccio	Marie		DC_M7343	UCS	K.2.1
Ciarrocca	Joe		DC_E0190		K.3.1
Ciavarella	Theresa		DC_M6091	UCS	K.2.1
Ciernia	Suzanna		DC_M0279		K.3.14
Cimiluca	Philip		DC_M1351	UCS	K.2.1
Cimino	Charlotte		DC_M4112	UCS	K.2.1
Cipher	Melanie		DC_M3883	UCS	K.2.1
Cipher	Melanie		DC_M5901	UCS	K.2.1
Cislo	Todd		DC_M7769		K.2.1
Claire	Insley		DC_E0048		K.3.2, K.3.7, K.3.11, K.3.12, K.3.15
Clark	Abigail		DC_M4998	UCS	K.2.1
Clark	Barbara		DC_E0170		K.3.14
Clark	Barbara		DC_M1197	UCS	K.2.1
Clark	Brian		DC_M3662	UCS	K.2.1
Clark	Carol		DC_M0661		K.2.1
Clark	Cindy		DC_M2896	UCS	K.2.1
Clark	Colleen		DC_M5822	UCS	K.2.1
Clark	Diane M		DC_M2219	UCS	K.2.1
Clark	Ejay		DC_M4681	UCS	K.2.1
Clark	John		DC_M1839	UCS	K.2.1
Clark	Kathy		DC_M4084	UCS	K.2.1
Clark	Lois		DC_M1699	UCS	K.2.1
Clark	Martha		DC_M4127	UCS	K.2.1
Clark	Martina		DC_M4232	UCS	K.2.1
Clark	Merrill		DC_M3619	UCS	K.2.1
Clark	Pamela		DC_M0469		K.2.1
Clark	Peter		DC_E0351		K.2.2
Clark	Robert		DC_E0396		K.2.2
Clark	Roselle		DC_M4072	UCS	K.2.1
Clark	Stacy		DC_M2510	UCS	K.2.1
Clark	Stacy		DC_M2553	UCS	K.2.1
Clark	Stuart		DC_M0653		K.2.1
Clark	Stuart		DC_M6717	UCS	K.2.1
Clark	Theresa		DC_M6137	UCS	K.2.1
Clark	Tim		DC_M0345		K.2.1
Clay	Margaret		DC_M5146	UCS	K.2.1
Claycomb	William		DC_M7822		K.2.1
Claypool	Roberta		DC_M2695	UCS	K.2.1
Clayton	Gwen		DC_M4292	UCS	K.2.1
Cleary	Steve		DC_PHO0038	Alaska PIRG	K.3.2, K.3.3, K.3.4, K.3.10, K.3.12, K.3.13, K.4
Cleland	Carrie		DC_M7783		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Clemens	Sydney Gurewitz		DC_M1528	UCS	K.2.1
Clement	Joe		DC_M6349	UCS	K.2.1
Clement	Suzette		DC_M5348	UCS	K.2.1
Clements	Peter		DC_M7778		K.2.1
Cleminson	Ron		DC_M2382	UCS	K.2.1
Clemmer	Janet		DC_M7344	UCS	K.2.1
Clendenen	Jason		DC_E0106		K.2.3
Clifton	Brigitte		DC_M7002	UCS	K.2.1
Cline	Michael		DC_M1384	UCS	K.2.1
Cline	Sherry		DC_M6797	UCS	K.2.1
Clinton	Ed & Jessie		DC_M2437	UCS	K.2.1
Clissold	David		DC_M1254	UCS	K.2.1
Cloner	Matthew		DC_M2792	UCS	K.2.1
Cloninger	John		DC_M4236	UCS	K.2.1
Cloud	Jennifer		DC_M4978	UCS	K.2.1
Clowney	David		DC_M7713		K.2.1
Clymo	Jerry		DC_M7288	UCS	K.2.1
Cobb	Stephen		DC_M2124	UCS	K.2.1
Coble	James		DC_M1920	UCS	K.2.1
Coburn	Bruce		DC_M5057	UCS	K.2.1
Cochrane	Steph		DC_M2678	UCS	K.2.1
Cockerill	Joanne		DC_M7073	UCS	K.2.1
Cocuzza	Douglas J.		DC_M4155	UCS	K.2.1
Coddon	Karin		DC_M5752	UCS	K.2.1
Coe	John		DC_M1853	UCS	K.2.1
Coffee	David		DC_M2596	UCS	K.2.1
Coffey	Morgan		DC_M4748	UCS	K.2.1
Coffey	Richard		DC_M4298	UCS	K.2.1
Cogswell	James		DC_M7138	UCS	K.2.1
Cohen	Alexandra		DC_M6399	UCS	K.2.1
Cohen	Anayansi		DC_M2857	UCS	K.2.1
Cohen	Benita		DC_M6164	UCS	K.2.1
Cohen	Claire		DC_E0165		K.2.3
Cohen	Nayana		DC_M6951	UCS	K.2.1
Cohen	Peter		DC_E0326		K.3.1, K.3.2, K.3.3, K.3.10, K.3.11, K.3.13, K.3.14, K.3.15, K.4
Cohen	Rajal		DC_M4048	UCS	K.2.1
Cohen	Sam		DC_M2470	UCS	K.2.1
Cohen	Ted		DC_M7568	UCS	K.2.1
Cohen	Todd		DC_M4859	UCS	K.2.1
Cohn	Carola		DC_M7266	UCS	K.2.1
Coker	Jason		DC_M7426	UCS	K.2.1
Colangelo	Annapoorne		DC_M4417	UCS	K.2.1
Colangelo	Annapoorne		DC_M7566	UCS	K.2.1
Cole	Barbara		DC_M4287	UCS	K.2.1
Cole	Bennett	Gabby Anderman	DC_M0260		K.2.1
Cole	Bertram		DC_M3148	UCS	K.2.1
Cole	Denise M.		DC_M4080	UCS	K.2.1
Cole	Denise M.		DC_M4148	UCS	K.2.1
Cole	Marian J		DC_M5152	UCS	K.2.1
Cole	Denise M.		DC_M0662		K.2.1
Coleman	Blaine		DC_M5562	UCS	K.2.1
Coleman	Elma		DC_PHO0047		K.4
Coleman	J.B.		DC_M7626	UCS	K.2.1
Coleman	Lorrie		DC_M2988	UCS	K.2.1
Coleman	Lorrie		DC_M2989	UCS	K.2.1
Coleman	Megan		DC_M0403		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Coleman	Peter		DC_M3698	UCS	K.2.1
Coleman	Stacey		DC_M3065	UCS	K.2.1
Coley	Deborah		DC_M3193	UCS	K.2.1
Coliver	Susan		DC_M1758	UCS	K.2.1
Coljohn	Kim		DC_M4527	UCS	K.2.1
Coll	Karen		DC_M2362	UCS	K.2.1
Colledge	Jeffrey		DC_M6106	UCS	K.2.1
Colley	Stephen		DC_M0591		K.2.1
Collier	Claudine		DC_M7529	UCS	K.2.1
Collier	Keli'i		DC_PHO0055		K.3.1, K.3.15, K.4
Collings	Andrew		DC_M4903	UCS	K.2.1
Collins	Amy		DC_M6679	UCS	K.2.1
Collins	Joseph		DC_M3801	UCS	K.2.1
Collins	Peggy S.		DC_M7183	UCS	K.2.1
Colon	Wendy		DC_M0547		K.2.1
Combs	Dianne		DC_M2562	UCS	K.2.1
Combs	Donald		DC_M5524	UCS	K.2.1
Combs	William L.		DC_M3392	UCS	K.2.1
Come	Lee		DC_M3608	UCS	K.2.1
Comer	Michael		DC_PHO0031		K.3.6, K.3.10, K.3.14, K.3.15
Comeskey	John		DC_M0904	UCS	K.2.1
Commer	Linda		DC_M5588	UCS	K.2.1
Compinsky	Dorothy		DC_M0084		K.2.1
Compton	Travis		DC_M4045	UCS	K.2.1
Comstock	Jean		DC_M4847	UCS	K.2.1
Cone	Nelson		DC_E0073		K.3.1, K.3.7
Cone	Richard		DC_M4465	UCS	K.2.1
Conger	Jean		DC_M0098		K.2.1
Conkle	Susan		DC_M7148	UCS	K.2.1
Conley	Geri		DC_M1734	UCS	K.2.1
Conley	James		DC_M0861	UCS	K.2.1
Conley	Michael		DC_M1906	UCS	K.2.1
Conn	Craig C.		DC_M1931	UCS	K.2.1
Connolly	Alyssa		DC_M3321	UCS	K.2.1
Connolly	Patricia		DC_M1591	UCS	K.2.1
Connor	Thomas		DC_M3742	UCS	K.2.1
Connors	Kathryn S.		DC_M6538	UCS	K.2.1
Conover	Ben		DC_M4101	UCS	K.2.1
Conroy	Kathleen		DC_M5068	UCS	K.2.1
Conroy	Nora		DC_M2575	UCS	K.2.1
Conroy	Peggy		DC_M7805		K.2.1
Constans	Mary Ann		DC_M5357	UCS	K.2.1
Conway	Dean		DC_M0179		K.3.14
Conway	Lauren		DC_M1791	UCS	K.2.1
Cook	Dagen		DC_M6221	UCS	K.2.1
Cook	James		DC_M0229		K.3.10, K.3.13, K.3.14
Cook	Jonathan		DC_M3589	UCS	K.2.1
Cook	Laura		DC_M3771	UCS	K.2.1
Cook	Liz		DC_M6030	UCS	K.2.1
Cook	Martha		DC_M5373	UCS	K.2.1
Cook	Morgan		DC_M5185	UCS	K.2.1
Cook	Robin		DC_M7936		K.2.3
Cook	William		DC_M5403	UCS	K.2.1
Cook-Carlton	Libby		DC_M1767	UCS	K.2.1
Cooke	Janet		DC_M2291	UCS	K.2.1
Cookman	Dick		DC_M2428	UCS	K.2.1
Cooney	Erin		DC_M5962	UCS	K.2.1
Cooney	Margaret		DC_M5438	UCS	K.2.1
Coonrod	Linda		DC_M7555	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Coons	Joel		DC_M6881	UCS	K.2.1
Cooper	James		DC_M0713		K.2.1
Cooper	Kelly		DC_M4620	UCS	K.2.1
Cooper	Maggie L.		DC_M3629	UCS	K.2.1
Cooper	Maury		DC_M3123	UCS	K.2.1
Cooper	Michael		DC_M1686	UCS	K.2.1
Cooper	Neil		DC_M0930	UCS	K.2.1
Cooper	Peter M.		DC_M1678	UCS	K.2.1
Cooper	Sandy		DC_M7143	UCS	K.2.1
Cooperman	Marcia		DC_M5654	UCS	K.2.1
Coopersmith	Jonathan		DC_M7792		K.2.1
Cope	Marcia		DC_M4930	UCS	K.2.1
Copeland	Albert		DC_M4363	UCS	K.2.1
Copeland	Damon		DC_M5858	UCS	K.2.1
Copeland	Lisa		DC_M1185	UCS	K.2.1
Copeland	Lisa		DC_M1341	UCS	K.2.1
Copeland	Patrice		DC_M3707	UCS	K.2.1
Copenagle	Lily		DC_M0725		K.2.1
Copes	Ken		DC_M1410	UCS	K.2.1
Copestakes	Vesta		DC_M7857		K.2.1
Corbin	Laurie		DC_M6635	UCS	K.2.1
Corbin	Linda		DC_M3395	UCS	K.2.1
Cordeau	Stephanie		DC_M6039	UCS	K.2.1
Cordell	Harold		DC_M7298	UCS	K.2.1
Corder	Peggy		DC_M3784	UCS	K.2.1
Cordes	Emily		DC_M1976	UCS	K.2.1
Cordes	Donald		DC_M2981	UCS	K.2.1
Cordova	Sherry		DC_M6032	UCS	K.2.1
Corley	Camie Foster		DC_M1425	UCS	K.2.1
Cornelius	Erin		DC_M1711	UCS	K.2.1
Cornell	Elizabeth		DC_M3015	UCS	K.2.1
Cornell	Steve		DC_M5720	UCS	K.2.1
Cornett	Paul		DC_E0372		K.3.4, K.3.7, K.3.10, K.3.11, K.3.12, K.3.13, K.3.14, K.3.15
Cornish	Rachel		DC_M4962	UCS	K.2.1
Cornwell	Charles		DC_E0385		K.3.5, K.3.6, K.3.11, K.3.12
Coronis	Laurence		DC_M1116	UCS	K.2.1
Corr	John F		DC_M3250	UCS	K.2.1
Correll	Nancy		DC_M2147	UCS	K.2.1
Corson	James M.		DC_M1162	UCS	K.2.1
Cortez	Chelle		DC_M4767	UCS	K.2.1
Cortinas	Jenni		DC_M5512	UCS	K.2.1
Corwin	Colette		DC_M5661	UCS	K.2.1
Cory	Christine		DC_M0127		K.2.1
Cosgriff	Mark		DC_M0391		K.2.1
Cosgriff	Mark		DC_M5984	UCS	K.2.1
Cosio	Paula		DC_M7939		K.2.1
Cosson	Ann		DC_M3665	UCS	K.2.1
Costa	Demelza		DC_M7099	UCS	K.2.1
Costello	Linda		DC_M4178	UCS	K.2.1
Cote	Katherine		DC_M6893	UCS	K.2.1
Cotter	Joe		DC_M6157	UCS	K.2.1
Cotton	Julie		DC_M3228	UCS	K.2.1
Cottrell	Duncan		DC_E0153		K.3.2, K.3.14
Couch	Courtney		DC_M1558	UCS	K.2.1
Coughlin	Barbara		DC_M4129	UCS	K.2.1
Couitt	Suzanne		DC_M5006	UCS	K.2.1
Coumoutso	Jill		DC_M5411	UCS	K.2.1
Courtenay	David		DC_M5526	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Courter	Mathew Russell		DC_M1042	UCS	K.2.1
Courtney	John		DC_M4385	UCS	K.2.1
Cousins	Vera		DC_M3527	UCS	K.2.1
Coutant	D		DC_M3141	UCS	K.2.1
Coutts	Bob		DC_M3642	UCS	K.2.1
Covello	Suzanne		DC_M6632	UCS	K.2.1
Cover	Esther		DC_M7206	UCS	K.2.1
Cowan	Kelly		DC_M0810	UCS	K.2.1
Cowan	Marian		DC_E0215		K.2.2
Cowley	Mary T		DC_M2560	UCS	K.2.1
Cox	Carol T.		DC_M1714	UCS	K.2.1
Cox	Catherine		DC_M2174	UCS	K.2.1
Cox	Douglas		DC_E0181		K.3.2, K.3.3, K.3.10, K.3.11, K.3.13
Cox	Jerry		DC_M0758		K.2.1
Cox	Julie		DC_M5514	UCS	K.2.1
Cox	Lesley		DC_E0257		K.2.2
Cox	Marilyn		DC_M6206	UCS	K.2.1
Cox	Michele Lee		DC_M0108		K.2.1
Cox	Rosemary		DC_M1238	UCS	K.2.1
Coyle	Philip		DC_E0318		K.3.9
Coyle	Philip		DC_PHO0026		K.3.4, K.3.12, K.3.14, K.3.15, K.4
Crabbe	Deborah		DC_M4349	UCS	K.2.1
Cracchiolo	Daniel		DC_M6310	UCS	K.2.1
Crady	Carrie		DC_M4502	UCS	K.2.1
Cragg	Noel		DC_M7408	UCS	K.2.1
Craig	David		DC_E0127		K.2.3
Craig	Eugene		DC_M5738	UCS	K.2.1
Craig	Frances		DC_M1204	UCS	K.2.1
Craig	George		DC_M7760		K.2.3
Craig	Paula		DC_M4179	UCS	K.2.1
Crain	WM D.		DC_M1460	UCS	K.2.1
Cramer	Craig S.		DC_M0111		K.2.1
Cramer	Mary Ann		DC_M4402	UCS	K.2.1
Crandall	Dean		DC_M6686	UCS	K.2.1
Crandell	Herbert C.		DC_M3648	UCS	K.2.1
Crane	Rita		DC_M4673	UCS	K.2.1
Crapo	Stan		DC_M0530		K.2.1
Craven	Mark		DC_M3692	UCS	K.2.1
Crawford	Adrian		DC_M5840	UCS	K.2.1
Crawford	Elizabeth		DC_E0399		K.3.9
Crawford	Louise		DC_M1335	UCS	K.2.1
Crawford	Lucas		DC_M3482	UCS	K.2.1
Crawford	Miriam		DC_E0193		K.2.2
Crawford	Morgan		DC_M3731	UCS	K.2.1
Crawford	Nancy		DC_M4805	UCS	K.2.1
Crawford	Tom	his father	DC_E0086		K.3.10
Creeley	Robert		DC_M6351	UCS	K.2.1
Creighton	Colleen		DC_M1289	UCS	K.2.1
Crenshaw	Aisha		DC_M4854	UCS	K.2.1
Cresseveur	Jessica		DC_M5699	UCS	K.2.1
Creswell	Joel		DC_M3164	UCS	K.2.1
Cribbin	Ruby A.		DC_M0117		K.2.1
Crickenberger	Ray		DC_M4463	UCS	K.2.1
Crimson	Beth		DC_M3443	UCS	K.2.1
Crisler	Patrick		DC_M6511	UCS	K.2.1
Crisp	William		DC_M6312	UCS	K.2.1
Crissman	Paul		DC_M0638		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Crist	Ed		DC_M5119	UCS	K.2.1
Crofut	Anni		DC_M1439	UCS	K.2.1
Crolius	Phyllis		DC_M0134		K.2.1
Crom	Nancy		DC_M5747	UCS	K.2.1
Crosby	Kimberely Michelle		DC_M6244	UCS	K.2.1
Cross	A. Donald		DC_M4237	UCS	K.2.1
Cross	Jay		DC_M6201	UCS	K.2.1
Cross	Joan		DC_E0161		K.3.1, K.3.10, K.3.15, K.4
Cross	Laurie		DC_M0278		K.3.1, K.3.2, K.3.3, K.3.4, K.3.11, K.3.12, K.3.15
Crouse	Mary Linn		DC_M3795	UCS	K.2.1
Crow	Laura		DC_M2594	UCS	K.2.1
Crowder	Tamara		DC_M2284	UCS	K.2.1
Crowley	Joyce		DC_M7211	UCS	K.2.1
Crowley	Joyce		DC_M7569	UCS	K.2.1
Crumbaugh	Jeff		DC_M1079	UCS	K.2.1
Cruz	Lynne		DC_M4746	UCS	K.2.1
Cruz	Marian		DC_M0099		K.2.1
Cruz	Marian		DC_M0389		K.2.1
Cruz	Marian		DC_M4810	UCS	K.2.1
Cseh	Zsolt		DC_M3088	UCS	K.2.1
Cubbage	Ruth		DC_M5249	UCS	K.2.1
Cubells	Joseph		DC_M5114	UCS	K.2.1
Cuellar	Vilma		DC_M0511		K.2.1
Culbertson	Brandy		DC_M0937	UCS	K.2.1
Culhane	Chuck		DC_M4663	UCS	K.2.1
Culley	Kathryn		DC_M3327	UCS	K.2.1
Culp	David		DC_E0404	Friends Committee on National Legislation	K.2.1
Culpepper	Pamela		DC_M3991	UCS	K.2.1
Cumming	Cheyne		DC_E0139		K.3.3, K.3.13
Cunningham	Kara		DC_M6285	UCS	K.2.1
Cunningham	Lynda		DC_M0032		K.2.1
Cunningham	Paul		DC_E0270		K.3.2, K.3.4, K.3.5, K.3.6, K.3.10, K.3.12, K.4
Cunningham	Richard		DC_M5939	UCS	K.2.1
Cunningham	Tim		DC_M1366	UCS	K.2.1
Cupp	Linda		DC_M0341		K.2.1
Curley	Susan		DC_M4692	UCS	K.2.1
Curotto	John		DC_M4461	UCS	K.2.1
Currie	Derek		DC_M3034	UCS	K.2.1
Curry	Joanne		DC_M4079	UCS	K.2.1
Curry	K.C.		DC_M0601		K.2.1
Curtin	Richard		DC_M3903	UCS	K.2.1
Curtis	Barbara		DC_M1622	UCS	K.2.1
Curtis	Joan		DC_M7302	UCS	K.2.1
Curtis	Mary Ruth		DC_M6568	UCS	K.2.1
Curtsinger	Lou		DC_M2348	UCS	K.2.1
Cushing	Therese		DC_M2826	UCS	K.2.1
Custer	Katherine		DC_M2013	UCS	K.2.1
Cygan	Denise		DC_M0701		K.2.1
Cyriacks	Christine		DC_M5010	UCS	K.2.1
D	Liz		DC_M5278	UCS	K.2.1
D.	Kavitha		DC_M7238	UCS	K.2.1
D.	Liz		DC_M7803		K.2.1
Da Silva Jain	Katherine		DC_M0222		K.2.1
Dacus	Chelsea		DC_M4912	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
DaFonte	Humberto		DC_M3174	UCS	K.2.1
Dahl	Astrid		DC_M1046	UCS	K.2.1
Dahl	Martha J.		DC_M7468	UCS	K.2.1
Dahlgren	James		DC_M5887	UCS	K.2.1
Dahlquist	Jean		DC_M6198	UCS	K.2.1
Dahringer	Nan		DC_M7004	UCS	K.2.1
Daigle	Deborah		DC_M2576	UCS	K.2.1
Daigle	Ralph		DC_M0554		K.2.1
Daigneault	Larry		DC_M5554	UCS	K.2.1
Daily	Janet		DC_M1041	UCS	K.2.1
Daims	Mark		DC_M4778	UCS	K.2.1
Daiss	Becky		DC_M6011	UCS	K.2.1
Dale	Emily		DC_M4344	UCS	K.2.1
D'Alessio	David		DC_M0572		K.2.1
D'Alessio	David		DC_M3374	UCS	K.2.1
Dalsemer	Terry		DC_M6584	UCS	K.2.1
Dalto	Carol Ann		DC_M0940	UCS	K.2.1
Daly	Kimberly		DC_M0807	UCS	K.2.1
Daly	Linda		DC_M3649	UCS	K.2.1
Daly	Linda		DC_M6701	UCS	K.2.1
Dame	Marilyn		DC_M1214	UCS	K.2.1
D'Amelio	Vanessa		DC_M7034	UCS	K.2.1
Dames	Jeff		DC_M4771	UCS	K.2.1
Damesek	Harriet		DC_M3595	UCS	K.2.1
Damico	Ron		DC_M4141	UCS	K.2.1
D'Amico	Mary		DC_M0876	UCS	K.2.1
Damien	Paul		DC_M4372	UCS	K.2.1
D'Amo	Philip		DC_M4685	UCS	K.2.1
Damon	Eric		DC_M2634	UCS	K.2.1
Danforth	Janet		DC_M0549		K.2.1
Dangelo	Joseph		DC_M3870	UCS	K.2.1
D'Angelo	Guy		DC_M3685	UCS	K.2.1
D'Angelo	Joseph		DC_M5686	UCS	K.2.1
Dangerfield	Dorothy Shays		DC_M5504	UCS	K.2.1
Daniel	Clay		DC_E0168		K.3.7, K.3.14
Daniel	E.E.		DC_E0185	Department of Pharmacolgoy U. Alberta	K.3.2, K.3.7, K.3.10, K.3.11, K.3.15
Daniel	Robert	Kathryn Daniel	DC_E0306		K.3.2, K.3.3, K.3.7, K.3.13
Danielle	Summerville-White		DC_E0022		K.2.2
Daniels	Alathea		DC_M5139	UCS	K.2.1
Daniels	Edwin		DC_M1596	UCS	K.2.1
Daniels	Elizabeth		DC_M0506		K.2.1
Daniels	J Scott		DC_M5454	UCS	K.2.1
Daniels	Laura		DC_E0232		K.2.2
Daniels	Walter		DC_M0455		K.2.1
Daniels	William		DC_M2302	UCS	K.2.1
Danielson	Amy		DC_M3063	UCS	K.2.1
D'Anna	Marie		DC_M3375	UCS	K.2.1
Dannacher	Pamela		DC_M0463		K.2.1
Dano	Eylene		DC_M5989	UCS	K.2.1
Danowski	Kristine		DC_M7152	UCS	K.2.1
Dantis	Denise		DC_M2735	UCS	K.2.1
Danziger	Michael		DC_M0428		K.2.1
D'Arcangelo	Dawn		DC_M5141	UCS	K.2.1
Dare	Cheryl		DC_M1022	UCS	K.2.1
Darnall	Diann		DC_M0845	UCS	K.2.1
Darnell	Cathy		DC_M3329	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Darr	Edyce		DC_M4793	UCS	K.2.1
Darrar	James		DC_M4946	UCS	K.2.1
Darrow	Eric		DC_M1266	UCS	K.2.1
Darwish	Amal		DC_M7405	UCS	K.2.1
DaSilva	Steven		DC_M3873	UCS	K.2.1
Dattner	Eric		DC_M5099	UCS	K.2.1
Datz	Sheila		DC_M3298	UCS	K.2.1
Daugherty	Ellen		DC_M5159	UCS	K.2.1
Daugherty	Tamara		DC_M2444	UCS	K.2.1
Daughtry-Weiss	Lisa		DC_M1512	UCS	K.2.1
Dauwalter	Christine		DC_M2287	UCS	K.2.1
Davey	Judy		DC_M2300	UCS	K.2.1
Davidson	Linda		DC_M2482	UCS	K.2.1
Davidson	Raighne		DC_M3782	UCS	K.2.1
Davies	J. Che'		DC_M0998	UCS	K.2.1
Davies	Nancy		DC_M1923	UCS	K.2.1
Davis	Candace		DC_M1220	UCS	K.2.1
Davis	Cynthia		DC_M2502	UCS	K.2.1
Davis	Davis		DC_M0613		K.2.1
Davis	Jennifer		DC_M0242		K.2.2
Davis	Jenny		DC_M6169	UCS	K.2.1
Davis	John		DC_M0501		K.2.1
Davis	Kate		DC_M0887	UCS	K.2.1
Davis	Larry		DC_M0146		K.2.1
Davis	Liza		DC_M0962	UCS	K.2.1
Davis	Lynn		DC_M7818		K.2.1
Davis	Margot L.		DC_M4902	UCS	K.2.1
Davis	Marion		DC_M7824		K.2.1
Davis	Mary		DC_M4390	UCS	K.2.1
Davis	P. Thompson		DC_M6680	UCS	K.2.1
Davis	Perry		DC_M1004	UCS	K.2.1
Davis	Robin		DC_M6684	UCS	K.2.1
Davis	Steve		DC_M7751		K.2.1
Davis	Susan		DC_M2293	UCS	K.2.1
Davis	Terrence		DC_M2628	UCS	K.2.1
Davis	Thomas		DC_M2531	UCS	K.2.1
Davis	TJ		DC_M1803	UCS	K.2.1
Davis	Todd		DC_M2010	UCS	K.2.1
Davis	Wendy Hale		DC_M7383	UCS	K.2.1
Davis	Y.		DC_M0954	UCS	K.2.1
Dawn	Loren		DC_M2500	UCS	K.2.1
Dawson	Kia		DC_M6447	UCS	K.2.1
Day	Faye		DC_M0882	UCS	K.2.1
Day	Joyce		DC_M7165	UCS	K.2.1
Day	Linda		DC_M2453	UCS	K.2.1
Day	M. Jeroma		DC_M0269		K.3.2, K.3.3, K.3.7
Day	Michael		DC_M1210	UCS	K.2.1
Day	Theresa		DC_M5203	UCS	K.2.1
Daye	Rev. Katherine H		DC_M2770	UCS	K.2.1
Daykin	Jeanne		DC_M0997	UCS	K.2.1
Dayton	Beverly		DC_M5621	UCS	K.2.1
Dayton	Norma		DC_M3723	UCS	K.2.1
de Boer	Chiquita		DC_M1348	UCS	K.2.1
de Cosmo-Carroll	Jacqueline		DC_M3302	UCS	K.2.1
De Costa	Lawrence		DC_M2931	UCS	K.2.1
De Costa	Lawrence		DC_M5819	UCS	K.2.1
De Jasu	Barry		DC_M2672	UCS	K.2.1
De Jesus	Monique		DC_M2046	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
de Jong	Marie		DC_M3267	UCS	K.2.1
de Jong	Marie		DC_M3322	UCS	K.2.1
de la Fuente	Chrinstina		DC_M4862	UCS	K.2.1
De Lu	Darien		DC_E0380		K.4
de Pujo	Frederic		DC_M6889	UCS	K.2.1
de Robbio	Elisabetta		DC_M4268	UCS	K.2.1
De Roin	Virginia		DC_M2656	UCS	K.2.1
De Smedt	Sandra		DC_M2976	UCS	K.2.1
de Streel	Nancy		DC_M1843	UCS	K.2.1
de Wolfe	Natashja		DC_M5575	UCS	K.2.1
Deacon	James		DC_M2155	UCS	K.2.1
Dean	Allison		DC_M2779	UCS	K.2.1
Dean	John		DC_M5586	UCS	K.2.1
Dean	Kristi		DC_M6670	UCS	K.2.1
Dean	Liama		DC_M3929	UCS	K.2.1
Dean	Nancy		DC_M6825	UCS	K.2.1
Dean	Patricia		DC_M1423	UCS	K.2.1
Dean	Rachel		DC_M7230	UCS	K.2.1
Dean	Sharon		DC_M3368	UCS	K.2.1
Dean	Sue E.		DC_M0761		K.2.1
Dean	Susan		DC_M1516	UCS	K.2.1
Dean	Rosamond		DC_M5020	UCS	K.2.1
Debasitis	Brian		DC_M4328	UCS	K.2.1
DeBing	Therese		DC_M4428	UCS	K.2.1
DeCaprio	Alexis		DC_M5362	UCS	K.2.1
DeCarlo	George		DC_M0135		K.2.1
Decker	Dorothy		DC_M5122	UCS	K.2.1
Decker	Mary Gail		DC_M6470	UCS	K.2.1
Deering	Beverly		DC_M7279	UCS	K.2.1
DeFalco	Tony		DC_M5048	UCS	K.2.1
DeFilippo	Lynn		DC_M1455	UCS	K.2.1
DeFrancesco	Susan		DC_M1441	UCS	K.2.1
Deftereos	Pallo		DC_PHO0012	Sacramento Committee for Nuclear Arms Control	K.3.1, K.3.5, K.3.15
Deftereos	Pallo		DC_PHW0007		K.3.9
DeGallier	Glenn		DC_M2118	UCS	K.2.1
deGero	Beverly		DC_M2216	UCS	K.2.1
DeGiuseppi	MaryJo		DC_M3644	UCS	K.2.1
Dehnbostel	Gemma		DC_M7647	UCS	K.2.1
D'Eilia	Joe		DC_E0337		K.3.9
Deirdre	Griffin		DC_E0280		K.3.3, K.3.12
Deisz	John		DC_M1152	UCS	K.2.1
DeJonghe	Mark	Juli	DC_M0827	UCS	K.2.1
del Castillo	Concepcion		DC_M2618	UCS	K.2.1
DeLaBarre	Elizabeth		DC_M0541		K.2.1
Delaney	Millie		DC_M3988	UCS	K.2.1
Delau	Katy		DC_M1403	UCS	K.2.1
Delcort	Benoit		DC_M3693	UCS	K.2.1
DeLeon	Ed		DC_M7350	UCS	K.2.1
Delevoryas	Penelope		DC_M4243	UCS	K.2.1
DeLeys	Robert		DC_M6313	UCS	K.2.1
del'Giudice	Janet		DC_M4907	UCS	K.2.1
DellaFemina	Peter		DC_M1470	UCS	K.2.1
delPino	Rosemary		DC_M4404	UCS	K.2.1
Delsemme	Jacques		DC_M5969	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Delu	Darien		DC_PHO0018	Women's International League for Peace and Freedom, United States Section	K.3.4, K.3.5, K.3.11, K.3.13, K.3.15, K.4
Deming	Deborah		DC_M3703	UCS	K.2.1
Demirgian	Elizabeth		DC_M3533	UCS	K.2.1
Dempsey	Isa		DC_M7581	UCS	K.2.1
Demski	Eileen		DC_M3819	UCS	K.2.1
Dene	David		DC_E0103		K.2.2
Denham	Isabel		DC_E0406		K.3.1, K.3.2, K.3.4, K.3.12, K.3.13
DeNicola	Jo-Ellen		DC_M2267	UCS	K.2.1
Denio	Allen		DC_M1778	UCS	K.2.1
Denio	Amy		DC_M7112	UCS	K.2.1
Denley	Walter E		DC_M3382	UCS	K.2.1
Denman	Jack	Margarita Denman	DC_M4066	UCS	K.2.1
Denneen	Bill		DC_M0128		K.2.1
Dennis	Larry		DC_M4938	UCS	K.2.1
Dennis	Todd E.		DC_M1827	UCS	K.2.1
Denny	Rachael		DC_M2648	UCS	K.2.1
Denslow	Estelle		DC_M1514	UCS	K.2.1
Denslow	Estelle		DC_M1515	UCS	K.2.1
Dent	William		DC_M2785	UCS	K.2.1
Dentel	Ann		DC_M4270	UCS	K.2.1
Denton	Joan		DC_M1749	UCS	K.2.1
DePauw	Jolie		DC_M6419	UCS	K.2.1
Derby	Nina		DC_M2601	UCS	K.2.1
Desbrow	Stacy		DC_M1701	UCS	K.2.1
Desfor	Paul		DC_M6415	UCS	K.2.1
DesJardins	Paul		DC_M1755	UCS	K.2.1
DeSpain	Juell		DC_M7091	UCS	K.2.1
Desreuisseau	Judy		DC_M4652	UCS	K.2.1
Dessain	Ronald		DC_M0759		K.2.1
Detwieler	Winnie		DC_PHO0032	Sacramento Area Peace Action	K.3.2, K.3.4, K.3.5, K.3.6, K.3.10, K.3.11, K.3.13, K.3.14, K.3.15, K.4
Detwiler	Winnie		DC_PHW0005		K.3.1, K.3.2, K.3.4, K.3.5, K.3.6, K.3.10, K.3.11, K.3.13, K.3. 14, K.3.15, K.4
Deutsch	Trudy		DC_M3387	UCS	K.2.1
Devasto	Ginny		DC_M4880	UCS	K.2.1
Devine	Dewey		DC_M3451	UCS	K.2.1
Devitt	Ed		DC_M5874	UCS	K.2.1
Devitt	Ed		DC_M6357	UCS	K.2.1
Devlin	Melissa		DC_M1462	UCS	K.2.1
DeVore	William		DC_M4591	UCS	K.2.1
Dewey	Laura		DC_M0022		K.3.2, K.3.3, K.3.5, K.3.11, K.3.12, K.3.15
DeWit	Fred		DC_M1761	UCS	K.2.1
Dexter	Dawn		DC_M6474	UCS	K.2.1
Dexter	Suzan	Ted Burik	DC_M0147		K.2.1
Dial	Jennifer		DC_M5532	UCS	K.2.1
Diamond	Karen		DC_M2185	UCS	K.2.1
Diaz	Natalie		DC_M6728	UCS	K.2.1
Dibble	Marcia C.		DC_M0959	UCS	K.2.1
DiCara	Sue		DC_M1329	UCS	K.2.1
DiCato	Leilani		DC_M6026	UCS	K.2.1
Dick	Kathy		DC_M5346	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Dick	R		DC_M6938	UCS	K.2.1
Dickerson	Birgitta		DC_M6245	UCS	K.2.1
Dickinson	Matt		DC_M2885	UCS	K.2.1
Dickson	Gloria		DC_M6956	UCS	K.2.1
DiDiano	Marisa		DC_M6274	UCS	K.2.1
Diehl	Chris		DC_M0830	UCS	K.2.1
Diel	Bryon		DC_PHO0030	Peace Fresno and Superfluid Helium 3 (a band)	K.3.2, K.3.6, K.3.10, K.3.12, K.3.15
Diesel	Sandra		DC_M3816	UCS	K.2.1
Dietrick	Janet		DC_E0125		K.3.1, K.3.14
Dietz	David		DC_M2873	UCS	K.2.1
Dietz	Kerry		DC_M4571	UCS	K.2.1
Dietz	Sally		DC_M3003	UCS	K.2.1
DiFiore	Maria		DC_M4758	UCS	K.2.1
DiGenova	Shannon		DC_M4889	UCS	K.2.1
Digou	Carol		DC_M1310	UCS	K.2.1
DiLabio	Gena		DC_E0341		K.3.2, K.3.7, K.3.10, K.3.11, K.3.12, K.3.15
Dillberg	David		DC_M5774	UCS	K.2.1
Diller	Jeanne V.		DC_M4338	UCS	K.2.1
Dilley	Maxx		DC_M0263		K.3.1, K.3.2, K.3.3, K.3.10, K.3.13, K.3.14
Dillon	Fred		DC_M5208	UCS	K.2.1
DiMatteo	Richard		DC_M0722		K.2.1
Dimin	Lee		DC_M7723		K.2.1
Dimin	Lee		DC_M7853		K.2.1
Dineen	Katherine		DC_M2694	UCS	K.2.1
Dingman	Jane		DC_M6908	UCS	K.2.1
DiRisio	Joe		DC_M1951	UCS	K.2.1
DiRodio	Matthew		DC_M5735	UCS	K.2.1
Dishman	Benjamin		DC_M1938	UCS	K.2.1
Disque	Melinda		DC_M1727	UCS	K.2.1
Dixon	Alice		DC_M3652	UCS	K.2.1
Dixon	David		DC_M1492	UCS	K.2.1
Dixon	Donald		DC_M4933	UCS	K.2.1
Dixon	John		DC_M2558	UCS	K.2.1
Dixon	Lynne		DC_M5904	UCS	K.2.1
Dockendorf	Lori		DC_M2493	UCS	K.2.1
Dockter	Jeremy		DC_M2754	UCS	K.2.1
Dodds	Debra		DC_M4497	UCS	K.2.1
Dodge	Fred		DC_PHO0059		K.3.1, K.3.2, K.3.3, K.3.4, K.3.6, K.3.10, K.3.11, K.3.13, K.3.15, K.4
Doe	R. Renee		DC_M6803	UCS	K.2.1
Doeden	Jon W.		DC_M2416	UCS	K.2.1
Doherty	Trish		DC_M6993	UCS	K.2.1
Dolinko	Paul		DC_M5157	UCS	K.2.1
Dolney	Rachel		DC_M0570		K.2.1
Dolnick	Cody		DC_M6756	UCS	K.2.1
Domina	Linda		DC_M5123	UCS	K.2.1
Dominguez	Fernando Buen Abad		DC_M3933	UCS	K.2.1
Dominguez	Laura		DC_M0909	UCS	K.2.1
Dominica	Susan		DC_M3247	UCS	K.2.1
Donahue	Nona		DC_M2072	UCS	K.2.1
Donahue	Robert		DC_M3543	UCS	K.2.1
Donaldson	Jamie K.		DC_E0129		K.3.2, K.3.4, K.3.10, K.3.12
Donatoni	Matthew		DC_M5465	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Donin	Eric		DC_M0300		K.2.1
Donley	Michelle		DC_M3277	UCS	K.2.1
Donnell	Jane		DC_M2254	UCS	K.2.1
Donnelly	Sam		DC_M3615	UCS	K.2.1
Donohoe	Martin		DC_E0148		K.2.2
Donohue	Carol		DC_E0305		K.3.1, K.3.3
Donohue	Eugene		DC_M6109	UCS	K.2.1
Donovan	Dave		DC_M6179	UCS	K.2.1
Donovan	David		DC_M3224	UCS	K.2.1
Donsbach	Carl		DC_M0333		K.2.1
Donsbach	Carl		DC_M5580	UCS	K.2.1
Donston	Kacey		DC_M2893	UCS	K.2.1
Doocy	Audrey		DC_M7451	UCS	K.2.1
Dooley	Scott		DC_M2415	UCS	K.2.1
Doost	Kay		DC_M0286		K.3.14
Doran	Jean		DC_M4371	UCS	K.2.1
Doran	Lori		DC_M6454	UCS	K.2.1
Doran	Patricia		DC_M3605	UCS	K.2.1
Dorner	Catherine		DC_M2473	UCS	K.2.1
Doros	Cheryl		DC_M1838	UCS	K.2.1
Dorris	Mary		DC_M2055	UCS	K.2.1
Dorsett	Felicity		DC_M5312	UCS	K.2.1
Dorton	Beth		DC_M1353	UCS	K.2.1
Dorweiler	Anne		DC_M0249		K.3.2, K.3.14
Doten	Meg		DC_M2582	UCS	K.2.1
Doucet	B.J.		DC_M3423	UCS	K.2.1
Doucet	Lisha		DC_M4730	UCS	K.2.1
Dougherty	Mona		DC_M1281	UCS	K.2.1
Dougherty	Ruby D		DC_M7582	UCS	K.2.1
Douglas	Linda		DC_M0282		K.3.2, K.3.13, K.3.14
Douglas	Matt		DC_M3154	UCS	K.2.1
Douglas	Rosealie		DC_M3364	UCS	K.2.1
Douglas	Edward		DC_M6084	UCS	K.2.1
Douglass	Terri		DC_M6029	UCS	K.2.1
Dove	Donna		DC_M4472	UCS	K.2.1
Dow	Duncan		DC_M0011		K.3.3, K.3.4, K.3.6, K.3.7, K.3.11, K.3.12
Dowell	Chet		DC_M7177	UCS	K.2.1
Dowling	Dave		DC_M5773	UCS	K.2.1
Downer	Vesta		DC_M5205	UCS	K.2.1
Downie	John		DC_M4199	UCS	K.2.1
Downing	Kenneth N.		DC_M3769	UCS	K.2.1
Downs	Patricia		DC_M3766	UCS	K.2.1
Doyle	Christine		DC_E0346	Simply Herbs Workers Collective	K.3.2, K.3.3, K.3.4, K.3.6, K.3.7, K.3.11, K.3.15
Doyle	Kathleen		DC_M2836	UCS	K.2.1
Doyle	Mary Anne		DC_E0274		K.3.2, K.3.3, K.3.10, K.3.12
Doyle	Shannon		DC_M4918	UCS	K.2.1
Drager	Annie		DC_M6769	UCS	K.2.1
Drake	Christy		DC_M3584	UCS	K.2.1
Drake	Cindi		DC_M6134	UCS	K.2.1
Draper	Janet		DC_M2079	UCS	K.2.1
Draudt	Dave		DC_E0237		K.2.2
Draudt	Dave		DC_P0007		K.2.2
Drea	Christine		DC_M6095	UCS	K.2.1
Drevicky	John		DC_M4579	UCS	K.2.1
Dreyer	Elanor		DC_M0250		K.3.2, K.3.7, K.3.11, K.3.15
Dreyer	Ellen		DC_E0308		K.2.2
Dreyer	Lu		DC_E0235		K.2.2

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Dries	Paul		DC_M3126	UCS	K.2.1
Drinkwater	Laurie		DC_M6939	UCS	K.2.1
Drischoll	Laura		DC_M7133	UCS	K.2.1
Driscoll	Jim		DC_E0057		K.3.7
Drobnik	Margaret		DC_M7201	UCS	K.2.1
Drohan	Lori		DC_M7669	UCS	K.2.1
Dryden	Robertson		DC_M2401	UCS	K.2.1
Dryer	Marilyn		DC_M0028		K.3.7, K.3.11, K.3.15
Du Mond	Glenna		DC_M7258	UCS	K.2.1
Dubbeldam	Marc		DC_M5368	UCS	K.2.1
Dube	Cindy		DC_M2768	UCS	K.2.1
duBrin	Jane		DC_M3113	UCS	K.2.1
Duck	Denise		DC_M2847	UCS	K.2.1
DuClaud	Monica		DC_M3289	UCS	K.2.1
Dudash	Doris		DC_M1275	UCS	K.2.1
Dudeck	Michelle		DC_M4439	UCS	K.2.1
Dudeck	Michelle		DC_M6433	UCS	K.2.1
Dudrick	Roseann		DC_M0721		K.2.1
Duenow	Lisa Renee		DC_M3340	UCS	K.2.1
Dufresne	JC		DC_M1236	UCS	K.2.1
Dugar	Alice		DC_M2620	UCS	K.2.1
Duggan	Joan		DC_M5855	UCS	K.2.1
Duink	Amy		DC_M1887	UCS	K.2.1
Dulicai	Dianne		DC_M1620	UCS	K.2.1
Dumbleton	Marilyn		DC_M4361	UCS	K.2.1
Dunar	Edward		DC_M6634	UCS	K.2.1
Duncan	Larissa		DC_M2432	UCS	K.2.1
Duneman	Gary		DC_M6395	UCS	K.2.1
Dunlap	Anne		DC_M5460	UCS	K.2.1
Dunmore	Ralph		DC_M0515		K.2.1
Dunn	Eddy		DC_M2641	UCS	K.2.1
Dunn	Mary		DC_E0304		K.2.2
Dunn	Michelle		DC_M1296	UCS	K.2.1
Dunn	Robert		DC_M3495	UCS	K.2.1
Dunn	Sheryl		DC_M0833	UCS	K.2.1
Dunn	Sheryl		DC_M5521	UCS	K.2.1
Dunne	Loretta		DC_M0287		K.3.1, K.3.10, K.3.14
Dunseath	Hugh		DC_M2571	UCS	K.2.1
Dupont	CJ		DC_M4384	UCS	K.2.1
Duprey	Renee		DC_M3480	UCS	K.2.1
Durand	Marie		DC_M6283	UCS	K.2.1
Durante	Grant R		DC_M6841	UCS	K.2.1
Durham	Crystal		DC_M6960	UCS	K.2.1
Durling	Teresa		DC_M5081	UCS	K.2.1
Durston	Bill		DC_PHO0014		K.3.1, K.3.2, K.3.4, K.3.11, K.3.12, K.3.15, K.4
Durston	William		DC_PHW0009		K.3.4, K.3.5, K.3.9, K.3.11, K.3.12, K.3.15, K.4
Dushkind	Winnie		DC_M0205		K.3.14
Duttlinger	Pierre		DC_M7617	UCS	K.2.1
DuVall	Judith		DC_M7590	UCS	K.2.1
Duxbury	Mitzi		DC_M3728	UCS	K.2.1
Dvorak	Eleanor		DC_M6530	UCS	K.2.1
Dwight	Eleanor		DC_M0029		K.3.2, K.3.3, K.3.7, K.3.12, K.3.15
Dwyer	Daniel		DC_M4564	UCS	K.2.1
Dwyer	Kerry		DC_M5268	UCS	K.2.1
Dwyer	Suzanna		DC_M2032	UCS	K.2.1
Dyas	Melissa		DC_M6341	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Dye	Joyce		DC_M5351	UCS	K.2.1
Dyer	Michel		DC_M6902	UCS	K.2.1
Dymkowski	Evelyn J.		DC_M7927		K.2.1
E	Russ		DC_M2303	UCS	K.2.1
Eaden	Denise		DC_M2192	UCS	K.2.1
Eames	Wendy		DC_M5640	UCS	K.2.1
Earl	Carina Alia		DC_M4234	UCS	K.2.1
Earle	Nancy		DC_M0753		K.2.1
Early	Gordon		DC_M6604	UCS	K.2.1
Earth	John		DC_M0814	UCS	K.2.1
Eash	David		DC_M3778	UCS	K.2.1
Easley	Judah Joy		DC_M5148	UCS	K.2.1
Easom	Colin		DC_M4994	UCS	K.2.1
Easter	Bunny		DC_M5130	UCS	K.2.1
Easter	Shane		DC_E0169		K.3.14
Eastlake	Brenda		DC_M1918	UCS	K.2.1
Easton	Rick		DC_M3259	UCS	K.2.1
Eaton	Barbara		DC_M7172	UCS	K.2.1
Eaton	Rose		DC_M1957	UCS	K.2.1
Ebbink	M.J.P		DC_M4413	UCS	K.2.1
Eberhard	Darielle		DC_M6099	UCS	K.2.1
Ebersole	Laurence		DC_E0179		K.3.1, K.3.2, K.3.3, K.3.4, K.3.5, K.3.6, K.3.11, K.3.15, K.4
Ebey	Christopher		DC_M7182	UCS	K.2.1
Eck	Daniel		DC_M3239	UCS	K.2.1
Eck	Laura Tyler		DC_M0938	UCS	K.2.1
Eck	Paul		DC_M0458		K.2.1
Eckel	Nancy		DC_M7277	UCS	K.2.1
Eckert	Janice		DC_E0290		K.3.2, K.3.14
Ecklund	Lars A.		DC_M3834	UCS	K.2.1
Eddy	Kevin		DC_M4971	UCS	K.2.1
Eddy	MacGregor		DC_PHO0009	advisory board member-Network Against Weapons and Nuclear Power in Space regardign the BMDS PEIS	K.3.3, K.3.4, K.3.11, K.3.12, K.4
Eddy	MacGregor		DC_PHW0006		K.3.4, K.3.11, K.3.15, K.4
Edelstein	Susan		DC_M0313		K.2.1
Eden	Scott		DC_M4186	UCS	K.2.1
Edgecomb	Jean		DC_M7009	UCS	K.2.1
Edison	Kevin		DC_M2968	UCS	K.2.1
Edlin	Maidland		DC_M5847	UCS	K.2.1
Edmonds	Barbara		DC_M1028	UCS	K.2.1
Edmonston	Donald		DC_M1142	UCS	K.2.1
Edmonston	Jack		DC_M7715		K.2.1
Edwards	Burke		DC_M7601	UCS	K.2.1
Edwards	Erin		DC_M5902	UCS	K.2.1
Edwards	Floyd		DC_M3342	UCS	K.2.1
Edwards	J.		DC_M5189	UCS	K.2.1
Edwards	Sherry		DC_M7424	UCS	K.2.1
Egain	Mollie		DC_M6254	UCS	K.2.1
Egan	Charlotte		DC_M4031	UCS	K.2.1
Egan	Elecia		DC_M7441	UCS	K.2.1
Egan	Sara		DC_M6736	UCS	K.2.1
Egbert	Susan		DC_M0408		K.2.1
Egen	Ned		DC_M3860	UCS	K.2.1
Eger	Jonathan		DC_M1023	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Eggleston	Margaret		DC_M5709	UCS	K.2.1
Ehrgott	Fred		DC_M5854	UCS	K.2.1
Ehrlich	Annette		DC_M5566	UCS	K.2.1
Eichenlaub	Connie		DC_M0394		K.2.1
Eichenlaub	Connie		DC_M3979	UCS	K.2.1
Eichler	Gina		DC_M3534	UCS	K.2.1
Eis	Mark		DC_M4939	UCS	K.2.1
Eisenberg	Ned		DC_M3220	UCS	K.2.1
Eisenberg	Nicol		DC_M0112		K.2.1
Ekenstam	Karon		DC_M2906	UCS	K.2.1
Ekstrom	Edwina		DC_M5229	UCS	K.2.1
Ekvinai	Penny		DC_M5378	UCS	K.2.1
El Masri	Judy		DC_M3803	UCS	K.2.1
Elaine	Dellande		DC_M5746	UCS	K.2.1
Elam	Barb		DC_M4325	UCS	K.2.1
El-Badry	Nadia		DC_M2085	UCS	K.2.1
Eldred	Neil		DC_M4457	UCS	K.2.1
Eldredge	Jeri		DC_M1559	UCS	K.2.1
Eldridge	Sherry		DC_M2775	UCS	K.2.1
Elgin	Dr. Robert		DC_M6089	UCS	K.2.1
Elio	Joel		DC_M5692	UCS	K.2.1
Eliot	Arthur		DC_M1676	UCS	K.2.1
Elkington	Harriet		DC_M7532	UCS	K.2.1
Ellenburg	DL		DC_M6380	UCS	K.2.1
Ellingbee	Randi		DC_M5844	UCS	K.2.1
Elliot	Miriam		DC_E0411		K.3.4, K.3.11, K.3.12
Elliott	Erica		DC_M7586	UCS	K.2.1
Elliott	Julie		DC_M4653	UCS	K.2.1
Elliott	Michael		DC_M3710	UCS	K.2.1
Ellis	Cathy		DC_M1724	UCS	K.2.1
Ellis	Dale		DC_M2108	UCS	K.2.1
Ellis	David		DC_M6575	UCS	K.2.1
Ellis	Gloria		DC_M3468	UCS	K.2.1
Ellis	Heidi		DC_M7274	UCS	K.2.1
Ellis	Jennifer		DC_M5841	UCS	K.2.1
Ellis	Joseph		DC_M4221	UCS	K.2.1
Ellis	Linda		DC_M4845	UCS	K.2.1
Ellis	Rob		DC_M0085		K.2.2
Ellis	Robert		DC_M6306	UCS	K.2.1
Ellison	Mark		DC_M1628	UCS	K.2.1
Ellison-Hanks	Johanna		DC_M5564	UCS	K.2.1
Ellman	Chana		DC_M7871		K.3.5, K.3.7, K.3.13
Ellsworth	Frederick		DC_M2326	UCS	K.2.1
Ellsworth	Linda		DC_M5704	UCS	K.2.1
Ellyn	Maura		DC_M1304	UCS	K.2.1
Elness	Barbara		DC_M6587	UCS	K.2.1
Elsbach	Peter		DC_M4623	UCS	K.2.1
Else	Victoria		DC_M1540	UCS	K.2.1
Emad	Victoria		DC_M7567	UCS	K.2.1
Emery	Melinda		DC_M1092	UCS	K.2.1
Emery	Melinda		DC_M2163	UCS	K.2.1
Emery	Michael		DC_M3840	UCS	K.2.1
Emetarom	Chitoh		DC_M4633	UCS	K.2.1
Emmett	Mike		DC_M5032	UCS	K.2.1
Enciso	Violeta		DC_M4025	UCS	K.2.1
Endo	Gayle		DC_M5534	UCS	K.2.1
Enevoldsen	David		DC_M7947		K.2.3
Enfield	Jackie		DC_M5138	UCS	K.2.1
Engel	Jane		DC_M7584	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Engelman	Marilin		DC_M7596	UCS	K.2.1
Engert	Kathy M.		DC_M1475	UCS	K.2.1
Engler	Grace		DC_M3439	UCS	K.2.1
English	Nicole		DC_M6108	UCS	K.2.1
English	Thomas		DC_M0964	UCS	K.2.1
Engman	Eloise		DC_M7486	UCS	K.2.1
Ennes	Howard		DC_M7934		K.3.3, K.3.10, K.3.11, K.3.13, K.3.14, K.3.15
Enright	Lynda		DC_M5560	UCS	K.2.1
Ensign	Tari		DC_M5332	UCS	K.2.1
Ently	Hilary		DC_M6041	UCS	K.2.1
Epstein	Judy		DC_M6984	UCS	K.2.1
Erb	Jay		DC_M2181	UCS	K.2.1
Ereckson	Ezra		DC_M7282	UCS	K.2.1
Eremita	Linda		DC_M3574	UCS	K.2.1
Erickson	Carl J.		DC_M0200		K.3.14
Erickson	John		DC_M2942	UCS	K.2.1
Erickson	Kent		DC_M5971	UCS	K.2.1
Erickson	Rodney		DC_M6196	UCS	K.2.1
Erickson	Todd J.		DC_M4904	UCS	K.2.1
Ernsberger	Paul		DC_M1925	UCS	K.2.1
Erwin	Micah		DC_M7216	UCS	K.2.1
Espeland	Shirley		DC_M5013	UCS	K.2.1
Esposito	Barbara		DC_M4791	UCS	K.2.1
Esterle	Ann		DC_M5155	UCS	K.2.1
Esterwood	Woody		DC_E0212		K.3.3, K.3.7, K.3.11, K.3.12, K.3.15
Estes	Douglas		DC_M1434	UCS	K.2.1
Estes	John		DC_M5469	UCS	K.2.1
Estes	Rose		DC_M5964	UCS	K.2.1
Estrada	Jenny		DC_M0854	UCS	K.2.1
Estrella	Julia		DC_PHO0049		K.3.2, K.3.3, K.3.5, K.3.12, K.4
Estrella	Susan		DC_M2012	UCS	K.2.1
Etchison	Craig		DC_M0173		K.3.2, K.3.10, K.3.14
Etheridge	Ramona		DC_M1035	UCS	K.2.1
Etter	Hanya		DC_M4060	UCS	K.2.1
Etzkorn	Felicia		DC_M0210		K.3.1, K.3.14
Eudy	Elaine W.		DC_M0683		K.2.1
Euler	Renee		DC_M7228	UCS	K.2.1
Evans	Brenna		DC_M6025	UCS	K.2.1
Evans	Dinda		DC_E0253		K.2.2
Evans	Dinda		DC_M7654	UCS	K.2.1
Evans	Hazel		DC_E0338		K.2.2
Evans	James		DC_M2141	UCS	K.2.1
Evans	Jeffrey		DC_M0371		K.2.1
Evans	Jennie		DC_M3996	UCS	K.2.1
Evans	Jim		DC_M2394	UCS	K.2.1
Evans	Marcus		DC_M3256	UCS	K.2.1
Evans	Roxanna J.		DC_M3634	UCS	K.2.1
Eveleigh	John		DC_M0273	Menwith Hill Forum	K.2.2
Everdell	William R.		DC_M3838	UCS	K.2.1
Everett	Ashley		DC_M6153	UCS	K.2.1
Everett	Carter		DC_M7123	UCS	K.2.1
Everett	Miles		DC_PHO0006	Alliance for Democracy	K.3.2, K.3.3, K.3.5, K.3.10, K.3.11, K.3.13, K.3.15
Eversole	Scott Thomas		DC_M6190	UCS	K.2.1
Everton	Clyde		DC_M0325		K.2.1
Evilsizer	Susan		DC_M6804	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Evinger	Matthew		DC_M3549	UCS	K.2.1
Evoy	Cherryl		DC_M0442		K.2.1
Ewaskey	April		DC_M6218	UCS	K.2.1
Ewell	Kathryn		DC_M6090	UCS	K.2.1
Ewers	Suki		DC_M6498	UCS	K.2.1
Ewig	Patricia L.		DC_M0453		K.2.1
Ewing	Sarah		DC_E0132		K.3.1, K.3.14, K.3.3.
Exline	Brenda		DC_M1217	UCS	K.2.1
Eyer	Sharon		DC_M7443	UCS	K.2.1
Eyheralde	Carol		DC_M2534	UCS	K.2.1
Eyheralde	Margaret		DC_M3307	UCS	K.2.1
Ezzell	Grace		DC_M0285		K.2.1
Fabiano	Donald D.		DC_M7655	UCS	K.2.1
Fabre	Sherri		DC_M1240	UCS	K.2.1
Faes	Natalie		DC_M5337	UCS	K.2.1
Faes	Natalie		DC_M5338	UCS	K.2.1
Fahey	John		DC_M6757	UCS	K.2.1
Faich	Ron		DC_M4535	UCS	K.2.1
Fairbanks	Kathryn		DC_M0605		K.2.1
Fairchild	Stephanie M.		DC_M1230	UCS	K.2.1
Falconello	Kathy		DC_M2005	UCS	K.2.1
Falotico	Georgann		DC_M0990	UCS	K.2.1
Falzone	Richard		DC_M1451	UCS	K.2.1
Fancher	Keith		DC_M3254	UCS	K.2.1
Farber	Joy		DC_M7863		K.2.3
Faridi	Mohammad		DC_M4183	UCS	K.2.1
Farina	Carol		DC_M1820	UCS	K.2.1
Farlow	Erin		DC_M3709	UCS	K.2.1
Farmer	Brian		DC_M1347	UCS	K.2.1
Farmer	Cameron		DC_M3009	UCS	K.2.1
Farnan	Lisa		DC_M5289	UCS	K.2.1
Farnan	Michael		DC_M6549	UCS	K.2.1
Farnum	Jenn		DC_M0664		K.2.1
Farr	Harry A		DC_M6699	UCS	K.2.1
Farrell	Brandan		DC_M2321	UCS	K.2.1
Farrell	Catherine		DC_M3465	UCS	K.2.1
Farrington	Susanne		DC_M7697		K.2.1
Farris	Andrea		DC_M6690	UCS	K.2.1
Farris	Beth		DC_M2288	UCS	K.2.1
Farris	Dan		DC_M1611	UCS	K.2.1
Farritor	Robert		DC_M3558	UCS	K.2.1
Farry	Gwen		DC_E0244		K.3.3, K.3.7, K.3.12, K.3.15
Faruolo	Dawn		DC_M1093	UCS	K.2.1
Farwell	Beatrice		DC_M4090	UCS	K.2.1
Faszczewski	Joan		DC_M2832	UCS	K.2.1
Faulkingham	Laura		DC_M2410	UCS	K.2.1
Faunce	Jami		DC_M2368	UCS	K.2.1
Faust	Heather		DC_M0531		K.2.1
Favreau	Neuil		DC_E0281		K.2.2
Favret	Andrew		DC_M7205	UCS	K.2.1
Fearnley	Jackie		DC_E0437		K.3.1, K.3.13
Federman	Adele		DC_M5012	UCS	K.2.1
Federman	Ellen		DC_M2922	UCS	K.2.1
Feeley	Janet		DC_M2456	UCS	K.2.1
Fehribach	Robert		DC_M2355	UCS	K.2.1
Fehribach	Robert		DC_M2422	UCS	K.2.1
Fehribach	Robert		DC_M2423	UCS	K.2.1
Fehrmann	Susie		DC_M2930	UCS	K.2.1
Feichtinger	Dennis		DC_M4698	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Feiner	Kenneth		DC_M0368		K.2.1
Feinstein	Daniel		DC_M0431		K.2.1
Feist	Joann		DC_M2872	UCS	K.2.1
Feitler	Zanna		DC_M6916	UCS	K.2.1
Feldman	Brett		DC_M4676	UCS	K.2.1
Feldman	George		DC_E0334		K.3.2, K.3.3, K.3.15
Feldman	Isabel		DC_M3977	UCS	K.2.1
Feldman	Larraine		DC_M2707	UCS	K.2.1
Fellowes	Christine		DC_E0032		K.3.1, K.3.3, K.3.4, K.3.5, K.3.11, K.3.12, K.3.13
Fenske	Karl		DC_M7200	UCS	K.2.1
Fenster	Steven		DC_M4822	UCS	K.2.1
Feraldi	Nancy		DC_M1328	UCS	K.2.1
Ferdinand	Mary L.		DC_M0459		K.2.1
Ferguson	Joanne		DC_M6107	UCS	K.2.1
Ferguson	Stacy		DC_M1389	UCS	K.2.1
Fernandez	Elizabeth		DC_M4696	UCS	K.2.1
Ferraro	Mary		DC_M3070	UCS	K.2.1
Ferraro	Nancy H.		DC_M7575	UCS	K.2.1
Ferrell	Lee		DC_M2996	UCS	K.2.1
Ferrell	Lee		DC_M2997	UCS	K.2.1
Ferrero	Betty		DC_M5535	UCS	K.2.1
Ferrier	Andrew		DC_M6046	UCS	K.2.1
Ferrier	Malcolm D.		DC_M0509		K.2.1
Ferris	Keith		DC_M6466	UCS	K.2.1
Ferris	Marc		DC_M1201	UCS	K.2.1
Ferstl	Jean		DC_M7565	UCS	K.2.1
Fessant	Steve		DC_M4613	UCS	K.2.1
Festa	Robert		DC_M0970	UCS	K.2.1
Ficek	Kathy		DC_M2044	UCS	K.2.1
Fielding	Claudia		DC_M4016	UCS	K.2.1
Fieldman	Anita		DC_M6854	UCS	K.2.1
Fields	Leslie		DC_M6806	UCS	K.2.1
Fields	Mary		DC_M7003	UCS	K.2.1
Fields	William		DC_M3854	UCS	K.2.1
Fifield	Robert		DC_M6265	UCS	K.2.1
Figueiredo	Eva		DC_M2972	UCS	K.2.1
Figueroa	Gustavo		DC_M6333	UCS	K.2.1
Fike	Chris		DC_M7498	UCS	K.2.1
Filiaut	Paul		DC_E0219		K.2.3
Filipiak	Michael		DC_M7668	UCS	K.2.1
Filley	Charles		DC_M6921	UCS	K.2.1
Fina	Chris		DC_M4974	UCS	K.2.1
Finamore	Richard	Judith Finamore	DC_M6765	UCS	K.2.1
Finch	Kenneth		DC_M0995	UCS	K.2.1
Fingerhood	Shirley		DC_M4122	UCS	K.2.1
Fink	David		DC_M4874	UCS	K.2.1
Finkelstein	June		DC_M3882	UCS	K.2.1
Fink-Winter	Ruth		DC_M7801		K.2.3
Finlay	R		DC_M4691	UCS	K.2.1
Finley	Greg		DC_M0847	UCS	K.2.1
Finn	Micheal		DC_M2476	UCS	K.2.1
Finnefrock	Kathryn		DC_M2356	UCS	K.2.1
Finnie	Chris		DC_M7816		K.2.3
Finnigan	Dave		DC_M5921	UCS	K.2.1
Finnity	Margaret		DC_E0271		K.3.12
Fiore	Mark		DC_M6287	UCS	K.2.1
Fiore	Mark		DC_M6288	UCS	K.2.1
Fiore	Susan	Jim Fiore	DC_E0345		K.3.1, K.3.3, K.3.13

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Fiorentino	Doris		DC_M7680	UCS	K.2.1
Firestone	Anne		DC_M5668	UCS	K.2.1
Firth	Jen		DC_M5693	UCS	K.2.1
Fischer	Douglas		DC_M7046	UCS	K.2.1
Fischer	Quentin		DC_M5097	UCS	K.2.1
Fischer	Richard J.		DC_M7482	UCS	K.2.1
Fischler	Diane		DC_M3525	UCS	K.2.1
Fish	Ralph		DC_M2049	UCS	K.2.1
Fisher	Andrew		DC_M7929		K.2.3
Fisher	Bill		DC_E0256		K.3.2, K.3.3, K.3.10, K.3.11
Fisher	David		DC_M1120	UCS	K.2.1
Fisher	Dietrich		DC_E0408		K.3.2, K.3.4, K.3.5, K.3.6, K.3.7, K.3.10, K.3.11, K.3.12, K.3. 13
Fisher	Donald		DC_M0983	UCS	K.2.1
Fisher	Douglas		DC_M7849		K.2.1
Fisher	Eric		DC_M1015	UCS	K.2.1
Fisher	Larry		DC_M1908	UCS	K.2.1
Fisher	Leonard		DC_PHO0025	Physicians for Social Responsibility	K.3.1, K.3.10, K.3.15, K.4
Fisher	Owen		DC_M2526	UCS	K.2.1
Fishkin	Anne		DC_M0650		K.2.1
Fissinger	Kaye		DC_M5307	UCS	K.2.1
Fite	Michael		DC_M3856	UCS	K.2.1
Fitzgerald	Anna		DC_M4881	UCS	K.2.1
Fitzgerald	Diane S.		DC_M6522	UCS	K.2.1
Fitzgerald	Donna		DC_M1133	UCS	K.2.1
FitzGerld	Eunice		DC_E0299		K.3.12
Fitzgibbons	Matt		DC_M4961	UCS	K.2.1
Fitzke	Robert		DC_M1411	UCS	K.2.1
Fitzpatrick	Tom		DC_M4293	UCS	K.2.1
Fitzsimmons	Patricia		DC_M5831	UCS	K.2.1
Fiumara	Carol A.		DC_M4294	UCS	K.2.1
Fiumara	Carol A.		DC_M0415		K.2.1
Flackett	Gail		DC_M3884	UCS	K.2.1
Flagor	Robert M		DC_M2498	UCS	K.2.1
Flaherty	Brendan		DC_M2222	UCS	K.2.1
Flanagan	Mary		DC_M5291	UCS	K.2.1
Flanary	Kate		DC_M6234	UCS	K.2.1
Flasko	Jennifer		DC_M6876	UCS	K.2.1
Flaus	Brighton		DC_M5987	UCS	K.2.1
Fleck	Ayda Lucero		DC_M7618	UCS	K.2.1
Fleenor	Fitz		DC_M6445	UCS	K.2.1
Fleming	David		DC_M4514	UCS	K.2.1
Fleming	Elizabeth		DC_M4339	UCS	K.2.1
Fleming	Mark		DC_M6985	UCS	K.2.1
Fleming	Philip		DC_PHW0001	Lawyers Allicance for World Security	K.3.2, K.3.3, K.3.10, K.3.11, K.3.12, K.3.13, K.3.14, K.3.15, K.4
Fleming	Phillip		DC_P0011		K.3.9
Fleming	Rosemary		DC_M7284	UCS	K.2.1
Flemming	Edward W		DC_M1171	UCS	K.2.1
Flemming	Philip		DC_F0005	Lawyer Alliance for World Security	K.3.2, K.3.3, K.3.10, K.3.13, K.3.14, K.4
Flesch	Alma S.		DC_M2852	UCS	K.2.1
Fleshman	Joyce		DC_M6805	UCS	K.2.1
Flodin	Betty		DC_M7727		K.3.2, K.3.4, K.3.7, K.3.10
Flood	Beverly		DC_M6531	UCS	K.2.1
Flood	RaVani		DC_M7219	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Floran-Bernier	Elvira		DC_M7607	UCS	K.2.1
Flores	Tessa		DC_M5124	UCS	K.2.1
Flory	Rick		DC_M1544	UCS	K.2.1
Flounoy	Edward		DC_M3048	UCS	K.2.1
Flowers	Bobbie Dee		DC_M4386	UCS	K.2.1
Floyd	Kim		DC_M2083	UCS	K.2.1
Floyd	Virginia		DC_M0214		K.3.2, K.3.12, K.3.14
Fluor	Christine		DC_M2154	UCS	K.2.1
Flynn	Maxfield		DC_M0356		K.2.1
Fobes	Jeanne		DC_M1077	UCS	K.2.1
Foerstel	Melissa		DC_M1848	UCS	K.2.1
Foley	Elaina		DC_M5288	UCS	K.2.1
Foley	Jo		DC_M4925	UCS	K.2.1
Foley Jr	Robert l		DC_M2604	UCS	K.2.1
Follman	Micheal		DC_M3041	UCS	K.2.1
Followill	Peter		DC_M3843	UCS	K.2.1
Follykue	Amenounve		DC_M2265	UCS	K.2.1
Folsom	Susan		DC_M1349	UCS	K.2.1
Folsom	Susan		DC_M1450	UCS	K.2.1
Folta	Edith		DC_M4169	UCS	K.2.1
Fonda	Thomas		DC_M0175		K.2.1
Fonng	L P		DC_M7432	UCS	K.2.1
Foote	Greg		DC_M1821	UCS	K.2.1
Forbes	Jeanne		DC_M1080	UCS	K.2.1
Ford	Carol		DC_M3998	UCS	K.2.1
Ford	Kenneth		DC_M2745	UCS	K.2.1
Ford	Mary		DC_M0584		K.2.1
Ford	Michael C.		DC_M4756	UCS	K.2.1
Forer	Jo		DC_M5717	UCS	K.2.1
Forester	Helen		DC_M3973	UCS	K.2.1
Forester	Lorrie		DC_M0379		K.2.1
Forman	Carol		DC_M6615	UCS	K.2.1
Forman	Maureen		DC_M0230		K.2.1
Forney	Frank		DC_E0298		K.3.10, K.3.11, K.3.13
Forrest	Diana		DC_E0024		K.3.12
Forrest	Jennifer		DC_M0576		K.2.1
Forrest	Melinda		DC_M1131	UCS	K.2.1
Forrest	Robert		DC_M7710		K.2.1
Forsberg	Bob		DC_M2477	UCS	K.2.1
Forseth	Linnea		DC_M4420	UCS	K.2.1
Forsyth	Kelley		DC_M5651	UCS	K.2.1
Fortenberry	Patricia		DC_M7164	UCS	K.2.1
Fortin	Lily		DC_M6992	UCS	K.2.1
Fortney	John		DC_M3651	UCS	K.2.1
Fossard	James		DC_M0414		K.2.1
Foster	Cindy		DC_M1130	UCS	K.2.1
Foster	Cindy		DC_M7453	UCS	K.2.1
Foster	Daniel		DC_M4604	UCS	K.2.1
Foster	Jacqueline		DC_M5642	UCS	K.2.1
Foster	Jennifer		DC_M5974	UCS	K.2.1
Fotidzis	Tess		DC_M7497	UCS	K.2.1
Foulke	Robert		DC_M4638	UCS	K.2.1
Fouts	Vickie		DC_M7395	UCS	K.2.1
Fowle	Chris		DC_M1840	UCS	K.2.1
Fowler	Jason		DC_M3877	UCS	K.2.1
Fowler	Linda		DC_M3325	UCS	K.2.1
Fowler	Pat		DC_M0251		K.2.1
Fox	Diana		DC_M3422	UCS	K.2.1
Fox	Eve		DC_M7144	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Fox	Marvin K		DC_M7027	UCS	K.2.1
Fox-Kemper	Baylor		DC_M2244	UCS	K.2.1
Foxworthy	Bruce L.		DC_M4561	UCS	K.2.1
Frame	Diana		DC_M6707	UCS	K.2.1
Frame	Karen		DC_M0957	UCS	K.2.1
Frame	Laura		DC_M6319	UCS	K.2.1
Francine	Jon		DC_E0431		K.4
Francis	Evan		DC_M6835	UCS	K.2.1
Francisco	Linda		DC_M4509	UCS	K.2.1
Francois	Anne-Lise		DC_M4337	UCS	K.2.1
Frank	Harritette		DC_M5271	UCS	K.2.1
Frank	Lee		DC_M1631	UCS	K.2.1
Frankel	Anne		DC_M5171	UCS	K.2.1
Frankel	Madeline		DC_M0560		K.2.1
Franklin	Douglas		DC_M0180		K.2.1
Franklin	Mary		DC_M2202	UCS	K.2.1
Franklin	Sarah		DC_M7083	UCS	K.2.1
Frantz	Don		DC_M1473	UCS	K.2.1
Frantz	Glenn		DC_M0627		K.2.1
Frantz	Glenn		DC_M4053	UCS	K.2.1
Frantz	Mary		DC_M6920	UCS	K.2.1
Frappier	Amy		DC_M6083	UCS	K.2.1
Fraser	William		DC_M2203	UCS	K.2.1
Fratoni	Mark		DC_M1235	UCS	K.2.1
Frazier	Eileen		DC_M3479	UCS	K.2.1
Frazier	Sharon		DC_M2714	UCS	K.2.1
Freamon	Dierdre		DC_M0745		K.2.1
Freberg	Deborah L.		DC_M6675	UCS	K.2.1
Freda	Gretchen		DC_M2474	UCS	K.2.1
Frederick	Gail		DC_M4073	UCS	K.2.1
Fredericks	Misha		DC_M4802	UCS	K.2.1
Fredrick	Jessica		DC_M3663	UCS	K.2.1
Freedman	Mike		DC_M3472	UCS	K.2.1
Freedom	Nancy		DC_M6345	UCS	K.2.1
Freel	Dorothy		DC_M1417	UCS	K.2.1
Freeman	Kimberly		DC_M1543	UCS	K.2.1
Freeman	Lena		DC_M3697	UCS	K.2.1
Freeman	Lena		DC_M4753	UCS	K.2.1
Freeman	Lena		DC_M6033	UCS	K.2.1
Freemole	Maynard		DC_M4572	UCS	K.2.1
Freese	Catherine		DC_E0060		K.3.7
Freitas	Col. Robert		DC_M1708	UCS	K.2.1
Freitas	Julene		DC_M4648	UCS	K.2.1
French	Bryan		DC_M6411	UCS	K.2.1
French	Effie		DC_M5536	UCS	K.2.1
French	Jacque		DC_M3045	UCS	K.2.1
French	Robert		DC_M3365	UCS	K.2.1
Frewin	Terri L		DC_M2573	UCS	K.2.1
Fried	Barbara		DC_M5497	UCS	K.2.1
Friedbauer	John		DC_M6639	UCS	K.2.1
Friedberg	Zoe		DC_M4099	UCS	K.2.1
Friedman	Benno		DC_M6174	UCS	K.2.1
Friedman	Elaine		DC_M2564	UCS	K.2.1
Friedman	Jody		DC_M7665	UCS	K.2.1
Friedman	Judi		DC_M0252		K.3.14
Friedman	Martin		DC_M7245	UCS	K.2.1
Friedman	Phyllis		DC_M7109	UCS	K.2.1
Friedman	Ruth H		DC_M2316	UCS	K.2.1
Friend	Eddie		DC_M2879	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Friendly	Frog		DC_M3105	UCS	K.2.1
Friesen	Debbie		DC_M1610	UCS	K.2.1
Friese-Staddler	Darlene		DC_M6890	UCS	K.2.1
Frigerio	Ashley		DC_M5400	UCS	K.2.1
Frisch	Matthew		DC_M4419	UCS	K.2.1
Frisch	Matthew		DC_M4426	UCS	K.2.1
Frisinger	Ryan		DC_M1234	UCS	K.2.1
Frith	Rachel		DC_M2762	UCS	K.2.1
Fritsche	A.		DC_M1785	UCS	K.2.1
Fritz	David		DC_M4732	UCS	K.2.1
Fritz	Stacey A.		DC_M7306	UCS	K.2.1
Froemming	Mary		DC_M1774	UCS	K.2.1
Frohnsdorff	Geoffrey		DC_M7695		K.3.1, K.3.4, K.3.11, K.3.13, K.3.14, K.3.15
Fromson	David		DC_M3612	UCS	K.2.1
Frost	Diana		DC_M6832	UCS	K.2.1
Frost	Jan		DC_M6184	UCS	K.2.1
Frumkin	Robert		DC_M0026	FAAAS and UCS	K.3.2, K.3.3, K.3.4, K.3.5, K.3.15
Fry	Brian		DC_E0282	Justice Coordinator, Congregation of St. Joseph	K.3.5, K.3.7
Fryburg	Stephen S.		DC_M3858	UCS	K.2.1
Fuccile	Madeline		DC_M0100		K.2.1
Fuchs	Ester		DC_M3770	UCS	K.2.1
Fudeman	Will		DC_E0211		K.3.2, K.3.3, K.3.4, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Fuess	Sam		DC_M5349	UCS	K.2.1
Fuhrman	Jed		DC_M0436		K.2.1
Fujiyoshi	Ronald		DC_M2936	UCS	K.2.1
Fujiyoshi	Ronald		DC_PHO0050	U.S. Japan Committee for Racial Justice	K.3.1, K.3.2, K.3.3, K.3.5, K.3.12, K.3.15, K.4
Fuller	Linda		DC_M2327	UCS	K.2.1
Fuller	Richard		DC_E0151		K.3.14
Fuller	Roy		DC_M4004	UCS	K.2.1
Fullerton	Dustyn		DC_M2036	UCS	K.2.1
Fullmer	Deb		DC_M0283		K.2.1
Fulmer-Scales	Karen		DC_M4800	UCS	K.2.1
Fulton	Richard		DC_M1212	UCS	K.2.1
Fulton	Tom		DC_M4899	UCS	K.2.1
Funk	Diane		DC_M0561		K.2.1
Furgurson	Neal		DC_M2168	UCS	K.2.1
Furlong	Randall		DC_M0486		K.2.1
Furmanski	Marie		DC_M7736		K.2.1
Furnish	Shearle		DC_M2402	UCS	K.2.1
Furr	Steven		DC_M4027	UCS	K.2.1
Fussner	Mary S.		DC_M5314	UCS	K.2.1
Futrell	Sherrill		DC_M7674	UCS	K.2.1
G	Ali		DC_M1790	UCS	K.2.1
G	Cheryl		DC_M6464	UCS	K.2.1
G	Ruth		DC_M2990	UCS	K.2.1
G.H.	Sara		DC_M3272	UCS	K.2.1
Gabe	Tara		DC_M3787	UCS	K.2.1
Gabey	Ruth		DC_E0041		K.3.7, K.3.15
Gaborow	Barbara Jane		DC_M0732		K.2.1
Gabriel	Alannah		DC_M5539	UCS	K.2.1
Gabriel	Kay		DC_M7786		K.2.1
Gabrieli	Diego		DC_M1147	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Gac	I.		DC_M4501	UCS	K.2.1
Gac	Wayne		DC_M6882	UCS	K.2.1
Gaddis	Mary Lou		DC_M5115	UCS	K.2.1
Gadoury	Kathryn		DC_M4707	UCS	K.2.1
Gaede	Marnie		DC_M5170	UCS	K.2.1
Gaffney	Patrick		DC_M4575	UCS	K.2.1
Gafford	Georgette		DC_M2488	UCS	K.2.1
Gage	Cathy		DC_M2662	UCS	K.2.1
Gagnon	Bruce		DC_M0235	Global Network Against Weapons and Nuclear Power in Space	K.2.2
Gaines	Richard		DC_M5481	UCS	K.2.1
Gaither	John		DC_M7834		K.2.1
Galbreath	Marcy		DC_M1684	UCS	K.2.1
Galdamez	Alicia		DC_M3730	UCS	K.2.1
Galieti	Ron		DC_M7331	UCS	K.2.1
Gallagher	Edward		DC_M6859	UCS	K.2.1
Gallagher	James		DC_M0101		K.3.10, K.3.13, K.3.14
Gallatin	Mary		DC_M4152	UCS	K.2.1
Gallimore	Gregg		DC_M7685	UCS	K.2.1
Gallo	Patti		DC_M5910	UCS	K.2.1
Gallup	David		DC_M2352	UCS	K.2.1
Galton	Christopher		DC_M3849	UCS	K.2.1
Galuska	Michael		DC_M1555	UCS	K.2.1
Galvez	Jose		DC_M3197	UCS	K.2.1
Galyardt	Ben		DC_M5655	UCS	K.2.1
Gambino	Jill		DC_M1792	UCS	K.2.1
Gamble	Fairlee		DC_M6103	UCS	K.2.1
Gambonini	Bette		DC_E0189		K.2.2
Gamrath	Dave		DC_M1242	UCS	K.2.1
Gangi	Lisa		DC_M4238	UCS	K.2.1
Gant	Heather		DC_M4455	UCS	K.2.1
Ganter	Paul		DC_M6322	UCS	K.2.1
Gap	Michelle		DC_M1816	UCS	K.2.1
Garber	Paul		DC_M6377	UCS	K.2.1
Garber	Sandra		DC_M0797	UCS	K.2.1
Garcia	Alfred		DC_M5257	UCS	K.2.1
Garcia	Brenda		DC_M4531	UCS	K.2.1
Garcia	Bridgette		DC_M1716	UCS	K.2.1
Garcia	Camilo N.		DC_M5297	UCS	K.2.1
Garcia	Eliana		DC_M6732	UCS	K.2.1
Garcia	Greg		DC_PHO0039	Alaskans for Peace and Justice, No Nuke North	K.3.2, K.3.3, K.3.4, K.3.10, K.3.11, K.3.12, K.3.13, K.4
Garcia	Jeffery A		DC_M3199	UCS	K.2.1
Garcia	Kevin		DC_M3581	UCS	K.2.1
Garcia	Paula		DC_M4383	UCS	K.2.1
Garcia	Sarah		DC_M4538	UCS	K.2.1
Gardener	Natalia Lee		DC_M4722	UCS	K.2.1
Gardner	B. Kay		DC_M3119	UCS	K.2.1
Gardner	Barbara		DC_M1522	UCS	K.2.1
Gardner	Barbara		DC_M1521	UCS	K.2.1
Gardner	Elliott		DC_M2780	UCS	K.2.1
Gardner	Linda		DC_M4830	UCS	K.2.1
Gardner	Steve		DC_M3049	UCS	K.2.1
Garen	David		DC_M1233	UCS	K.2.1
Gargiulo	John		DC_M7145	UCS	K.2.1
Garland	Ruth		DC_M6309	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Garlick	Tena		DC_M4362	UCS	K.2.1
Garmon	Jeff		DC_M6194	UCS	K.2.1
Garner	Lee		DC_M5748	UCS	K.2.1
Garner	Phil		DC_M5086	UCS	K.2.1
Garnes	Rochelle		DC_M0518		K.2.1
Garove	Alex		DC_M4505	UCS	K.2.1
Garrett	M.L.		DC_M5253	UCS	K.2.1
Gartin	Courtney		DC_M5014	UCS	K.2.1
Gartner	Robert		DC_M3650	UCS	K.2.1
Garton	Jan		DC_M7891		K.2.1
Garvey	Lydia		DC_M0221		K.3.1, K.3.2, K.3.3, K.3.5, K.3.13, K.3.14, K.3.15
Garvey	Lydia		DC_M6496	UCS	K.2.1
Garwin	Edward		DC_M0405		K.2.1
Gary	Kurt		DC_M4042	UCS	K.2.1
Garze	Cecilia		DC_M6579	UCS	K.2.1
Gaskins	Mary Anne		DC_M0716		K.2.1
Gates	Dorothy		DC_M3764	UCS	K.2.1
Gathing	Nancy		DC_M3706	UCS	K.2.1
Gathing	Nancy		DC_M4343	UCS	K.2.1
Gatzke	Rhonda		DC_M4920	UCS	K.2.1
Gaulin	Cynthia		DC_M6978	UCS	K.2.1
Gault	Ted		DC_M3714	UCS	K.2.1
Gawne	Cindy		DC_M6150	UCS	K.2.1
Gazorn	Gwen		DC_E0412		K.3.1, K.3.2, K.3.6, K.3.7, K.3.10, K.3.11, K.3.15
Geary	B.		DC_M6243	UCS	K.2.1
Gebhardt	Matt		DC_M4271	UCS	K.2.1
Gebhardt	Walter		DC_M4641	UCS	K.2.1
Gebhart	Gerald		DC_M6867	UCS	K.2.1
Geczy	Renee		DC_M4963	UCS	K.2.1
Geear	Jim		DC_M3266	UCS	K.2.1
Gegner	Jack		DC_M6665	UCS	K.2.1
Geisel	Julie		DC_M2165	UCS	K.2.1
Geisert	Matthew		DC_M1964	UCS	K.2.1
Geisler	Dorothy		DC_M0218		K.3.2, K.3.10, K.3.14
Geissinger	Annie		DC_M1588	UCS	K.2.1
Geissler	Jean		DC_M4410	UCS	K.2.1
Geist	Barbara		DC_M4161	UCS	K.2.1
Geist	Linda		DC_M6590	UCS	K.2.1
Geitner	Charles		DC_M5173	UCS	K.2.1
Gelover	Jerome		DC_M6776	UCS	K.2.1
Genthner	Sara Hoffman		DC_M5610	UCS	K.2.1
Gentile	Frank		DC_M4326	UCS	K.2.1
Gentry	Mark		DC_M0585		K.2.1
George	Carolyn		DC_M2119	UCS	K.2.1
George	Christy		DC_M3544	UCS	K.2.1
George	Edward		DC_M4956	UCS	K.2.1
George	Helga		DC_M3829	UCS	K.2.1
George	Joni		DC_M7105	UCS	K.2.1
Georgeson	Christa		DC_M1876	UCS	K.2.1
Georgiades	Vanessa		DC_M1394	UCS	K.2.1
Georgiou	Christine		DC_M7008	UCS	K.2.1
Gepp	Sara		DC_M2605	UCS	K.2.1
Geraets	Mary		DC_E0149		K.2.2
Geraw	Heather		DC_M5894	UCS	K.2.1
Gerber	Jerry		DC_M5449	UCS	K.2.1
Gerber	John		DC_M5888	UCS	K.2.1
Gerlach	Trudy		DC_M6367	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Germanus	Andrea		DC_M5391	UCS	K.2.1
Gerrity	Sharon		DC_M1285	UCS	K.2.1
Gerster	Anne		DC_M1409	UCS	K.2.1
Gerster	Anne		DC_M5183	UCS	K.2.1
Gerster	E. Alexander		DC_M2924	UCS	K.2.1
Gervits	Kate		DC_M1657	UCS	K.2.1
Gfddrh	Hesss		DC_M1852	UCS	K.2.1
Gholson	Christien		DC_E0249		K.2.2
Giampa	Luciano		DC_M1796	UCS	K.2.1
Giantomasi	David		DC_M4548	UCS	K.2.1
Giarrizzo	Andrew		DC_M7799		K.2.1
Gibbions	John		DC_E0432		K.3.9
Gibbon	Roy		DC_M2777	UCS	K.2.1
Gibbons	Brian T		DC_M3096	UCS	K.2.1
Gibbons	Eva		DC_M0490		K.2.1
Gibbons	Eva		DC_M2842	UCS	K.2.1
Gibbons	Eva		DC_M3454	UCS	K.2.1
Gibbons	Jeanne		DC_M1311	UCS	K.2.1
Gibbs	Kathleen		DC_M2191	UCS	K.2.1
Gibbs	William		DC_M2909	UCS	K.2.1
Gibbs-Halm	Debbie		DC_M7062	UCS	K.2.1
Gibson	Carol		DC_M5825	UCS	K.2.1
Gibson	Janice		DC_M1436	UCS	K.2.1
Gibson	Jess		DC_M4398	UCS	K.2.1
Gibson	Robert		DC_M6774	UCS	K.2.1
Gicking	Barbara		DC_M3248	UCS	K.2.1
Giebink	Nancy		DC_M7546	UCS	K.2.1
Gierlach	Marian Baker		DC_M3210	UCS	K.2.1
Giesselbach	Ann		DC_M3459	UCS	K.2.1
Gifford	John	Diane Gifford	DC_M5618	UCS	K.2.1
Gilbert	Gail		DC_M0043		K.2.1
Gilbert	Heidi		DC_M0465		K.2.1
Gilbert	Judith		DC_M6661	UCS	K.2.1
Gilbert	Michael		DC_M5104	UCS	K.2.1
Gilbert	Phyllis		DC_E0405	Peace Action-Delaware Valley	K.3.1, K.3.3, K.3.4, K.3.6, K.3.7, K.3.11, K.3.12, K.3.15
Gilbert	Rachel		DC_M5169	UCS	K.2.1
Gilbert	Robert		DC_M1144	UCS	K.2.1
Gilbert	Robert	Patricia Gilbert	DC_M4784	UCS	K.2.1
Gilchrist	Siobhan		DC_M6418	UCS	K.2.1
Giles	Gail		DC_M6500	UCS	K.2.1
Giles	Jazer		DC_M2320	UCS	K.2.1
Giles	Kathy		DC_M6079	UCS	K.2.1
Giles	Marlene		DC_M2397	UCS	K.2.1
Gilgun	Michael		DC_M6100	UCS	K.2.1
Gill	Michael		DC_M1324	UCS	K.2.1
Gill	Sherrie		DC_M0432		K.2.1
Gillard	Richard		DC_M2125	UCS	K.2.1
Gillen	Christine		DC_M3448	UCS	K.2.1
Gillett	Julia Marie		DC_M4105	UCS	K.2.1
Gillis	Greg		DC_M6102	UCS	K.2.1
Gillman	Miki		DC_M5329	UCS	K.2.1
Gilman	Richard		DC_M6545	UCS	K.2.1
Gilmer	Peggy		DC_M1911	UCS	K.2.1
Ginestra	Margaret		DC_M0171		K.2.1
Giniewicz	Debbie		DC_M2848	UCS	K.2.1
Ginsburg	Michael		DC_M6286	UCS	K.2.1
Gioia	Benjamin		DC_M1702	UCS	K.2.1
Gioia	Benjamin		DC_M5425	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Gioia	Sarah		DC_M6988	UCS	K.2.1
Giraldo	Janiel		DC_M1507	UCS	K.2.1
Girffin	Kimberly		DC_M1511	UCS	K.2.1
Girjalva	Michael		DC_M0917	UCS	K.2.1
Gisick	Rodney		DC_M3904	UCS	K.2.1
Giuliani	Rachelle		DC_M7873		K.2.1
Gjessing	Helen		DC_M0335		K.2.1
Glamser	Peter		DC_M2285	UCS	K.2.1
Glanc	Ross		DC_M0896	UCS	K.2.1
Glanz	Filson		DC_E0355		K.3.2, K.3.3, K.3.6, K.3.11, K.3.12, K.3.15, K.4
Glasner	Lynne		DC_M7552	UCS	K.2.1
Glauser	Charlotte		DC_M3563	UCS	K.2.1
Glavina	Sonja		DC_M7010	UCS	K.2.1
Glavina	Vesna		DC_M7011	UCS	K.2.1
Gleason	Ann		DC_M5194	UCS	K.2.1
Gleason	Ann		DC_M5316	UCS	K.2.1
Gleason	Jessica		DC_M3064	UCS	K.2.1
Gleason	Richard		DC_M3060	UCS	K.2.1
Gleckel	Garry		DC_M6396	UCS	K.2.1
Glenn	Martha		DC_M3573	UCS	K.2.1
Glenn	Sarah		DC_M4803	UCS	K.2.1
Glenn	T		DC_M3408	UCS	K.2.1
Glick	Marion		DC_M3631	UCS	K.2.1
Glick	Mike		DC_M5918	UCS	K.2.1
Glimpse	Anne		DC_M0610		K.2.1
Glimpse	Anne		DC_M0624		K.2.1
Glissendorf	William		DC_M3968	UCS	K.2.1
Gliva	Dave		DC_M0718		K.2.1
Gliva	Stephen		DC_M0544		K.2.1
Glor	Poppy		DC_M1487	UCS	K.2.1
Glover	Emma		DC_PHO0056		K.3.2, K.3.11
Gluckman	Joan		DC_M4320	UCS	K.2.1
Glusker	Stephen		DC_M5078	UCS	K.2.1
Gluskini	Jason		DC_M0885	UCS	K.2.1
Gnezda	Anthony J		DC_M3292	UCS	K.2.1
Go	Jimmy		DC_M5036	UCS	K.2.1
Goding	Larry		DC_M4074	UCS	K.2.1
Godwin	Lara		DC_M4720	UCS	K.2.1
Godwin	Sherryanne		DC_M2913	UCS	K.2.1
Goebel	Jane		DC_M1509	UCS	K.2.1
Goebel	Katherine		DC_M0815	UCS	K.2.1
Goetinck	Jean		DC_M3075	UCS	K.2.1
Goff	Bruce		DC_M4702	UCS	K.2.1
Goff	Redux		DC_M5018	UCS	K.2.1
Gofman	Sheryl		DC_M3990	UCS	K.2.1
Goheen	Tamara		DC_M7587	UCS	K.2.1
Golban	Yasaman		DC_M0808	UCS	K.2.1
Goldberg	Freeda		DC_M5026	UCS	K.2.1
Goldberg	Ken		DC_M0948	UCS	K.2.1
Golden	Connie		DC_M0751		K.2.1
Golden	Jerry		DC_M4274	UCS	K.2.1
Goldfeder	Stanley		DC_M5198	UCS	K.2.1
Goldfeld	Anne		DC_M0723		K.2.1
Goldfinch	Albert		DC_M6926	UCS	K.2.1
Goldner	Ronald		DC_M0548		K.2.1
Goldsmith	Jane		DC_M5041	UCS	K.2.1
Goldstein	Carol Ann		DC_M6217	UCS	K.2.1
Goldstein	David		DC_M2002	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Goldstein	Gary		DC_M5304	UCS	K.2.1
Goldstein	Karl		DC_M7640	UCS	K.2.1
Goldstick	Corrine		DC_PHO0054		K.3.1
Goldthwaite	Robert		DC_M5212	UCS	K.2.1
Goldwaite	Lerea		DC_M5243	UCS	K.2.1
Golembeski	Ed		DC_M6849	UCS	K.2.1
Golis	Dale		DC_M2684	UCS	K.2.1
Golodik	Tom		DC_M2241	UCS	K.2.1
Golove	William		DC_M7490	UCS	K.2.1
Gols	Lorie		DC_M6572	UCS	K.2.1
Gomer	Kimberley		DC_M2279	UCS	K.2.1
Gomez	Angela		DC_M6605	UCS	K.2.1
Gomez	Carlos		DC_M2096	UCS	K.2.1
Gomez	Eleanor		DC_M4738	UCS	K.2.1
Gomez	Lenora		DC_M6731	UCS	K.2.1
Gomez	Maria L.		DC_M1519	UCS	K.2.1
Gomsi	Nellie G.		DC_M4645	UCS	K.2.1
Gonci	David		DC_M0898	UCS	K.2.1
Gonyo	Linda J.		DC_M4524	UCS	K.2.1
Gonzales	Paula		DC_M2747	UCS	K.2.1
Gonzalez	Concpecion		DC_M1491	UCS	K.2.1
Gonzalez	Lisa		DC_M2215	UCS	K.2.1
Gonzalez	Lisa		DC_M6524	UCS	K.2.1
Gonzalez	Rob		DC_M1257	UCS	K.2.1
Gonzalez	Stephen		DC_PHO0028		K.3.13, K.3.15
Goode	Deborah		DC_M3690	UCS	K.2.1
Goodell	Adele		DC_M3635	UCS	K.2.1
Goodell	Adele		DC_M3636	UCS	K.2.1
Goodell	Adele		DC_M4900	UCS	K.2.1
Goodin	Ben		DC_M5204	UCS	K.2.1
Goodmaker	Greg		DC_M7422	UCS	K.2.1
Goodman	E.		DC_M4785	UCS	K.2.1
Goodman	Ellen		DC_M3878	UCS	K.2.1
Goodman	Jerry		DC_M1146	UCS	K.2.1
Goodman	Jerry		DC_M7743		K.2.3
Goodman	Jodi		DC_M3524	UCS	K.2.1
Goodman	Linda		DC_M0136		K.2.1
Goodman	Shelley		DC_M3501	UCS	K.2.1
Goodman	Sidney		DC_E0052		K.3.2, K.3.4, K.3.10, K.3.13
Goodman	Sidney J.		DC_M1357	UCS	K.2.1
Goodrich	John H.		DC_M1157	UCS	K.2.1
Goodwin	A.		DC_M7930		K.2.1
Goolsby	Virginia		DC_M2253	UCS	K.2.1
Goosey	Doug		DC_M5486	UCS	K.2.1
Gorby	Heather		DC_M2379	UCS	K.2.1
Gordley	D. Janet		DC_M6725	UCS	K.2.1
Gordon	Bradley		DC_M0153		K.2.1
Gordon	John		DC_M4890	UCS	K.2.1
Goring	Brent		DC_M2701	UCS	K.2.1
Gorman	Brian		DC_M5671	UCS	K.2.1
Gorman	Kathleen		DC_E0238		K.3.3, K.3.4, K.3.5, K.3.12
Gormann	Paul		DC_M6698	UCS	K.2.1
Gorringe	Richard		DC_M5622	UCS	K.2.1
Gorton	Kevin		DC_M4560	UCS	K.2.1
Gorzelsky	Gwen		DC_M1765	UCS	K.2.1
Goth	George		DC_M0027		K.3.2, K.3.7, K.3.10
Gottemoeller	Madeline		DC_M7373	UCS	K.2.1
Gottlieb	Seymour		DC_M0563		K.2.1
Gottschalk	Lyn		DC_M1965	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Gould	Laura		DC_E0155		K.3.1, K.3.7
Gould	Robert		DC_E0424	PSR-former national president, current SF president	K.3.2, K.3.3, K.3.4, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Govedare	Joan		DC_M0181		K.3.2, K.3.3, K.3.4, K.3.5, K.3.7, K.3.10, K.3.11, K.3.13, K.3.14, K.3.15
Govedare	Joan		DC_M5345	UCS	K.2.1
Gover	Mary		DC_M5914	UCS	K.2.1
Governale	John		DC_M3411	UCS	K.2.1
Goynes	Beverlee		DC_M3995	UCS	K.2.1
Grabert	Christian		DC_M7392	UCS	K.2.1
Grace	Amy		DC_M7645	UCS	K.2.1
Grace	Kerri		DC_M0795	UCS	K.2.1
Grace	R. Mark		DC_M3609	UCS	K.2.1
Gradler	Patricia		DC_M1118	UCS	K.2.1
Graf	Kenneth		DC_M4916	UCS	K.2.1
Graham	Charlie		DC_M6408	UCS	K.2.1
Graham	Helen		DC_M0014		K.2.2
Graham	Holly		DC_E0069		K.2.2
Graham	Kenneth		DC_M4792	UCS	K.2.1
Graham	Kimberley		DC_M7119	UCS	K.2.1
Graham	Susan		DC_M4980	UCS	K.2.1
Grainer	Aimee		DC_M0949	UCS	K.2.1
Granat	Gary		DC_M3103	UCS	K.2.1
Granick	Lawrence		DC_M1159	UCS	K.2.1
Grant	Bette		DC_M5462	UCS	K.2.1
Grant	Gordon		DC_M4559	UCS	K.2.1
Grant	John		DC_E0247		K.3.1, K.3.2, K.3.10, K.3.15
Grant	Michael		DC_M0073		K.2.1
Grant	Miles		DC_M2970	UCS	K.2.1
Grasmeyer	Joel		DC_M5726	UCS	K.2.1
Grassia	Arianna		DC_M0366		K.2.1
Grassia	Linda		DC_M2139	UCS	K.2.1
Graue	Walter		DC_M6614	UCS	K.2.1
Grauer	Steven		DC_M7190	UCS	K.2.1
Grauman	Hilda		DC_E0117		K.2.3
Gravely	Brittany		DC_M7781		K.3.2, K.3.3, K.3.4, K.3.5, K.3.7, K.3.10, K.3.11, K.3.13, K.3.15
Graves	Mary		DC_M5721	UCS	K.2.1
Gray	Allan		DC_M6223	UCS	K.2.1
Gray	Carol		DC_M1486	UCS	K.2.1
Gray	Corinda		DC_M3744	UCS	K.2.1
Gray	Debbie		DC_E0120		K.2.3
Gray	Erica		DC_M3101	UCS	K.2.1
Gray	Katherine		DC_M7485	UCS	K.2.1
Gray	Lynne		DC_M0154		K.2.1
Gray	Mary		DC_M2128	UCS	K.2.1
Gray	Sumner		DC_E0029		K.3.1, K.3.2, K.3.7
Gray-See	Lisa		DC_M6677	UCS	K.2.1
Greaney	Dan		DC_M2757	UCS	K.2.1
Greco	Claudia		DC_M4750	UCS	K.2.1
Greek	Ragnhild		DC_E0239		K.2.2
Greemann	Ellen		DC_M7271	UCS	K.2.1
Green	Alan		DC_M0899	UCS	K.2.1
Green	Barbara		DC_M5862	UCS	K.2.1
Green	Barbara L		DC_M0489		K.2.1
Green	Ben		DC_M0556		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Green	Heather Meeker		DC_M7651	UCS	K.2.1
Green	J.M.		DC_M7410	UCS	K.2.1
Green	Joel		DC_M7837		K.2.1
Green	Judith	James Kurtz	DC_M7746		K.3.2, K.3.4, K.3.5, K.3.7, K.3.10, K.3.11, K.3.13, K.3.14, K.3.15
Green	Judith	James Kurtz	DC_M7747		K.3.2, K.3.4, K.3.5, K.3.7, K.3.10, K.3.11, K.3.13, K.3.14, K.3.15
Green	Juli		DC_E0259	Loyola Society for Civil Engagement	K.3.3, K.3.13
Green	Lance		DC_M4170	UCS	K.2.1
Green	Mary		DC_M2339	UCS	K.2.1
Green	Michael		DC_E0076	Professor of Chemistry City College	K.3.7, K.3.10, K.3.14
Green	Mike		DC_M3185	UCS	K.2.1
Green	Pamela		DC_M1252	UCS	K.2.1
Green	Steve		DC_M4876	UCS	K.2.1
Green	Vanessa		DC_M0587		K.2.1
Green	Theresa		DC_M6434	UCS	K.2.1
Greenberg	Jill		DC_M3528	UCS	K.2.1
Greenberrg	Ulla		DC_M6723	UCS	K.2.1
Greene	Eileen		DC_M7844		K.2.1
Greene	Linda		DC_M1009	UCS	K.2.1
Greene	Minna		DC_M3286	UCS	K.2.1
Greene	Tracia		DC_M6664	UCS	K.2.1
Greenfield	Dawn		DC_E0328		K.2.2
Greenfield	Dawn		DC_M0254		K.2.2
Greenfield	Mark		DC_M5042	UCS	K.2.1
Greenfield	Veronica		DC_E0356		K.2.2
Greensfelder	Roger		DC_M3061	UCS	K.2.1
Greensfelder	Roger		DC_M3098	UCS	K.2.1
Greenspan	Emily R.		DC_M6726	UCS	K.2.1
Greenstein	Michele		DC_M3328	UCS	K.2.1
Greenwald	Virginia		DC_M1691	UCS	K.2.1
Greenway	Lumina		DC_M6564	UCS	K.2.1
Greenwell	Donna		DC_M2821	UCS	K.2.1
Greenwell	Jack		DC_E0352		K.2.2
Greenwell	Neil		DC_E0386		K.3.2, K.3.3, K.3.6, K.3.7, K.3.11, K.3.12, K.3.15
Greenwood	Ellen		DC_M7391	UCS	K.2.1
Gregg	Linda		DC_M0396		K.2.1
Gregory	Carol T		DC_M2925	UCS	K.2.1
Gregory	Marc		DC_M2723	UCS	K.2.1
Gregory	MaryAnn		DC_M2515	UCS	K.2.1
Gregory	William J.		DC_M5393	UCS	K.2.1
Gregson	Rodney		DC_M6962	UCS	K.2.1
Greiner	Sarah		DC_M5263	UCS	K.2.1
Greiner	Tony		DC_M6600	UCS	K.2.1
Gresko	Michael		DC_M3900	UCS	K.2.1
Gress	Archie		DC_M1025	UCS	K.2.1
Greyraven	Ruth		DC_M7772		K.2.1
Grib	Dawn		DC_M5590	UCS	K.2.1
Gries	Susan		DC_M1990	UCS	K.2.1
Griffin	Colton		DC_M4492	UCS	K.2.1
Griffin	Colton		DC_M6271	UCS	K.2.1
Griffin	Colton		DC_M7292	UCS	K.2.1
Griffin	K		DC_M6512	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Griffin	Virginia		DC_M7867		K.2.3
Griffith	Ellen B.		DC_M3350	UCS	K.2.1
Griffith	Paul		DC_M7948		K.2.1
Griffith	Robert		DC_M4037	UCS	K.2.1
Griffith	Ryan		DC_M7273	UCS	K.2.1
Griffith	Margaret		DC_M4858	UCS	K.2.1
Griffiths	Susan		DC_M4635	UCS	K.2.1
Griffiths	Susan Alice		DC_M2858	UCS	K.2.1
Grigaltchik	Veronica		DC_M5500	UCS	K.2.1
Griggs	Linda		DC_M3826	UCS	K.2.1
Grillo	John		DC_M7915		K.2.1
Grimes	Elizabeth		DC_M4972	UCS	K.2.1
Grimesey	David		DC_M5476	UCS	K.2.1
Grimm	Cody		DC_M5912	UCS	K.2.1
Grimm	Cody		DC_M5913	UCS	K.2.1
Grimm	Sharon		DC_M6740	UCS	K.2.1
Grinstein	Geoffrey		DC_M7919		K.2.3
Grisel	Judy		DC_M7580	UCS	K.2.1
Griswold	Lyman W.		DC_M1692	UCS	K.2.1
Griswold	Lyman W.		DC_M1694	UCS	K.2.1
Griswold	Lyman W.		DC_M5456	UCS	K.2.1
Groff	Robert		DC_M0750		K.2.1
Grommon	Gary		DC_M2769	UCS	K.2.1
Groobert	Lawrene		DC_M7637	UCS	K.2.1
Groome	Malcolm		DC_M6855	UCS	K.2.1
Groover	Marian		DC_M4520	UCS	K.2.1
Groshardt	Joanne		DC_M7944		K.2.1
Gross	Mike		DC_M6940	UCS	K.2.1
Gross	William		DC_M3565	UCS	K.2.1
Grossman	Bonnie Dale		DC_M7014	UCS	K.2.1
Grossman	Janet		DC_M0691		K.2.1
Grote	Jan		DC_M1581	UCS	K.2.1
Grounds	Jenny	Sue Wareham	DC_F0007	Medical Association for Prevention of War (Australia)	K.3.1, K.3.2, K.3.3, K.3.4, K.3.5, K.3.11, K.3.12, K.3.13, K.3.15
Grover	Kevin		DC_M6214	UCS	K.2.1
Grover	Mark		DC_M6230	UCS	K.2.1
Grover	Ravi		DC_M7767		K.2.1
Gruber	Kenneth		DC_M1143	UCS	K.2.1
Grumman	Helen B.		DC_M0857	UCS	K.2.1
Grupp	Arthur		DC_M0620		K.2.1
Guardado	Rochelle		DC_M1199	UCS	K.2.1
Gubelman	Erin		DC_M4422	UCS	K.2.1
Guchemand	Margaret		DC_M0853	UCS	K.2.1
Gudgell	Orion		DC_M6647	UCS	K.2.1
Guenther	Michelle L.		DC_M1033	UCS	K.2.1
Guenther	Ruth		DC_M1316	UCS	K.2.1
Guerrero	Wendi		DC_M1654	UCS	K.2.1
Guida	Georgia		DC_M5100	UCS	K.2.1
Guilbault	Lauralee F		DC_M2602	UCS	K.2.1
Guillemard	Claude		DC_M7730		K.2.1
Gula	Patricia		DC_M7554	UCS	K.2.1
Gulick	Elizabeth		DC_M5863	UCS	K.2.1
Gullerud	Lois		DC_M0829	UCS	K.2.1
Gullick	Ben		DC_M5313	UCS	K.2.1
Gumban	Cristeta B.		DC_M2926	UCS	K.2.1
Gundersen	Jody		DC_M7905		K.2.1
Gunn	Kathryn		DC_M2259	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Gunter	Karlene		DC_F0001	Union of Concerned Scientists	K.3.7, K.3.10, K.3.14
Gunther	Peter		DC_M2551	UCS	K.2.1
Gunzel	Fred		DC_M2740	UCS	K.2.1
Gurevich	Vsevolod		DC_M0395		K.2.1
Gustafson	Chris		DC_M6127	UCS	K.2.1
Gutelius	Ken		DC_E0340		K.3.1, K.3.2, K.3.15
Guth	Jody		DC_M2627	UCS	K.2.1
Gutherie	Stephen	Jeanie Gutherie	DC_M4035	UCS	K.2.1
Gutherie	Taza		DC_M2676	UCS	K.2.1
Guthrie	Chris		DC_M3748	UCS	K.2.1
Guthrie	Elizabeth K.		DC_M6510	UCS	K.2.1
Guthrie	Elizabeth K.		DC_M6534	UCS	K.2.1
Guthrie	Pam		DC_M7439	UCS	K.2.1
Gutkowski	Marie		DC_M3541	UCS	K.2.1
Gutman	Mark		DC_M0419		K.2.1
Gutman	Mark		DC_M5333	UCS	K.2.1
Guyer	Tracy		DC_M6431	UCS	K.2.1
Gwyn	Martha		DC_M1547	UCS	K.2.1
Gwyn	Martha		DC_M1548	UCS	K.2.1
Gwyn	Martha		DC_M1551	UCS	K.2.1
Gwynneth	Mark		DC_E0339		K.3.1, K.3.3, K.3.4, K.3.7, K.3.11, K.3.12, K.3.15
H	Jen		DC_M4955	UCS	K.2.1
Haag	Mathew		DC_M3523	UCS	K.2.1
Haas	Jeff		DC_M7108	UCS	K.2.1
Haas	Margaret		DC_M5135	UCS	K.2.1
Haase	Richard		DC_M7933		K.2.1
Habenicht	Tania		DC_M2226	UCS	K.2.1
Hadler	Dale		DC_M1395	UCS	K.2.1
Hadley	Cami		DC_M4882	UCS	K.2.1
Hadley	Fawn		DC_PHO0034		K.3.18
Hadrawi	Abdul		DC_M2386	UCS	K.2.1
Hafeman	Dan		DC_M7691		K.2.1
Hafley	Sarah		DC_M0301		K.2.1
Haftl	Christine E.		DC_M1307	UCS	K.2.1
Hagelberger	Frank		DC_M5062	UCS	K.2.1
Haggbloom	Karen		DC_M1808	UCS	K.2.1
Haglund	Elaine		DC_M3078	UCS	K.2.1
Haglund	Roger		DC_M2815	UCS	K.2.1
Hagopian	James		DC_M3603	UCS	K.2.1
Hagstrom	Sean		DC_M1360	UCS	K.2.1
Hahn	Jill		DC_M3788	UCS	K.2.1
Hahn	Melissa		DC_M4401	UCS	K.2.1
Haible	John		DC_M5468	UCS	K.2.1
Haig	Maureen		DC_M6870	UCS	K.2.1
Haig	Thomas		DC_E0332	Col. USAF (retired)	K.3.2, K.3.3, K.3.5, K.3.6, K.3.7, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Haines	Karen		DC_M3022	UCS	K.2.1
Haines	Richard		DC_M0303		K.2.1
Haines	Robert		DC_M7335	UCS	K.2.1
Halderman	Terry		DC_M1291	UCS	K.2.1
Hale	Christine		DC_M3170	UCS	K.2.1
Haley	Debra		DC_M4879	UCS	K.2.1
Haley	Margie		DC_M6556	UCS	K.2.1
Hall	Alex		DC_M1416	UCS	K.2.1
Hall	Carl		DC_M6076	UCS	K.2.1
Hall	Elizabeth		DC_M6200	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Hall	Fred		DC_M4704	UCS	K.2.1
Hall	H. Eugene		DC_M1472	UCS	K.2.1
Hall	James		DC_M6622	UCS	K.2.1
Hall	Jean		DC_M5033	UCS	K.2.1
Hall	John		DC_M0831	UCS	K.2.1
Hall	Sach		DC_M6028	UCS	K.2.1
Hall	Steven		DC_M1448	UCS	K.2.1
Hall	Kay		DC_M4543	UCS	K.2.1
Hallahan	Janice		DC_M5631	UCS	K.2.1
Halley	Jack		DC_M2956	UCS	K.2.1
Halligan	Mary		DC_M4491	UCS	K.2.1
Hallinan	Rosemary		DC_E0143		K.2.3
Halloran	Neal		DC_M2350	UCS	K.2.1
Halmick	Michael S.		DC_M7625	UCS	K.2.1
Halpern	Lynn		DC_M0231		K.2.1
Halpern	Phyllis		DC_M2366	UCS	K.2.1
Halpert	Tasha		DC_M2756	UCS	K.2.1
Halpin	Tina		DC_M7359	UCS	K.2.1
Halward	Tracy		DC_M2717	UCS	K.2.1
Hamblen	Jennifer		DC_M0715		K.2.1
Hamel	David		DC_M4631	UCS	K.2.1
Hamel	Laura		DC_M6848	UCS	K.2.1
Hamel	Melissa		DC_M1779	UCS	K.2.1
Hamilton	Mary		DC_M4504	UCS	K.2.1
Hamilton	Mary		DC_M7115	UCS	K.2.1
Hamilton	Mary		DC_M7116	UCS	K.2.1
Hamilton	Traci		DC_M2169	UCS	K.2.1
Hamlin	Daniel	Caroline Hamlin	DC_M1184	UCS	K.2.1
Hammar	Timothy		DC_E0166		K.3.7, K.3.12, K.3.14
Hammarstrom	Bryn		DC_M3602	UCS	K.2.1
Hamme	Robyne		DC_M4125	UCS	K.2.1
Hammer	Amy		DC_M7224	UCS	K.2.1
Hammer	Elizabeth		DC_M7878		K.2.1
Hammock	Tony		DC_M5637	UCS	K.2.1
Hammond	Carol		DC_M2529	UCS	K.2.1
Hammond	James		DC_M1604	UCS	K.2.1
Hammond	Marcella		DC_M5544	UCS	K.2.1
Hammond	Stacy		DC_M6094	UCS	K.2.1
Hammond-Pettis	Elizabeth		DC_M4973	UCS	K.2.1
Hammons	Delia		DC_M5803	UCS	K.2.1
Hamon	Peter		DC_M2702	UCS	K.2.1
Hampton	Betty		DC_M4577	UCS	K.2.1
Hampton	Francesca		DC_M0401		K.2.1
Hamrick	J.C.		DC_M0076	Open Minds Open Doors	K.2.1
Hanchin	Barbara		DC_M0015		K.2.2
Hancock	Lee		DC_M1381	UCS	K.2.1
Handelsman	Robert		DC_E0199		K.3.14
Handler	Bernardine		DC_M4865	UCS	K.2.1
Hanisch	Erik		DC_M4416	UCS	K.2.1
Hanks	Jeanne		DC_M2819	UCS	K.2.1
Hanks	Laura		DC_M4634	UCS	K.2.1
Hanley	Denise		DC_M7207	UCS	K.2.1
Hanlon	Joan		DC_M4150	UCS	K.2.1
Hanna	Karel		DC_M5833	UCS	K.2.1
Hannon	Emilie		DC_M2825	UCS	K.2.1
Hannon	James		DC_M1127	UCS	K.2.1
Hanrahan	Meg		DC_M3628	UCS	K.2.1
Hanschka	Mark		DC_M5834	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Hansen	Amy		DC_M6499	UCS	K.2.1
Hansen	Brenda J.		DC_M0456		K.2.1
Hansen	Camilla	Aase Moeller Hansen, Eva Fidjestoel, Bhanumathi Natarajan, Marie Tjelta and Susanne Urban	DC_E0392	Bergen Peace Forum, Attac and Women's International League for Peace and Freedom	K.2.2
Hansen	Marcus		DC_M5680	UCS	K.2.1
Hansen	Peter		DC_M1823	UCS	K.2.1
Hanson	Art		DC_M0740		K.2.1
Hanson	Art		DC_M3110	UCS	K.2.1
Hanson	Art		DC_M5270	UCS	K.2.1
Hanson	Christine		DC_M3358	UCS	K.2.1
Hanson	Don		DC_M3094	UCS	K.2.1
Hanson	Donald J		DC_M7049	UCS	K.2.1
Hanson	Jennifer		DC_M2886	UCS	K.2.1
Hanson	Laura		DC_M7129	UCS	K.2.1
Hanson	Marcia		DC_M4348	UCS	K.2.1
Hanson	Natalie		DC_M0733		K.2.1
Hanson	Natalie		DC_M3158	UCS	K.2.1
Hanson	Natalie		DC_M3159	UCS	K.2.1
Hanson	Natalie		DC_M3169	UCS	K.2.1
Hanta	Hashi		DC_M1167	UCS	K.2.1
Harbst	Mark		DC_M7845		K.3.2, K.3.7, K.3.11
Harbus	Richard		DC_M7411	UCS	K.2.1
Harbutt	Charles		DC_M4798	UCS	K.2.1
Harclerode	Rebecca		DC_M2110	UCS	K.2.1
Harden	Brandi		DC_M1921	UCS	K.2.1
Hardersen	Paul		DC_M3910	UCS	K.2.1
Hardey	Pat	Jo An Bell	DC_M0253		K.2.2
Hardin	Judy		DC_M3516	UCS	K.2.1
Harding	Kevin		DC_M6038	UCS	K.2.1
Harding	Tara		DC_M7187	UCS	K.2.1
Hardwick	Barbara		DC_M0057		K.2.1
Hardy	Ann		DC_M7446	UCS	K.2.1
Hardy	Cherri		DC_M4689	UCS	K.2.1
Hardy	H Nick		DC_M5614	UCS	K.2.1
Hardy	Kenneth		DC_M6721	UCS	K.2.1
Hardy	Sharon		DC_M1880	UCS	K.2.1
Hargis-Bullen	Rachael		DC_M3865	UCS	K.2.1
Hargraves	Darla		DC_M0521		K.2.1
Hargraves	Darla		DC_M0525		K.2.1
Hargreave	Lynette		DC_M5827	UCS	K.2.1
Harig	Carl		DC_M3927	UCS	K.2.1
Harkins	Hugh		DC_M5017	UCS	K.2.1
Harley	Betts		DC_M6559	UCS	K.2.1
Harmon	Bobby		DC_M3398	UCS	K.2.1
Harmon	Joan		DC_M7812		K.2.1
Harms	Sharon		DC_M2184	UCS	K.2.1
Harp	Carol Lynn		DC_M3219	UCS	K.2.1
Harper	George M		DC_M7047	UCS	K.2.1
Harper	Jeannette		DC_M6049	UCS	K.2.1
Harper	Joseph and Patricia		DC_M1954	UCS	K.2.1
Harper	Julie		DC_M7325	UCS	K.2.1
Harper	Laura		DC_M1789	UCS	K.2.1
Harper	Marian		DC_M6304	UCS	K.2.1
Harper	Rebecca		DC_M6742	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Harper	Shannon		DC_M1712	UCS	K.2.1
Harrell	Ben		DC_M4140	UCS	K.2.1
Harrell	Nanka		DC_M2900	UCS	K.2.1
Harrer	Julie		DC_M7681	UCS	K.2.1
Harried	Michelle		DC_M6888	UCS	K.2.1
Harries	Thomas		DC_M5565	UCS	K.2.1
Harriman	Guy		DC_M7092	UCS	K.2.1
Harrington	Eileen		DC_M3901	UCS	K.2.1
Harrington	Margaret		DC_M2144	UCS	K.2.1
Harrington	Patrick		DC_M4782	UCS	K.2.1
Harris	Angie		DC_M2504	UCS	K.2.1
Harris	Carroll		DC_M1110	UCS	K.2.1
Harris	David	Sue Harris	DC_M1364	UCS	K.2.1
Harris	Emily		DC_M0362		K.2.1
Harris	Erin		DC_M2404	UCS	K.2.1
Harris	Joan		DC_M1639	UCS	K.2.1
Harris	Laura		DC_M7556	UCS	K.2.1
Harris	Melinda		DC_M7287	UCS	K.2.1
Harris	Michael		DC_M6589	UCS	K.2.1
Harris	Michelle		DC_M1800	UCS	K.2.1
Harris	Susan		DC_M4445	UCS	K.2.1
Harris	Dale		DC_M6082	UCS	K.2.1
Harrison	Dan		DC_M0370		K.2.1
Harrison	Mark		DC_M3672	UCS	K.2.1
Harrison	Richard		DC_M3417	UCS	K.2.1
Harrison	William		DC_M6010	UCS	K.2.1
Harrod	Annemarie		DC_M7859		K.2.1
Harrod	Katherine		DC_M1647	UCS	K.2.1
Hart	Becky		DC_M7748		K.2.1
Hart	Jess		DC_M6393	UCS	K.2.1
Hart	Joan		DC_M7354	UCS	K.2.1
Hart	Jess		DC_M6383	UCS	K.2.1
Harte	Julia		DC_M6353	UCS	K.2.1
Harte	Mary Ellen		DC_M6621	UCS	K.2.1
Harter	Theo		DC_M6827	UCS	K.2.1
Hartl	Ken		DC_M2691	UCS	K.2.1
Hartman	Julia		DC_M2633	UCS	K.2.1
Hartsough	David		DC_E0370	paceworkers/nonviolent Peaceforce	K.2.2
Harvey	Loreen		DC_M2354	UCS	K.2.1
Harvey-Marose	Kevin		DC_M3057	UCS	K.2.1
Harwood	Susana		DC_M7506	UCS	K.2.1
Haseltine	Allan		DC_M0416		K.2.1
Haseltine	Allan		DC_M1037	UCS	K.2.1
Hasenbein	Sister Francine		DC_M1847	UCS	K.2.1
Haslam	Malissa		DC_M5223	UCS	K.2.1
Hass	Marjorie		DC_M4373	UCS	K.2.1
Hassa	Linda		DC_M6112	UCS	K.2.1
Hass-Holcombe	Aleita		DC_E0277		K.2.2
Hassman	Howard		DC_M6527	UCS	K.2.1
Hastings	Sandie		DC_M0555		K.2.1
Hatfield	Lucretia		DC_M5701	UCS	K.2.1
Hathaway	Christopher		DC_M1706	UCS	K.2.1
Hatleberg	Earl		DC_M2912	UCS	K.2.1
Haugan	Anne E.		DC_M1421	UCS	K.2.1
Haugan	Janice		DC_M5756	UCS	K.2.1
Haugen	Lisa		DC_M7300	UCS	K.2.1
Haughton	Theodora		DC_M6162	UCS	K.2.1
Haughton	Theodora		DC_M7754		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Havercamp	Micheal		DC_M2089	UCS	K.2.1
Haverkamp	Patricia		DC_M7641	UCS	K.2.1
Hawkins	Dimity		DC_E0410/ DC_F0005	Medical Association for Prevention of War (Western Australian Branch)	K.3.9
Hawkins	Michaelynn		DC_M6054	UCS	K.2.1
Hawkins	Robert		DC_M3282	UCS	K.2.1
Hawkins	Shereen		DC_M4607	UCS	K.2.1
Hawrylik	Marilyn		DC_M4599	UCS	K.2.1
Hayaward	Barbara		DC_M0914	UCS	K.2.1
Hayaward	Barbara		DC_M4936	UCS	K.2.1
Haydamacha	Tina		DC_M4083	UCS	K.2.1
Hayden	William		DC_E0152		K.3.2, K.3.14
Hayes	Amy		DC_M7558	UCS	K.2.1
Hayes	David		DC_M5598	UCS	K.2.1
Hayes	Mark		DC_M7768		K.2.1
Hayes	Scott		DC_M5498	UCS	K.2.1
Haygood	Jay		DC_M7315	UCS	K.2.1
Hayhurst	Derek		DC_M0460		K.2.1
Haymon	David		DC_M1070	UCS	K.2.1
Hayner	April		DC_M5552	UCS	K.2.1
Haynes-Paton	T.		DC_E0236		K.3.3, K.3.10, K.3.12, K.3.13
Hays	Lynn		DC_M0236		K.2.2
Hays	Walter		DC_M5783	UCS	K.2.1
Hayward	Elizabeth		DC_M6943	UCS	K.2.1
Hayward	Judith		DC_M5945	UCS	K.2.1
Hayward	Rachel		DC_M5261	UCS	K.2.1
Hazelton	Harry		DC_M2008	UCS	K.2.1
Hazelton	J		DC_M0690		K.2.1
Hazen	Chad		DC_M0835	UCS	K.2.1
Hazen	Libby		DC_M3155	UCS	K.2.1
Hazlett	Stephanie		DC_M4409	UCS	K.2.1
Hazzard	Norman		DC_M3583	UCS	K.2.1
Heacker	Gina		DC_M7551	UCS	K.2.1
Head	Jeremy		DC_M3944	UCS	K.2.1
Head	Kevin		DC_M3885	UCS	K.2.1
Healthcoat	Elaine		DC_M6289	UCS	K.2.1
Heaps	Joan		DC_M6370	UCS	K.2.1
Heasom	William		DC_M7782		K.2.1
Heath	Al		DC_M1069	UCS	K.2.1
Heath	Rose		DC_M1205	UCS	K.2.1
Heathcoat	Elaine		DC_M2094	UCS	K.2.1
Hebert	Lee		DC_M2018	UCS	K.2.1
Heburn	Chet		DC_M2609	UCS	K.2.1
Hecht	Chris		DC_M5310	UCS	K.2.1
Hedlund	Nick		DC_M6929	UCS	K.2.1
Heeber	Alisa		DC_M2767	UCS	K.2.1
Heer	John		DC_M6344	UCS	K.2.1
Heeschen	Judith		DC_M3285	UCS	K.2.1
Hefner	Elizabeth		DC_M4565	UCS	K.2.1
Hegarty	Robert		DC_M3273	UCS	K.2.1
Hege	E. Keith		DC_M1181	UCS	K.2.1
Hegmann	Elisabeth		DC_M4609	UCS	K.2.1
Hegney	Scott		DC_M1617	UCS	K.2.1
Heiden	Jessica		DC_M6823	UCS	K.2.1
Heidt	Jeff		DC_M3189	UCS	K.2.1
Heil	Nicola		DC_M4223	UCS	K.2.1
Heil	Roselyn		DC_M2092	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Heimbach	La Yvonne		DC_M1284	UCS	K.2.1
Heinonen	Valerie		DC_M7841		K.2.3
Heinrich	Cybele		DC_M3831	UCS	K.2.1
Heinrich	Heidi		DC_M3790	UCS	K.2.1
Heinsch	Faith Ann		DC_M1795	UCS	K.2.1
Heisler	Mike		DC_M3869	UCS	K.2.1
Heitjan	Dorothy		DC_M1682	UCS	K.2.1
Heitman	Carolyn		DC_E0002		K.3.9
Heitman	Carolyn		DC_E0063		K.3.9
Heitman	Carolyn		DC_E0319		K.3.11, K.3.12, K.3.13, K.3.15, K.4
Heitsch	Irene		DC_M2599	UCS	K.2.1
Heitz	Gary		DC_M4313	UCS	K.2.1
Heitz	Rebecca D.		DC_M4585	UCS	K.2.1
Helferich	Molly R.		DC_M1433	UCS	K.2.1
Helland	Susan		DC_M4686	UCS	K.2.1
Heller	Marika		DC_M1986	UCS	K.2.1
Hellyer	Greg		DC_M1571	UCS	K.2.1
Helm	Pen		DC_M3999	UCS	K.2.1
Helmers	Nancy		DC_M0328		K.2.1
Helmes	Phyllis		DC_M4908	UCS	K.2.1
Helmin	Jenine		DC_M1627	UCS	K.2.1
Hemlin	Lila		DC_E0348		K.3.1, K.3.2, K.3.3, K.3.10, K.3.11, K.3.12
Henderson	Barbara		DC_M0546		K.2.1
Henderson	David		DC_M2195	UCS	K.2.1
Henderson	Dorea		DC_M0673		K.2.1
Henderson	Lillian		DC_M2344	UCS	K.2.1
Henderson	Phyllis		DC_M2146	UCS	K.2.1
Henderson	Roger C.		DC_M1251	UCS	K.2.1
Hendlish	Abe		DC_M0467		K.2.1
Hendon	Jodi		DC_M3396	UCS	K.2.1
Hendren	Lanette		DC_M5009	UCS	K.2.1
Hendricks	M.L.		DC_M7293	UCS	K.2.1
Hendrickson	Randy		DC_M7528	UCS	K.2.1
Henke	Jill		DC_M2666	UCS	K.2.1
Henke	Jill		DC_M7491	UCS	K.2.1
Henneman	Chip		DC_M5116	UCS	K.2.1
Hennessy	Al		DC_M5835	UCS	K.2.1
Hennigar	Logadia		DC_M1125	UCS	K.2.1
Henriksen	Helle		DC_M4174	UCS	K.2.1
Henry	Alvin		DC_M7321	UCS	K.2.1
Henry	Christopher		DC_M2718	UCS	K.2.1
Henry	Christopher		DC_M2784	UCS	K.2.1
Henry	David		DC_M7689		K.3.7, K.3.10, K.3.13, K.3.15
Henry	Russell		DC_M3594	UCS	K.2.1
Henry	Steve		DC_M3149	UCS	K.2.1
Henshaw	Mel		DC_M4640	UCS	K.2.1
Henze	Christine		DC_M2065	UCS	K.2.1
Herberger	Abby		DC_M1488	UCS	K.2.1
Herbert	Crystal		DC_M1361	UCS	K.2.1
Herbert	Crystal		DC_M1362	UCS	K.2.1
Herbert	Leigh		DC_E0309		K.2.2
Herbruck	Janet		DC_M5463	UCS	K.2.1
Herland	Holly J.		DC_M7089	UCS	K.2.1
Herman	Lee		DC_M5758	UCS	K.2.1
Hernandez	April		DC_M5210	UCS	K.2.1
Hernandez	Guillermo		DC_M3069	UCS	K.2.1
Herne	Jennifer		DC_M7649	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Herness	Michelle		DC_M6779	UCS	K.2.1
Hernon	Joseph		DC_M7712		K.3.14, K.3.17
Heron	Joan		DC_M0074		K.2.1
Herrera	Michelle		DC_M6715	UCS	K.2.1
Herrero	Marta		DC_M6796	UCS	K.2.1
Herrmann	Renita		DC_M4441	UCS	K.2.1
Herron	Wendy		DC_M2903	UCS	K.2.1
Hersey	Patricia		DC_M4260	UCS	K.2.1
Hershey	Randy		DC_M4310	UCS	K.2.1
Herstein	Gary		DC_M1599	UCS	K.2.1
Hervatin	Shirley		DC_M7131	UCS	K.2.1
Hess	Dan		DC_M4995	UCS	K.2.1
Hess	Joseph		DC_M4156	UCS	K.2.1
Hessen	Patti		DC_M0944	UCS	K.2.1
Hessenaur	Roxan		DC_M7369	UCS	K.2.1
Hessler	Gary		DC_M0820	UCS	K.2.1
Hetrick	Kay		DC_M4875	UCS	K.2.1
Hetzel	Bob		DC_E0227		K.3.1, K.3.3
Heuman	Christopher S.		DC_M1619	UCS	K.2.1
Hewitt	David W.		DC_M3743	UCS	K.2.1
Hewitt	Patricia		DC_M4878	UCS	K.2.1
Hewitt	Rosalie		DC_M6872	UCS	K.2.1
Heyde	Paul		DC_M2550	UCS	K.2.1
Hiatt	Richard		DC_M3275	UCS	K.2.1
Hickenbottom	Norman		DC_M4200	UCS	K.2.1
Hickman	Russ		DC_M2816	UCS	K.2.1
Hickman	Wendy		DC_M6318	UCS	K.2.1
Hicks	Amalia		DC_M2205	UCS	K.2.1
Hicks	David		DC_M4494	UCS	K.2.1
Hicks	Robert A.		DC_M1150	UCS	K.2.1
Hicks	Whitney		DC_M7725		K.2.1
Hieb	Andrew		DC_M1138	UCS	K.2.1
Higbee	Audrey		DC_M3389	UCS	K.2.1
Higgins	Beth		DC_M1292	UCS	K.2.1
Higgins	Beth		DC_M6163	UCS	K.2.1
Higgins	Brittany		DC_M2337	UCS	K.2.1
High	Mardy		DC_M5946	UCS	K.2.1
Highland	Anne		DC_M1306	UCS	K.2.1
Hilbrandt	Julia M.		DC_M6871	UCS	K.2.1
Hildebrandt	Joel		DC_M3163	UCS	K.2.1
Hildebrandt	Todd		DC_M2595	UCS	K.2.1
Hilder	Margaret		DC_M5993	UCS	K.2.1
Hilder	Rebecca		DC_M6130	UCS	K.2.1
Hilgerman	Mary Ann		DC_M4117	UCS	K.2.1
Hill	Frieda		DC_M7160	UCS	K.2.1
Hill	Gregory		DC_M5845	UCS	K.2.1
Hill	Joann		DC_M4952	UCS	K.2.1
Hill	Karen		DC_M7421	UCS	K.2.1
Hill	Maureen		DC_M0039		K.2.1
Hill	Rosco		DC_M4273	UCS	K.2.1
Hill	Suzanne		DC_M4314	UCS	K.2.1
Hilliard	Marion		DC_M7510	UCS	K.2.1
Hilson	Robert		DC_M6724	UCS	K.2.1
Hilton	Julie		DC_M1794	UCS	K.2.1
Hinchliffe	John		DC_M0255		K.2.2
Hinderstein	Karen		DC_M6777	UCS	K.2.1
Hinds	Marilyn		DC_M1453	UCS	K.2.1
Hines	Lisa		DC_M5412	UCS	K.2.1
Hines	Lori		DC_M4172	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Hinkley	Pat		DC_M5929	UCS	K.2.1
Hinman	Dorothy		DC_M4158	UCS	K.2.1
Hinman	Jan		DC_M7264	UCS	K.2.1
Hinnant	John		DC_M2814	UCS	K.2.1
Hinnant	John		DC_M5958	UCS	K.2.1
Hinnant	John		DC_M5961	UCS	K.2.1
Hinnebusch	Mark		DC_M4387	UCS	K.2.1
Hinz	Nicholas		DC_M7345	UCS	K.2.1
Hiramatsu	Sandra		DC_M0864	UCS	K.2.1
Hiramatsu	Sandra		DC_M7276	UCS	K.2.1
Hirsch	Barbara		DC_M5028	UCS	K.2.1
Hirsch	Cherie		DC_M3038	UCS	K.2.1
Hirsch	Harriet		DC_M4727	UCS	K.2.1
Hirt	James		DC_M5633	UCS	K.2.1
Hirt	Kristin		DC_M5724	UCS	K.2.1
Hirth	Carol		DC_M0873	UCS	K.2.1
Hise	Diane		DC_M7379	UCS	K.2.1
Hitch	Alan		DC_M5264	UCS	K.2.1
Hitchens	Theresa		DC_PHO0002	Center for Defense Information	K.4
Hitchens	Theresa		DC_PHW0003	Center for Defense Information	K.3.3, K.3.15, K.4
Hively	Jan		DC_E0224		K.2.2
Hlavna	Penny		DC_M3206	UCS	K.2.1
Hnatowich	Marcia		DC_M5095	UCS	K.2.1
Ho	Rebecca		DC_M3978	UCS	K.2.1
Hoad	Karin		DC_M1418	UCS	K.2.1
Hoaglund	Maria		DC_M0102		K.2.1
Hochberg	Harris		DC_M1754	UCS	K.2.1
Hock	Judy		DC_M0232		K.2.1
Hodgson	John		DC_M4576	UCS	K.2.1
Hoeh	Walter		DC_M4927	UCS	K.2.1
Hoerlein	Robert		DC_M7923		K.2.1
Hoerr	James		DC_M4632	UCS	K.2.1
Hoff	Marilyn		DC_E0286		K.3.1, K.3.2, K.3.3, K.3.5, K.3.11, K.3.13, K.3.15
Hoff	Marilyn		DC_M4391	UCS	K.2.1
Hoffberg	Judith		DC_M4146	UCS	K.2.1
Hoffer	Lois		DC_M7299	UCS	K.2.1
Hoffman	Frances		DC_E0254		K.2.2
Hoffman	Frances		DC_M1061	UCS	K.2.1
Hoffman	Stuart		DC_M4364	UCS	K.2.1
Hoffman	Stuart		DC_M7756		K.2.1
Hoffman	Valerie		DC_M6539	UCS	K.2.1
Hoffmann	Kit		DC_M2849	UCS	K.2.1
Hofman	James		DC_M7531	UCS	K.2.1
Hogan	Cynthia		DC_M3580	UCS	K.2.1
Hogan	Jennifer		DC_M5184	UCS	K.2.1
Hogu	Paul		DC_M4194	UCS	K.2.1
Hogue	Caroline		DC_M6458	UCS	K.2.1
Hohenberg	Adrienne		DC_M4948	UCS	K.2.1
Hohenemser	Chris		DC_M0058		K.3.1, K.10, K.3.11
Hoistad	Gerald		DC_M1805	UCS	K.2.1
Hojohn	Wendy		DC_M1367	UCS	K.2.1
Hokanson	Gene		DC_E0134		K.3.1, K.3.2, K.3.10, K.3.13, K.3.14
Holaday	Susan		DC_M5719	UCS	K.2.1
Holden	Michael		DC_M0794	UCS	K.2.1
Holden	Nichole		DC_M3620	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Holesovsky	Renee		DC_M0312		K.2.1
Holifield	Helen		DC_M2612	UCS	K.2.1
Holland	Loretta		DC_M6817	UCS	K.2.1
Holland	Ronald		DC_M1218	UCS	K.2.1
Holland	Theodore		DC_M6863	UCS	K.2.1
Hollenbach	Ruth		DC_M6368	UCS	K.2.1
Holley	James W.		DC_M4006	UCS	K.2.1
Hollis	Barbara		DC_M5541	UCS	K.2.1
Hollis	Megan		DC_M3669	UCS	K.2.1
Hollman	Fredde		DC_M7802		K.2.3
Holloway	Deborah		DC_M5093	UCS	K.2.1
Holloway	Deborah		DC_M6251	UCS	K.2.1
Holloway	Katherine		DC_E0383		K.3.1, K.3.2, K.3.12, K.3.15
Hollowell	Jennifer		DC_M7174	UCS	K.2.1
Holman	Tara		DC_M3372	UCS	K.2.1
Holmes	Joseph		DC_M4887	UCS	K.2.1
Holowicki	Tammy		DC_M5190	UCS	K.2.1
Holt	Jesse		DC_M0441		K.2.1
Holte	Inese		DC_M4618	UCS	K.2.1
Holtrop	Elizabeth Bouma		DC_M0129		K.2.1
Holtz	Eileen		DC_M3646	UCS	K.2.1
Holtzman	Michelle		DC_M1562	UCS	K.2.1
Homan	Dan		DC_M7797		K.3.7, K.3.13, K.3.15
Homer	Deanna		DC_M6892	UCS	K.2.1
Honish	David		DC_M2951	UCS	K.2.1
Hons	Thomas		DC_M0955	UCS	K.2.1
Hoo	Lanlan		DC_M4807	UCS	K.2.1
Hoodwin	Marcia		DC_M0616		K.2.1
Hooker	Betsey		DC_M7890		K.2.1
Hoover	Janet		DC_M6683	UCS	K.2.1
Hoover	Karen		DC_M2998	UCS	K.2.1
Hoover	Mary Anne		DC_M5284	UCS	K.2.1
Hoover	Tricia		DC_M5859	UCS	K.2.1
Hope	Elizabeth		DC_M1501	UCS	K.2.1
Hopf	David		DC_M7708		K.2.1
Hopkins	Steve		DC_M0162		K.3.14
Hopper	Pam		DC_M2929	UCS	K.2.1
Hopper	Thomas		DC_M6593	UCS	K.2.1
Horeluk	Tara		DC_M6299	UCS	K.2.1
Horenstine	Susan		DC_M3514	UCS	K.2.1
Hormann	Theo		DC_M0822	UCS	K.2.1
Horn	Bill		DC_M5448	UCS	K.2.1
Horn	Stephen		DC_M7877		K.2.1
Horn	Susan		DC_M5200	UCS	K.2.1
Hornberger	Susanne		DC_M0522		K.2.1
Horne	Jeff		DC_M7638	UCS	K.2.1
Horne	Kenneth		DC_M2063	UCS	K.2.1
Hornfeld	Gary		DC_M5003	UCS	K.2.1
Horning	Michelle		DC_M1297	UCS	K.2.1
Horst	Leslie		DC_M3763	UCS	K.2.1
Horton	Harriet		DC_M1718	UCS	K.2.1
Horwitz	Lawrence		DC_M4181	UCS	K.2.1
Hoskins	Catherine		DC_M7260	UCS	K.2.1
Hosler	Pamela		DC_M1500	UCS	K.2.1
Hosseinion	Ali		DC_PHO0021		K.3.2
Hostetter	Emily		DC_M5280	UCS	K.2.1
Hotchkiss	Babette		DC_M1156	UCS	K.2.1
Hough	Nancy		DC_M4580	UCS	K.2.1
Hough	Peggy		DC_M0340		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Houghton	Abigail		DC_M5453	UCS	K.2.1
Houghton	Alex		DC_M1302	UCS	K.2.1
Houghton	Jack		DC_M7606	UCS	K.2.1
Houle	Janet		DC_M0568		K.2.1
House	Vanessa		DC_M4500	UCS	K.2.1
Houser	Jerry		DC_M2657	UCS	K.2.1
Houston	Dorothy		DC_PHO0016		K.3.1, K.3.2, K.3.3, K.3.4, K.3.5, K.3.11
Houston	Lynn		DC_E0005		K.2.2
Houston	Lynn		DC_M2480	UCS	K.2.1
Houston	Matthew Travis		DC_M0155		K.2.1
Houston	Robert		DC_M3758	UCS	K.2.1
Hovey	Amanda		DC_M3399	UCS	K.2.1
Howald	Shanna		DC_M2543	UCS	K.2.1
Howald	William		DC_M5799	UCS	K.2.1
Howard	Alice		DC_M7740		K.2.3
Howard	David		DC_M6927	UCS	K.2.1
Howard	Graham		DC_M4864	UCS	K.2.1
Howard	Jessica		DC_M4713	UCS	K.2.1
Howard	Steven		DC_E0021		K.3.1, K.3.2, K.3.3, K.3.4, K.3.12, K.3.13, K.3.15
Howard	Theodore		DC_M3046	UCS	K.2.1
Howard	William		DC_M4033	UCS	K.2.1
Howatt	G		DC_M7896		K.2.1
Howd	Robert		DC_E0376	Office of Environmental Health Hazard Assessment Oakland, CA 94612	K.4
Howe	Jared		DC_M7458	UCS	K.2.1
Howell	Marilyn		DC_M2877	UCS	K.2.1
Howells	Lynda		DC_M2867	UCS	K.2.1
Hower	Judith		DC_M0086		K.2.1
Howse	Robin		DC_M2190	UCS	K.2.1
Hoyer	Eric		DC_M3681	UCS	K.2.1
Hruska	Elias		DC_M4710	UCS	K.2.1
Hsieh	Efan		DC_M6023	UCS	K.2.1
Hsu	Margaret		DC_M5703	UCS	K.2.1
Hubard	Libby		DC_E0216		K.3.3, K.3.12, K.3.15, K.4
Hubbell	Paige		DC_M1493	UCS	K.2.1
Huber	Ernest		DC_M3823	UCS	K.2.1
Huber	Gerald		DC_M7677	UCS	K.2.1
Huckins	George		DC_M4667	UCS	K.2.1
Huddlestone	Laura		DC_M5759	UCS	K.2.1
Hudgins	Andrew		DC_M2133	UCS	K.2.1
Hudgins	William G.		DC_M5133	UCS	K.2.1
Hudleson	Nordica		DC_M5749	UCS	K.2.1
Hudnall	Eric		DC_M0717		K.2.1
Hudnell	Alan		DC_M2045	UCS	K.2.1
Hudnut	Robert		DC_M3828	UCS	K.2.1
Hudock	Jim		DC_M4009	UCS	K.2.1
Hudson	Laura		DC_M4429	UCS	K.2.1
Hudson	Leslie J.		DC_M2944	UCS	K.2.1
Hudson	Rick		DC_M0654		K.2.1
Huebner	Albert		DC_M3935	UCS	K.2.1
Huebner	Tanya		DC_M5906	UCS	K.2.1
Huemmer	Nick		DC_M1050	UCS	K.2.1
Huerta	Ernest		DC_M3449	UCS	K.2.1
Huff	Lisa		DC_M0462		K.2.1
Huff	Lisa		DC_M7608	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Huffman	Amie		DC_M2209	UCS	K.2.1
Huffman	Margaret L.		DC_M4569	UCS	K.2.1
Hugel	Paul		DC_M1922	UCS	K.2.1
Huggins	Irene		DC_M5880	UCS	K.2.1
Hughes	Angie		DC_M5553	UCS	K.2.1
Hughes	Jennifer		DC_M5287	UCS	K.2.1
Hughes	K.A.		DC_M0939	UCS	K.2.1
Hughes	Linda		DC_E0323		K.2.2
Hughes	Patricia		DC_M7471	UCS	K.2.1
Hughes	Robert M.		DC_M3700	UCS	K.2.1
Huidobro	Michael		DC_M3737	UCS	K.2.1
Huie	Serena		DC_M4537	UCS	K.2.1
Hull	Lucy		DC_M6977	UCS	K.2.1
Hull	Margaret		DC_M0952	UCS	K.2.1
Hull	Markwood		DC_M6239	UCS	K.2.1
Hulse	Elyse		DC_M4300	UCS	K.2.1
Hultgren	David		DC_M4421	UCS	K.2.1
Hume	Peter		DC_M3484	UCS	K.2.1
Humes	Leah		DC_M6778	UCS	K.2.1
Humke	Patrice		DC_M4826	UCS	K.2.1
Humme	Cheryl		DC_M1454	UCS	K.2.1
Hunn	Gail		DC_M7454	UCS	K.2.1
Hunt	Carole		DC_M1786	UCS	K.2.1
Hunt	James		DC_M2145	UCS	K.2.1
Hunter	Kay		DC_M4333	UCS	K.2.1
Huntman	Bret		DC_M6958	UCS	K.2.1
Hurban	Richard		DC_E0118		K.3.14
Hurd	John		DC_E0296		K.2.2
Hurd	John		DC_M6232	UCS	K.2.1
Hurlbert	Ronald		DC_M1382	UCS	K.2.1
Hurley	Bridget		DC_M0972	UCS	K.2.1
Hurliman	Bonnie		DC_M4849	UCS	K.2.1
Hurte	Nancy		DC_M6975	UCS	K.2.1
Hurwitz	Art		DC_M1658	UCS	K.2.1
Hurwitz	Debbie		DC_M2317	UCS	K.2.1
Hussey	Ikaika		DC_PHO0058		K.3.1, K.3.4, K.3.11, K.3.12, K.3.15, K.4
Hutchings	Noel		DC_M1837	UCS	K.2.1
Hutchins	Karmen		DC_M6704	UCS	K.2.1
Hutchinson	Peggy		DC_M7386	UCS	K.2.1
Hutchinson	Randi		DC_M7456	UCS	K.2.1
Hutchison	Judith		DC_M5246	UCS	K.2.1
Hutton	Micheal S		DC_M3227	UCS	K.2.1
Hutton	Stephanie		DC_M6836	UCS	K.2.1
Hyatt	Don		DC_M7332	UCS	K.2.1
Hyatt	Donna		DC_M4160	UCS	K.2.1
Hyatt	Donna		DC_M4162	UCS	K.2.1
Hyde	Ralph		DC_M2722	UCS	K.2.1
Hyde	Ralph		DC_M2724	UCS	K.2.1
Hydeman	Jinx		DC_M2883	UCS	K.2.1
Hyder	Sherrie		DC_M0945	UCS	K.2.1
Hydro	Mary		DC_M5392	UCS	K.2.1
Hyers	Anisha		DC_M7256	UCS	K.2.1
Hyman	Rudoff		DC_E0037		K.2.2
Hymer	Monica		DC_M1145	UCS	K.2.1
Hynes	Kathryn A		DC_M2232	UCS	K.2.1
Iacono	David J.		DC_M0538		K.2.1
Iannone	Karen		DC_M1579	UCS	K.2.1
Ibison	Micahael		DC_E0142		K.3.14, K.4

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Ichiriu	Ed		DC_M3430	UCS	K.2.1
Ievins	Janet		DC_M1354	UCS	K.2.1
Ignacio	Christine		DC_M2679	UCS	K.2.1
Ilardi	Virginia		DC_M7093	UCS	K.2.1
illedgible	William		DC_M0034		K.2.1
Iltzsche	William		DC_M5966	UCS	K.2.1
Imbody	Ellen		DC_M6161	UCS	K.2.1
Ingalsbe	David		DC_M7433	UCS	K.2.1
Ingerman	Karen		DC_M6327	UCS	K.2.1
Inglehart	Debbie		DC_M1861	UCS	K.2.1
Inglis	William		DC_M2073	UCS	K.2.1
Ingraham-Malchow	Tami		DC_M1602	UCS	K.2.1
Ingram	Shawn		DC_M2439	UCS	K.2.1
Inkip	Eleanor		DC_M4863	UCS	K.2.1
Inouye	Arlene		DC_M6132	UCS	K.2.1
Inouye	Brain		DC_M6014	UCS	K.2.1
Inouye	Brian		DC_E0173		K.3.14
Interis	Evelyn		DC_M7487	UCS	K.2.1
Intili	Celia		DC_M7815		K.2.1
Ipock	Dorita		DC_M4360	UCS	K.2.1
Iracki	Donna		DC_M2332	UCS	K.2.1
Ireland	Linda		DC_M7800		K.2.3
Ireland-Frey	Louise		DC_M4480	UCS	K.2.1
Irion	Lindsay		DC_M6747	UCS	K.2.1
Irwin	Harry		DC_M2132	UCS	K.2.1
Isenman	Donald Carl		DC_M0421		K.2.1
Isenman	Donald Carl		DC_M7922		K.2.1
Isensee	Chris		DC_M2208	UCS	K.2.1
Islan	Hampton		DC_E0279		K.2.2
Italiano	Debra		DC_M0309		K.2.1
Ivankovic	Anthony		DC_M6051	UCS	K.2.1
Iverson	Karen		DC_M2408	UCS	K.2.1
Iverson	Miriam		DC_M7001	UCS	K.2.1
Ivy	A.T.		DC_M3301	UCS	K.2.1
Jabs	Sharon		DC_M7222	UCS	K.2.1
Jack Community Pharmacy			DC_M5202	UCS	K.2.1
Jackanicz	Theodore		DC_M1927	UCS	K.2.1
Jackowsky	Meredith		DC_M0614		K.2.1
Jackson	Amy		DC_M1928	UCS	K.2.1
Jackson	Carla		DC_M3546	UCS	K.2.1
Jackson	Diane		DC_M1485	UCS	K.2.1
Jackson	Erlene		DC_M4954	UCS	K.2.1
Jackson	Shawn		DC_M1504	UCS	K.2.1
Jackson	Stephanie		DC_M0598		K.2.1
Jackson	Tom	Tina Jackson	DC_M3311	UCS	K.2.1
Jackson	Tom		DC_M7234	UCS	K.2.1
Jackson	Tom & Tina		DC_M2029	UCS	K.2.1
Jackson	Vanessa		DC_M2173	UCS	K.2.1
Jackson	Vanessa		DC_M2361	UCS	K.2.1
Jackson	Weldon		DC_M5789	UCS	K.2.1
Jacob	Julie		DC_E0082		K.2.2
Jacob	Michael		DC_M7757		K.2.1
Jacobie	Ken		DC_M5885	UCS	K.2.1
Jacobs	Marilyn		DC_M0526		K.2.1
Jacobsen	Lynne		DC_M6790	UCS	K.2.1
Jacobson	Albert S.		DC_M4668	UCS	K.2.1
Jacoby	Jamie		DC_M3150	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Jacus	Anna		DC_E0368		K.2.3
Jaeger	Dieter		DC_M3023	UCS	K.2.1
Jaeger	Jennifer		DC_M6692	UCS	K.2.1
Jaffe	A		DC_M7543	UCS	K.2.1
Jaffe	Wilma		DC_M5236	UCS	K.2.1
Jakimowski	Michal		DC_M1780	UCS	K.2.1
James	Lowell		DC_M6208	UCS	K.2.1
Jamieson	Ellen		DC_M4581	UCS	K.2.1
Jamvold	Shunko		DC_M5384	UCS	K.2.1
Janeiro	Aurelio		DC_M2935	UCS	K.2.1
Jankowski	Ethan		DC_M5443	UCS	K.2.1
Jannone	Dan		DC_M4979	UCS	K.2.1
Janowitz-Price	Beverly		DC_M6160	UCS	K.2.1
Jansons	Andrejs		DC_M3821	UCS	K.2.1
Janssen	M.W.		DC_M1412	UCS	K.2.1
Janssen	Sarah		DC_M6348	UCS	K.2.1
Janus	Joan		DC_M0618		K.2.1
Janusko	Robert		DC_M6125	UCS	K.2.1
Janzen	Gayle		DC_M4584	UCS	K.2.1
Janzen	Shawn		DC_M3318	UCS	K.2.1
Jarboe	JoLynn		DC_M4202	UCS	K.2.1
Jarrell	Linda		DC_M1575	UCS	K.2.1
Jarvis	Scott		DC_M7360	UCS	K.2.1
Jaskoski	Helen		DC_M1241	UCS	K.2.1
Jaskowski	Helen		DC_PHO0015		K.3.1, K.3.13
Jaskowski	Mariusz		DC_M4442	UCS	K.2.1
Jasper	Lea Anne		DC_M7742		K.2.1
Javed	Diane		DC_M6197	UCS	K.2.1
Jawlick	Mary		DC_M0582		K.2.1
Jazzborne	September		DC_M4496	UCS	K.2.1
Jeanne	Kresser		DC_M6802	UCS	K.2.1
Jefferson	Kaneesah		DC_M7130	UCS	K.2.1
Jefferson	Kaneesha		DC_M4833	UCS	K.2.1
Jeffery	Raymond		DC_M3433	UCS	K.2.1
Jefferys	Alan		DC_E0222		K.3.4, K.3.11
Jeffrey	Daniel		DC_M4473	UCS	K.2.1
Jeffries	Michael		DC_E0335		K.2.2
Jeffries	Michael		DC_M0615		K.2.1
Jeffries	Michael		DC_M6763	UCS	K.2.1
Jeffries	Sherry		DC_M5875	UCS	K.2.1
Jelic	John		DC_M7320	UCS	K.2.1
Jelinek	Alexander		DC_M5320	UCS	K.2.1
Jelinek	Alexander		DC_M5899	UCS	K.2.1
Jenkens	Jesslyn		DC_M2281	UCS	K.2.1
Jenkins	Bonnie		DC_M5849	UCS	K.2.1
Jenkins	John L.		DC_M7465	UCS	K.2.1
Jenkins	Jon		DC_M0562		K.2.1
Jenkins	Michael		DC_E0360		K.3.9
Jennetten	Paul		DC_M3487	UCS	K.2.1
Jennings	Mary Alice		DC_M3902	UCS	K.2.1
Jensen	Kristina		DC_M5389	UCS	K.2.1
Jensen	Pamela		DC_M5611	UCS	K.2.1
Jenson	Paula		DC_M6110	UCS	K.2.1
Jerman	Kathy		DC_M3586	UCS	K.2.1
Jett	Marshall		DC_M2023	UCS	K.2.1
Ji	Angela		DC_M7598	UCS	K.2.1
Jijon	Humberto		DC_M7192	UCS	K.2.1
Jimenez	Salvador		DC_M5059	UCS	K.2.1
Jine	Karen		DC_M3257	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Jirles	Bill		DC_M0375		K.2.1
Joel	Kenneth		DC_M0195		K.3.2, K.3.14
Joerg	John		DC_M0445		K.2.1
Joffrain	Abigail		DC_M6096	UCS	K.2.1
Johannesen	Amy		DC_M6027	UCS	K.2.1
Johannesen	Amy		DC_M3225	UCS	K.2.1
Johannesen	Joahn		DC_M6571	UCS	K.2.1
John	Helen		DC_E0388	Womenwith Hill Women's Peace Campaign	K.3.4, K.3.5, K.3.6, K.3.11, K.3.11, K.3.12, K.3.15
Johns	Patrick		DC_M4934	UCS	K.2.1
Johnson	Ashley		DC_M3670	UCS	K.2.1
Johnson	Audrey		DC_M6347	UCS	K.2.1
Johnson	Ava-Dale		DC_M0113		K.3.2, K.3.3, K.3.4, K.3.7, K.3.11, K.3.12, K.3.15
Johnson	B		DC_M4460	UCS	K.2.1
Johnson	Brenda		DC_E0119	USGS	K.3.9
Johnson	Coriella		DC_M3026	UCS	K.2.1
Johnson	Donald W.		DC_M4493	UCS	K.2.1
Johnson	Douglas C.		DC_M0510		K.2.1
Johnson	Heidi		DC_M6659	UCS	K.2.1
Johnson	James		DC_M2766	UCS	K.2.1
Johnson	Janet		DC_M6193	UCS	K.2.1
Johnson	Janice		DC_M1924	UCS	K.2.1
Johnson	Jillian		DC_M5335	UCS	K.2.1
Johnson	Julie		DC_M6145	UCS	K.2.1
Johnson	Kersten		DC_M2927	UCS	K.2.1
Johnson	Lisa		DC_M3945	UCS	K.2.1
Johnson	Mary L.		DC_M6428	UCS	K.2.1
Johnson	Michael		DC_M5669	UCS	K.2.1
Johnson	Nancy		DC_M6830	UCS	K.2.1
Johnson	Nancy		DC_M6831	UCS	K.2.1
Johnson	Nicole		DC_M6486	UCS	K.2.1
Johnson	Paul		DC_M2865	UCS	K.2.1
Johnson	R.E.		DC_M2509	UCS	K.2.1
Johnson	R.M.		DC_M3231	UCS	K.2.1
Johnson	Raymond		DC_M3416	UCS	K.2.1
Johnson	Ron		DC_M2358	UCS	K.2.1
Johnson	Rose		DC_M0088		K.2.1
Johnson	Steve		DC_M7866		K.2.1
Johnson	Susan		DC_M5804	UCS	K.2.1
Johnson	Virginia		DC_M3339	UCS	K.2.1
Johnson	Joann		DC_M1430	UCS	K.2.1
Johnson-Grim	Anne		DC_M1397	UCS	K.2.1
Johnsrud	Robert		DC_E0350		K.3.3, K.3.12, K.3.13, K.3.15
Johnston	Ardis		DC_M6300	UCS	K.2.1
Johnston	Matthew		DC_M4367	UCS	K.2.1
Johnston	Tom		DC_P0004		K.3.2, K.3.14
Jones	Ann		DC_M2625	UCS	K.2.1
Jones	Ben		DC_M1561	UCS	K.2.1
Jones	Carole		DC_M2630	UCS	K.2.1
Jones	Cathleen		DC_M5794	UCS	K.2.1
Jones	Chris		DC_M4755	UCS	K.2.1
Jones	David H.		DC_M5188	UCS	K.2.1
Jones	Dayvid		DC_M1689	UCS	K.2.1
Jones	Eric		DC_M4593	UCS	K.2.1
Jones	Gwyneth		DC_M4671	UCS	K.2.1
Jones	Janna		DC_M5071	UCS	K.2.1
Jones	Jeff		DC_M1190	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Jones	Jeffrey		DC_M3390	UCS	K.2.1
Jones	Jeri		DC_M5791	UCS	K.2.1
Jones	Joan		DC_M3587	UCS	K.2.1
Jones	Judy		DC_M4712	UCS	K.2.1
Jones	Katherine		DC_M7095	UCS	K.2.1
Jones	Linda		DC_M7213	UCS	K.2.1
Jones	Mary		DC_M4780	UCS	K.2.1
Jones	Melissa		DC_M3397	UCS	K.2.1
Jones	Michael		DC_E0001		K.3.9
Jones	Michael		DC_E0023		K.3.9
Jones	Michael		DC_E0162	Department of Physics and Astronomy, Univ. of Hawaii	K.4
Jones	Michael		DC_PHO0044		K.4
Jones	Nicholas		DC_M1653	UCS	K.2.1
Jones	Rebecca		DC_M2282	UCS	K.2.1
Jones	Ruth F.		DC_M4969	UCS	K.2.1
Jones	Sandra		DC_M6638	UCS	K.2.1
Jones	Wendy		DC_M2003	UCS	K.2.1
Jongsma	Jonathon		DC_M5683	UCS	K.2.1
Jonkel	George		DC_M0201		K.3.10, K.3.14
Jordan	Ava		DC_M0156		K.2.2
Jordan	Callie		DC_M6546	UCS	K.2.1
Jordan	Lawrence		DC_M5174	UCS	K.2.1
Jordan	Michael		DC_M1624	UCS	K.2.1
Jordan	Nancy		DC_M6113	UCS	K.2.1
Jordan	Pete		DC_M0182		K.2.1
Jordan	Susan		DC_M4808	UCS	K.2.1
Jorgensen	James H		DC_M0545		K.2.1
Jorgenson	Rhodie		DC_M3278	UCS	K.2.1
Jorissen	Robert		DC_M0792	UCS	K.2.1
Jorstad	Jon		DC_M2273	UCS	K.2.1
Joseph	Nathan		DC_M4511	UCS	K.2.1
Josephs	Emmy	Clark Josephs	DC_M5492	UCS	K.2.1
Joshua	Sophia		DC_M1696	UCS	K.2.1
Joslin	David		DC_E0045		K.3.1, K.3.7, K.3.15
Jossi	Lynn		DC_M7888		K.3.2, K.3.3, K.3.7, K.3.10, K.3.14
Joyce	Patricia		DC_M4345	UCS	K.2.1
Juckes	Pauline		DC_M6550	UCS	K.2.1
Jud	Daniel		DC_M5319	UCS	K.2.1
Judd	Floyd		DC_E0065		K.3.8
Judge	Jane		DC_M6481	UCS	K.2.1
Judge	Steven		DC_M7536	UCS	K.2.1
Judson	Arnold		DC_E0124		K.3.1, K.3.3, K.3.14
Judson	Charles		DC_E0156		K.3.13, K.3.14
Judson	Sarah		DC_M4601	UCS	K.2.1
Judy	Randolph		DC_M4781	UCS	K.2.1
Julien	Lorraine		DC_E0311		K.3.1, K.3.2, K.3.10, K.3.11, K.3.15
Jurash	Andrew		DC_M3142	UCS	K.2.1
Juricic	Marilyn		DC_M2463	UCS	K.2.1
Jurkowski	Janine		DC_M4846	UCS	K.2.1
Jury	Elissa		DC_E0113		K.3.2, K.3.3, K.3.4, K.3.7, K.3.10, K.3.12, K.3.15
Just	Margaret		DC_M1913	UCS	K.2.1
Justen	Kathy		DC_M5317	UCS	K.2.1
Justesen	Evy		DC_M4242	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Justice	Sivita		DC_M2019	UCS	K.2.1
K	Doug		DC_M3553	UCS	K.2.1
K	Raquel		DC_M6045	UCS	K.2.1
K.	Laura		DC_M5069	UCS	K.2.1
Kadas	Linda		DC_M3261	UCS	K.2.1
Kaeser	Anne		DC_M6842	UCS	K.2.1
Kafkaloff	John		DC_M0907	UCS	K.2.1
Kahan	D.		DC_M3503	UCS	K.2.1
Kahl	Kim		DC_M3793	UCS	K.2.1
Kahle	Joyce		DC_M6336	UCS	K.2.1
Kahn	Eva M.		DC_M5109	UCS	K.2.1
Kahn	Jerome		DC_M7752		K.2.3
Kahn	Peter		DC_M3777	UCS	K.2.1
Kairys	Howard		DC_M2964	UCS	K.2.1
Kajihiro	Kyle		DC_E0008		K.3.9
Kajihiro	Kyle		DC_PHO0046	American Friends Service Committee	K.3.1, K.3.3, K.3.4, K.3.11, K.4
Kalbtleisch	George		DC_M7924		K.2.1
Kalicki	John		DC_M4392	UCS	K.2.1
Kalovsky	Robert		DC_M4094	UCS	K.2.1
Kaluzynski	Thomas		DC_M0196		K.3.7, K.3.11, K.3.12, K.3.15
Kalven	Janet		DC_M0910	UCS	K.2.1
Kamath	Tara		DC_M5898	UCS	K.2.1
Kameya	Patti		DC_M7448	UCS	K.2.1
Kamin	Russell		DC_M1059	UCS	K.2.1
Kaminsky	Jason		DC_M3939	UCS	K.2.1
Kamke	Jay		DC_M7209	UCS	K.2.1
Kammer	Marjorie		DC_M0016		K.3.1, K.3.4, K.3.6, K.3.10, K.3.11, K.3.12
Kandel	Cheryl		DC_M1764	UCS	K.2.1
Kandell	Paul		DC_M7557	UCS	K.2.1
Kane	Ailene		DC_M1096	UCS	K.2.1
Kane	John		DC_M0589		K.2.1
Kane	Joseph		DC_M4020	UCS	K.2.1
Kane	Sherman		DC_M4945	UCS	K.2.1
Kaneko	Sabine		DC_M1333	UCS	K.2.1
Kang	Betty		DC_M5163	UCS	K.2.1
Kannappan	Sheila		DC_M5743	UCS	K.2.1
Kanoff	Alexandra		DC_M6013	UCS	K.2.1
Kapan	Eric		DC_M2621	UCS	K.2.1
Kaplan	Jessica		DC_M0752		K.2.1
Kaplan	Robert B.		DC_M2765	UCS	K.2.1
Kaplan	Sarah		DC_M6798	UCS	K.2.1
Kapral	Olga		DC_M3751	UCS	K.2.1
Kapral	Olga		DC_M3754	UCS	K.2.1
Kardiak	Jennifer		DC_M2074	UCS	K.2.1
Karl	Jason		DC_M2797	UCS	K.2.1
Karlin	Tyler		DC_M2610	UCS	K.2.1
Karnowski	Sandi		DC_M1229	UCS	K.2.1
Karnowski	Sandi		DC_M2122	UCS	K.2.1
Karp	Michael		DC_M6700	UCS	K.2.1
Karp	Xantha		DC_M6944	UCS	K.2.1
Karpen	Leah		DC_M0017		K.3.1, K.3.2, K.3.3, K.3.6, K.3.7, K.3.10, K.3.13, K.3.15
Kasebier	Tracy		DC_M6009	UCS	K.2.1
Kaselow	Frederick		DC_M3926	UCS	K.2.1
Kaser	Ruth		DC_E0441		K.3.1, K.3.2, K.3.4, K.3.14
Kasper	Alexa		DC_M0030		K.3.4, K.3.11, K.3.12
Kasper	Ed		DC_M5295	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Kasper	James		DC_M7023	UCS	K.2.1
Kass	Jamie		DC_M3907	UCS	K.2.1
Kasten	Christine		DC_M5893	UCS	K.2.1
Kastern	William		DC_M3678	UCS	K.2.1
Kaszas	Jayne		DC_M4523	UCS	K.2.1
Katch	Jed		DC_M7705		K.2.1
Kateiva	Alberta		DC_M5710	UCS	K.2.1
Kathleen	Wroblewski		DC_M3388	UCS	K.2.1
Katten	DC		DC_M2863	UCS	K.2.1
Katten	DC		DC_M5967	UCS	K.2.1
Katz	Fern		DC_E0141		K.2.2
Katz	Sondra		DC_M3264	UCS	K.2.1
Katzenmeyer			DC_M3980	UCS	K.2.1
Katzenstein	Robin		DC_M7591	UCS	K.2.1
Katzin	William		DC_M3577	UCS	K.2.1
Kauffman	Caryn		DC_M5850	UCS	K.2.1
Kaufman	Katherine		DC_M1428	UCS	K.2.1
Kaufmann	Gina		DC_M0565		K.2.1
Kausher	Carol Y.		DC_M1833	UCS	K.2.1
Kay	Candace		DC_M2126	UCS	K.2.1
Kay	David		DC_M6455	UCS	K.2.1
Kay	Joni		DC_M3230	UCS	K.2.1
Kay	Sasha		DC_M6085	UCS	K.2.1
Kaye	Diana		DC_M1034	UCS	K.2.1
Kaymen	Scott		DC_M5151	UCS	K.2.1
Kayser	Roland		DC_M5730	UCS	K.2.1
Kayyal	Amjad		DC_M5220	UCS	K.2.1
Kean	Martha		DC_M4669	UCS	K.2.1
Kearns	D.		DC_M7220	UCS	K.2.1
Kearns	Sandy		DC_M6452	UCS	K.2.1
Keating	Katherine		DC_M1043	UCS	K.2.1
Keating-Secular	Karen		DC_M2798	UCS	K.2.1
Keech	Helen Cecelia		DC_M4068	UCS	K.2.1
Keefe	Frankie		DC_M4043	UCS	K.2.1
Keefe	Meghan		DC_M2238	UCS	K.2.1
Keefer	Julie D		DC_M2180	UCS	K.2.1
Keefer	Julie D.		DC_M7470	UCS	K.2.1
Keefer	Julie D.		DC_M7472	UCS	K.2.1
Keefer	Kristine		DC_M1813	UCS	K.2.1
Keeley	Diane		DC_M2200	UCS	K.2.1
Kee-Manon	Dylan		DC_M2506	UCS	K.2.1
Keenan	Tajha		DC_M1623	UCS	K.2.1
Keenan	Thomas D		DC_M3108	UCS	K.2.1
Keene	Margo		DC_M0190		K.2.1
Keene	Paul		DC_M3759	UCS	K.2.1
Keeney	Sharon		DC_M4481	UCS	K.2.1
Keeton	Dewey		DC_M6355	UCS	K.2.1
Keim	Anna		DC_M1319	UCS	K.2.1
Keitelman	Mary		DC_M3080	UCS	K.2.1
Keith	Novella		DC_M4431	UCS	K.2.1
Kekoolani	Terri		DC_PHO0051		K.3.1, K.3.4, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Kelleher	Stephen		DC_M5234	UCS	K.2.1
Keller	Charlotte		DC_M5053	UCS	K.2.1
Keller	Jill		DC_M3554	UCS	K.2.1
Keller	Nathan		DC_M3341	UCS	K.2.1
Keller	Robert E.		DC_M3410	UCS	K.2.1
Keller	William		DC_M1207	UCS	K.2.1
Keller	Wynne		DC_M5583	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Kelley	Pam		DC_M0382		K.2.1
Kellogg	David		DC_M0834	UCS	K.2.1
Kellogg	Lorie B.		DC_M5215	UCS	K.2.1
Kelly	Alice		DC_M6086	UCS	K.2.1
Kelly	Anne		DC_E0343		K.3.4, K.3.13, K.3.15, K.4
Kelly	Barbara		DC_M3798	UCS	K.2.1
Kelly	Jeannie		DC_M4379	UCS	K.2.1
Kelly	Lee Anna		DC_M2738	UCS	K.2.1
Kelly	Mary		DC_M1293	UCS	K.2.1
Kelly	Paula		DC_M6436	UCS	K.2.1
Kelting	Michael		DC_M4203	UCS	K.2.1
Keltner	Jeanie		DC_PHO0022		K.4
Kendy	Diane		DC_M6240	UCS	K.2.1
Kennard	Kimberly		DC_M6506	UCS	K.2.1
Kennedy	Brenda		DC_M2201	UCS	K.2.1
Kennedy	Janet		DC_E0414		K.3.2, K.3.3, K.3.4, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15
Kennedy	Jason		DC_M0595		K.2.1
Kennedy	Joan		DC_M7121	UCS	K.2.1
Kennedy	JoAnn C		DC_M2801	UCS	K.2.1
Kennedy	Kate		DC_PHW0010	Veterans for Peace, Womens International League for Peace and Freedom, Peace Action	K.3.2, K.3.4, K.3.5, K.3.11, K.3.12
Kennedy	Leslie		DC_M1946	UCS	K.2.1
Kennedy	Sara		DC_M6922	UCS	K.2.1
Kennedy	Susan		DC_F0006	NOAA	K.5
Kennedy	Tom		DC_M6255	UCS	K.2.1
Kennedy	V.J		DC_F0004		K.3.13, K.3.15, K.4
Kennedy	Vernon		DC_E0157		K.3.1, K.3.2, K.3.3, K.3.5
Kennedy	Vicky Jo		DC_P0002		K.3.9
Kennedy	Vicky Jo		DC_P0006		K.3.9
Kennedy	Vicky Jo		DC_P0012		K.3.9
Kenney	Alison		DC_M6507	UCS	K.2.1
Kenney	Anne		DC_M6646	UCS	K.2.1
Kenney	Stepahnie		DC_M7474	UCS	K.2.1
Kenny	James A.		DC_M0487		K.2.1
Kenny	Robert		DC_E0316		K.2.2
Kent	Margaret		DC_M6868	UCS	K.2.1
Keough	Kurt		DC_M5837	UCS	K.2.1
Kern	Alicia		DC_M6052	UCS	K.2.1
Kern	Marcia		DC_M7636	UCS	K.2.1
Kerner	Jeremy		DC_M6328	UCS	K.2.1
Kerr	Barbara		DC_M6551	UCS	K.2.1
Kerr	Danielle		DC_M2590	UCS	K.2.1
Kerr	Dr. D.		DC_M1841	UCS	K.2.1
Kessler	Irene		DC_M5557	UCS	K.2.1
Kessler	Laura N.		DC_M5147	UCS	K.2.1
Kessler	Micheal		DC_M2489	UCS	K.2.1
Kessler	Stuart		DC_M3677	UCS	K.2.1
Kester	Donald		DC_M5154	UCS	K.2.1
Kestler	Carol S.		DC_M5470	UCS	K.2.1
Kestler	Ronald		DC_M5584	UCS	K.2.1
Ketels	Shaw		DC_M5110	UCS	K.2.1
Ketels	Shaw		DC_M7599	UCS	K.2.1
Keuler	Rachel		DC_M4288	UCS	K.2.1
Kever	Jeanne		DC_M4666	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Keyes	Larry	Peg Keyes	DC_M1343	UCS	K.2.1
Khairandish	Mohi		DC_M0344		K.2.1
Khalil	Mary		DC_M0369		K.2.1
Khalil	Suzanne		DC_M3696	UCS	K.2.1
Khalsa	Hari Mandir Kaur		DC_M0639		K.2.1
Khalsa	Mha Atma Singh		DC_M0035		K.2.1
Khalsa	Santokh Singh	Suraj Kaur Khalsa	DC_M0075		K.2.1
Khalsa	Shanti Shanit Kaur		DC_M0118		K.2.1
Khamzang			DC_M3133	UCS	K.2.1
Khan	Dina		DC_M6502	UCS	K.2.1
Kibitz	Gregory D.		DC_M3551	UCS	K.2.1
Kidder	KD		DC_M3625	UCS	K.2.1
Kiehl	Renate		DC_M6834	UCS	K.2.1
Kihn	Mitch		DC_M4615	UCS	K.2.1
Kilborn	Adam		DC_M3807	UCS	K.2.1
Kilcrease	Terry		DC_M1206	UCS	K.2.1
Kilduff	Katherine		DC_M6640	UCS	K.2.1
Kilimas	Christie		DC_M5949	UCS	K.2.1
Killay	Sharon		DC_M4813	UCS	K.2.1
Killinger	Deb		DC_M4742	UCS	K.2.1
Kim	Jennifer		DC_M6517	UCS	K.2.1
Kim	Tiffany		DC_M6516	UCS	K.2.1
Kimball	Deborah		DC_E0242		K.3.1, K.3.4, K.3.13, K.3.14, K.3.15
Kimber	David		DC_M7175	UCS	K.2.1
Kimble	Dawn		DC_M0936	UCS	K.2.1
Kimmich	Scott		DC_M3719	UCS	K.2.1
Kimple	J.D.		DC_M5213	UCS	K.2.1
Kincaid	Colli		DC_M0077		K.2.1
Kincaide	Delores		DC_E0293		K.3.2, K.3.3, K.3.4, K.3.7, K.3.11, K.3.13, K.3.15
Kincses	Robert		DC_M3497	UCS	K.2.1
King	Christopher		DC_M3326	UCS	K.2.1
King	David		DC_M1745	UCS	K.2.1
King	Donna		DC_E0101		K.3.2, K.3.11, K.3.13
King	Jennifer		DC_M5128	UCS	K.2.1
King	Natalie		DC_M1648	UCS	K.2.1
Kingsbury	Maxine		DC_M3613	UCS	K.2.1
Kingsnorth	Neil		DC_E0387	Yorkshire Campaign for Nuclear Disarmament	K.3.2, K.3.3, K.3.4, K.3.5, K.3.6, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Kingston	John		DC_M2663	UCS	K.2.1
Kinkead	Sheila		DC_M2547	UCS	K.2.1
Kinn	Joan		DC_M7507	UCS	K.2.1
Kippling	David		DC_M7711		K.2.1
Kiralla	Michael		DC_M3961	UCS	K.2.1
Kirby	Douglas		DC_M1140	UCS	K.2.1
Kirby	Laurence		DC_F0002		K.2.2
Kirby	Laurence		DC_M0256		K.2.2
Kirch	Jan		DC_M1400	UCS	K.2.1
Kirchenbauer	Maryann		DC_M1835	UCS	K.2.1
Kirchhof	Joe		DC_M7545	UCS	K.2.1
Kirchhoff	Richard		DC_M6685	UCS	K.2.1
Kirchner	John		DC_M4299	UCS	K.2.1
Kirchner	Michael		DC_M3951	UCS	K.2.1
Kirk	Edgar		DC_M6560	UCS	K.2.1
Kirk	Karisha		DC_M2726	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Kirk	Ruth		DC_M0225		K.2.2
Kirkconnell	Robert		DC_M3134	UCS	K.2.1
Kirkwood	Anne		DC_M3024	UCS	K.2.1
Kirschner	Jonathan		DC_M2763	UCS	K.2.1
Kislock	Stephen F.		DC_M3585	UCS	K.2.1
Kissam	Sandra		DC_M3861	UCS	K.2.1
Kissler	Kenneth F.		DC_M0337		K.2.1
Kistler	Suzanne		DC_P0008		K.2.2
Kistler	Suzanne F.		DC_M1355	UCS	K.2.1
Kistner	Carrie		DC_M7212	UCS	K.2.1
Kitti	Teri		DC_M5490	UCS	K.2.1
Kittrell	Jeff		DC_M5905	UCS	K.2.1
Kjolseth	Rolf		DC_E0089		K.3.1, K.3.13
Kjonass	Raechel		DC_M3466	UCS	K.2.1
Klatt	Dana		DC_M0426		K.2.1
Kleckner	Kathryn		DC_M2261	UCS	K.2.1
Klein	Alison		DC_M7170	UCS	K.2.1
Klein	David		DC_M7903		K.3.4, K.3.5, K.3.7, K.3.10, K.3.11, K.3.13, K.3.14, K.3.15, K.4
Klein	Michael		DC_M7578	UCS	K.2.1
Klein	Pam		DC_M2024	UCS	K.2.1
Klein	William		DC_M3779	UCS	K.2.1
Kleiss	Lee Maria		DC_M2579	UCS	K.2.1
Klesh	Jennifer		DC_M3348	UCS	K.2.1
Kleshinski	Frank X.		DC_M3888	UCS	K.2.1
Kleyman	Alexandra		DC_M0540		K.2.1
Kligman	Philip S.		DC_M4163	UCS	K.2.1
Kline	Laree		DC_M0979	UCS	K.2.1
Kline	Paula		DC_M6906	UCS	K.2.1
Kline	Peter		DC_M1867	UCS	K.2.1
Klinger	Roderick		DC_M1782	UCS	K.2.1
Klitgord	Niels		DC_M5978	UCS	K.2.1
Klohr	Antonia		DC_M3561	UCS	K.2.1
Klonin	Hilary		DC_E0031		K.2.2
Klos	Tracy		DC_M6213	UCS	K.2.1
Klosterman	Michelle		DC_M4046	UCS	K.2.1
Knapp	Eva		DC_M4218	UCS	K.2.1
Knapp	Leah		DC_M0299		K.2.1
Knapp	Regina		DC_M3866	UCS	K.2.1
Kneece	Angela		DC_M6780	UCS	K.2.1
Knese	Greg		DC_M7438	UCS	K.2.1
Kness	Alena		DC_M7195	UCS	K.2.1
Knight	Paige		DC_E0186	Hanford Watch	K.3.2, K.3.3, K.3.4, K.3.10, K.3.11, K.3.13, K.3.15, K.4
Knight	Paige		DC_M3674	UCS	K.2.1
Knight	Sue		DC_M4023	UCS	K.2.1
Knoll	Kristie		DC_M0157		K.2.1
Knott	Esther		DC_M0321		K.2.1
Knowles	Nancy		DC_M1019	UCS	K.2.1
Knox	Lynne		DC_M5125	UCS	K.2.1
Knox	Rand		DC_M3092	UCS	K.2.1
Knudson	Robert		DC_M2681	UCS	K.2.1
Knuth	C		DC_E0094	Center for Environmental Education	K.3.11, K.3.12
Knuth	C		DC_E0100		K.3.18
Knuth	C		DC_E0107		K.3.18
Knutsen	Leif		DC_M0736		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Knutsen	Leif		DC_M3604	UCS	K.2.1
Knutson	Alice		DC_M3431	UCS	K.2.1
Kochert	Marlene		DC_M1695	UCS	K.2.1
Koehler	Frank		DC_M4196	UCS	K.2.1
Koehler	Nancy		DC_M7339	UCS	K.2.1
Koenig	James		DC_M2700	UCS	K.2.1
Koester	Gisela		DC_M0166		K.3.14
Koester	Shawn		DC_M2973	UCS	K.2.1
Koetzle	Thomas		DC_M1168	UCS	K.2.1
Kogan	Robert		DC_M2980	UCS	K.2.1
Koger	Susan		DC_E0363		K.3.11, K.3.13, K.3.15, K.4
Kohler	John		DC_M3177	UCS	K.2.1
Kohler	John F.		DC_M5238	UCS	K.2.1
Kohler	Julilly		DC_M2159	UCS	K.2.1
Kohler	Kit		DC_M3640	UCS	K.2.1
Kohler	Melissa		DC_M2041	UCS	K.2.1
Kohn	Jeremy		DC_M7843		K.3.17
Kohn	Marilyn		DC_M0050		K.2.1
Kohn	Steve		DC_M3440	UCS	K.2.1
Kohn	Walter		DC_M4022	UCS	K.2.1
Kok	Terry Ryan		DC_M4869	UCS	K.2.1
Kolarik	John		DC_M3407	UCS	K.2.1
Kolin	April		DC_M2687	UCS	K.2.1
Kolinski	Mark		DC_M5101	UCS	K.2.1
Koller	S.l.		DC_M5767	UCS	K.2.1
Konigsbauer	Kathleen		DC_M5306	UCS	K.2.1
Konopaski	Bud and Judy		DC_M2283	UCS	K.2.1
Konopaski	Kirsten		DC_M2245	UCS	K.2.1
Kontje	Claire		DC_M6325	UCS	K.2.1
Kooi	Steven		DC_M4225	UCS	K.2.1
Koon	Teresa		DC_M1121	UCS	K.2.1
Koonmen	Marie Aimee		DC_E0358		K.2.4
Kopicki	Susan		DC_E0055		K.3.1, K.3.3, K.3.5, K.3.6, K.3.11, K.3.12
Kopizke	Mary		DC_M7231	UCS	K.2.1
Kopnick	Donna		DC_E0090		K.2.2
Kopolow	John		DC_M4534	UCS	K.2.1
Kopp	Chad		DC_M6518	UCS	K.2.1
Kopp	Helen		DC_M6050	UCS	K.2.1
Koprak	Sam		DC_M4611	UCS	K.2.1
Koralja	Jason		DC_M2778	UCS	K.2.1
Korb	George		DC_M6760	UCS	K.2.1
Korbel	Kate		DC_M5117	UCS	K.2.1
Korbel	Kate		DC_M7534	UCS	K.2.1
Korte	Mary		DC_M5839	UCS	K.2.1
Kortge	Walter		DC_M6352	UCS	K.2.1
Kosacz	Nicole		DC_M6070	UCS	K.2.1
Kosek	John		DC_M1250	UCS	K.2.1
Kosek	Raphael		DC_M2037	UCS	K.2.1
Kosuda	Joseph		DC_M7774		K.2.1
Kotka	Keith		DC_M0360		K.2.1
Kotta	Paul A.		DC_M2899	UCS	K.2.1
Kotula	Joseph		DC_M1950	UCS	K.2.1
Koumoutseas	Katherine		DC_M5311	UCS	K.2.1
Kourkoumelis	C		DC_M5126	UCS	K.2.1
Kovack	Michelle		DC_M5561	UCS	K.2.1
Kovacs	Micheal		DC_M3288	UCS	K.2.1
Koval	Jason		DC_M5788	UCS	K.2.1
Kowal	Robert		DC_M1216	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Kowaleski	Ann		DC_M7620	UCS	K.2.1
Kowalski	Victor		DC_M0507		K.2.1
Kowitt	T.		DC_M0364		K.2.1
Kowitt	T.		DC_M0376		K.2.1
Kozaka	Josef		DC_M5869	UCS	K.2.1
Kozanli	A.N.		DC_M2818	UCS	K.2.1
Kozisek	Summer		DC_M2140	UCS	K.2.1
Kozlowicz	Kelvin	Emily Kozlowicz	DC_M6792	UCS	K.2.1
Kozlowski	David		DC_M7313	UCS	K.2.1
Kozlowski	Thaddeus P		DC_M2051	UCS	K.2.1
Kozub	John		DC_M0346		K.2.1
Kraan	Aletta		DC_M4100	UCS	K.2.1
Kraatz	Monica		DC_M5778	UCS	K.2.1
Krach	Judy		DC_M0635		K.2.1
Kraegenbrink	Melody		DC_M4510	UCS	K.2.1
Krajec	Edward		DC_M6339	UCS	K.2.1
Kramer	David		DC_M7262	UCS	K.2.1
Krane	Ben		DC_M1452	UCS	K.2.1
Krasney	Mitchell		DC_M7662	UCS	K.2.1
Kraszewski	Chester		DC_M5641	UCS	K.2.1
Kraus	Rhoda		DC_M5326	UCS	K.2.1
Krause	Al		DC_M3081	UCS	K.2.1
Krause	Judy		DC_M3909	UCS	K.2.1
Krauss	Roland		DC_M3458	UCS	K.2.1
Krautheim	Raymond		DC_M3845	UCS	K.2.1
Kray	Gina		DC_M3994	UCS	K.2.1
Kreamer	Bill		DC_M2400	UCS	K.2.1
Kreider	Nancy		DC_M6376	UCS	K.2.1
Kremer	Karen		DC_M2539	UCS	K.2.1
Kremer	Karen		DC_M4839	UCS	K.2.1
Kremer-Collins	Karen		DC_M7120	UCS	K.2.1
Kreml	Liz		DC_M6999	UCS	K.2.1
Krems	Susan		DC_M3188	UCS	K.2.1
Kress	Marin		DC_M6826	UCS	K.2.1
Kreutz	Eileen		DC_M4435	UCS	K.2.1
Krezdorn	Roxanne M.		DC_M1103	UCS	K.2.1
Kriby	Stephen		DC_M5700	UCS	K.2.1
Kriesel	Jason		DC_M7758		K.3.7, K.3.10, K.3.11, K.3.13, K.3.14
Kristel	Todd		DC_M7865		K.2.1
Krizanich	Annette		DC_M3111	UCS	K.2.1
Krmaer	Sheryl		DC_M4222	UCS	K.2.1
Krolikowski	Helena		DC_M6463	UCS	K.2.1
Kroll	Kathryn		DC_M1568	UCS	K.2.1
Kronika	Jessica		DC_M1576	UCS	K.2.1
Kropf	John		DC_M1391	UCS	K.2.1
Krotser	Donald		DC_E0147		K.3.2
Kroupa	Brenda		DC_M2105	UCS	K.2.1
Krous	Constance		DC_M4533	UCS	K.2.1
Krueger	Evelyn		DC_E0140		K.3.2, K.3.10, K.3.13, K.3.14
Krueger	Shelly		DC_M7006	UCS	K.2.1
Kruger	Amy		DC_M1040	UCS	K.2.1
Krupp	Catharine		DC_M3260	UCS	K.2.1
Kruse	Mary Ann		DC_M2236	UCS	K.2.1
Krzmarzick	Jim		DC_M7918		K.3.1, K.3.2, K.3.3, K.3.4, K.3.10, K.3.11, K.3.12
Kubiak	Arnie		DC_M5589	UCS	K.2.1
Kucera	Renee		DC_M2314	UCS	K.2.1
Kuetzing	Karl		DC_M4770	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Kugland	Nathan		DC_M6968	UCS	K.2.1
Kugler	Peter		DC_M3809	UCS	K.2.1
Kugler	Tony		DC_M6611	UCS	K.2.1
Kulcsar	Michael		DC_M6088	UCS	K.2.1
Kunkel	Christopher R.		DC_M0094		K.2.1
Kunkel	Michael		DC_M6874	UCS	K.2.1
Kuramoto	Sue		DC_M3138	UCS	K.2.1
Kurihara	Chiaki		DC_M4438	UCS	K.2.1
Kuroczka	Justine		DC_M2381	UCS	K.2.1
Kurowski	Bryan		DC_M2597	UCS	K.2.1
Kuruc	Karol		DC_M2532	UCS	K.2.1
Kurz	Robert		DC_M4661	UCS	K.2.1
Kusko	Elizabeth		DC_M2804	UCS	K.2.1
Kutzer	Norma		DC_M5578	UCS	K.2.1
Kuzin	James		DC_M7363	UCS	K.2.1
Kwan	Dory		DC_M4240	UCS	K.2.1
Kwon	Brenda		DC_E0382		K.2.3
Kyger-Liskey	Margaret		DC_M2908	UCS	K.2.1
Kyser	Angela		DC_M2335	UCS	K.2.1
L	E		DC_M6064	UCS	K.2.1
La Freniere	Cher Louise		DC_M0387		K.2.1
La Rosa	Frank		DC_M4568	UCS	K.2.1
Laben	Bill		DC_P0001		K.3.2, K.3.3, K.3.10, K.3.13
Labonte	Emmy		DC_M7874		K.2.1
LaBonte	Heather		DC_M0626		K.2.1
LaBonte	Heather		DC_M2346	UCS	K.2.1
Labriola	Kathy		DC_M0004		K.3.2, K.3.4, K.3.7, K.3.10, K.3.12, K.3.15
LaBruna	Victor		DC_M3680	UCS	K.2.1
Lacey	Dave		DC_M3958	UCS	K.2.1
Lachman	Julie		DC_M0226		K.2.1
Lackey	Mercedes		DC_M7884		K.2.1
LaCognata	Dale		DC_M5956	UCS	K.2.1
LaCrosse	Guy		DC_M6231	UCS	K.2.1
LaDeur	Penny		DC_M2349	UCS	K.2.1
Ladson	Michael		DC_M1426	UCS	K.2.1
Ladson	Michael		DC_M6479	UCS	K.2.1
Laedlein	Shirley		DC_M4797	UCS	K.2.1
Laemle	Johanna		DC_M7826		K.2.1
Lafaver	Barbara		DC_M3216	UCS	K.2.1
Lafler	Tim		DC_M6420	UCS	K.2.1
Lafollete	Peter		DC_M0869	UCS	K.2.1
lafollete	Peter		DC_M5277	UCS	K.2.1
LaFreniere	Joanne		DC_M2373	UCS	K.2.1
LaGarde	James		DC_M0738		K.2.1
LaHaie	Andrew		DC_M4095	UCS	K.2.1
Lai	Chauyen		DC_E0075		K.3.18
Laino	V.		DC_M4935	UCS	K.2.1
Laiti	Jared		DC_M7409	UCS	K.2.1
Laitysnyder	Mark		DC_M4866	UCS	K.2.1
Lamas	Alex		DC_M2469	UCS	K.2.1
Lamb	Belinda		DC_M6971	UCS	K.2.1
Lambert	Betsy		DC_M1265	UCS	K.2.1
Lambert	John		DC_M0051		K.2.1
Lamborn	Suzanne		DC_E0123		K.3.2, K.3.3, K.3.10
Lammie	Deanna		DC_M1980	UCS	K.2.1
Lamp	Zena		DC_M3176	UCS	K.2.1
Lampman	Melissa J		DC_M2911	UCS	K.2.1
Lampman	Ralph		DC_M1282	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Lampson	Sue		DC_M6991	UCS	K.2.1
Lampton	Catherine		DC_M5360	UCS	K.2.1
Lancaster	Emily		DC_M2617	UCS	K.2.1
Lancaster	Katherine		DC_M2494	UCS	K.2.1
Landa	Joanne		DC_M7431	UCS	K.2.1
Landeen	Clint		DC_M5259	UCS	K.2.1
Landis	Dana		DC_M3412	UCS	K.2.1
Landis	Larry		DC_M4065	UCS	K.2.1
Landis	Phyllis		DC_M7104	UCS	K.2.1
Landon-Lane	Elizabeth		DC_M0158		K.2.1
Landry	Margo		DC_M0202		K.2.1
Lane	Alexa		DC_M0858	UCS	K.2.1
Lane	Earl	Sue Lane	DC_M4108	UCS	K.2.1
Lane	Michael		DC_M5427	UCS	K.2.1
Lang	Cynthia R.		DC_M4777	UCS	K.2.1
Lang	Susanna		DC_M5698	UCS	K.2.1
Langdon	Abby		DC_M0839	UCS	K.2.1
Lange	Rebecca		DC_M5753	UCS	K.2.1
Langley	Mark		DC_M0553		K.2.1
Langley	Mike		DC_M7239	UCS	K.2.1
Langreck	Lillia		DC_M0040		K.2.2
Langridge	Judith		DC_M6687	UCS	K.2.1
Langton	David		DC_M1560	UCS	K.2.1
Lanham	Phyllis		DC_M7308	UCS	K.2.1
Lanning	Irvin		DC_M4244	UCS	K.2.1
Lanphear	Nancy		DC_M1345	UCS	K.2.1
Lansdowne	Jerry		DC_M7897		K.2.3
Lanzman	Sarah		DC_M7511	UCS	K.2.1
Lardon	Cecile		DC_M0872	UCS	K.2.1
Larisch	Erich W.		DC_M0498		K.2.1
Larish	Erich W.		DC_M6457	UCS	K.2.1
Larkin	Kristi		DC_M0385		K.2.1
LaRoe	Be		DC_M5646	UCS	K.2.1
Larose	Stephan		DC_M1844	UCS	K.2.1
Larsen	David W.		DC_M1456	UCS	K.2.1
Larsen	Joyce		DC_M2774	UCS	K.2.1
Larsen	Sonja		DC_M5035	UCS	K.2.1
Larson	Gil		DC_M1225	UCS	K.2.1
Larson	Jay		DC_M2813	UCS	K.2.1
Larson	Kelly		DC_M2902	UCS	K.2.1
Larson	MaryAnn		DC_M7644	UCS	K.2.1
Larter	Steve		DC_M2673	UCS	K.2.1
Laskin	Diane		DC_M1601	UCS	K.2.1
Lasman	Sharon		DC_M5587	UCS	K.2.1
Lasoff	Edward		DC_M3042	UCS	K.2.1
Lassalle	Kennith		DC_M3914	UCS	K.2.1
Lastiri	Bob		DC_M2325	UCS	K.2.1
Latham	Janet A.		DC_M1917	UCS	K.2.1
Latzen	Jaymi		DC_M7776		K.2.1
Laubach	Jeffrey S.		DC_M4269	UCS	K.2.1
Lauber	Diane		DC_M7699		K.2.1
Lauder	Carley		DC_M5711	UCS	K.2.1
Lauderdale	Edith		DC_E0367		K.3.1, K.3.2, K.3.3, K.3.15
Lauria	Jeanette		DC_M2495	UCS	K.2.1
Laurie	Annie		DC_M7616	UCS	K.2.1
Lausell	Susan		DC_M6525	UCS	K.2.1
Lavee	Annina		DC_M0103		K.2.1
Laverty	Denise		DC_M3291	UCS	K.2.1
Lavigna	Jacqueline		DC_M4528	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Lavigna	Jacqueline		DC_M4529	UCS	K.2.1
Lavoie	Diane		DC_M2131	UCS	K.2.1
Law	Patricia		DC_M2561	UCS	K.2.1
Lawless	Thomas Rollie		DC_M5275	UCS	K.2.1
Lawrence	Carl		DC_M7114	UCS	K.2.1
Lawrence	Deron		DC_M4113	UCS	K.2.1
Lawrence	George		DC_M0119		K.3.1, K.3.3, K.3.5, K.3.10, K.3.13, K.3.14
Lawrence	Jack		DC_M4598	UCS	K.2.1
Lawrence	Kirk		DC_M6941	UCS	K.2.1
Lawrence	Mary		DC_M2957	UCS	K.2.1
Lawson	Mickey		DC_M0988	UCS	K.2.1
Layman	Dorothy		DC_M0206		K.3.14
Layton	Jean		DC_M1211	UCS	K.2.1
Le Cun	Isabelle		DC_M6249	UCS	K.2.1
Leach	Harold		DC_M1652	UCS	K.2.1
Leacock	Carolyn		DC_M6165	UCS	K.2.1
Leal	Karl		DC_M2574	UCS	K.2.1
Lean	DA		DC_M0373		K.2.1
Leaverton	Dan		DC_M6663	UCS	K.2.1
Leavitt-Pagaling	Patricia		DC_M0571		K.2.1
Lebherz	Herbert G.		DC_M5489	UCS	K.2.1
LeBlanc	David J.		DC_M4760	UCS	K.2.1
Lebo	Harlan		DC_M5060	UCS	K.2.1
Lechtanski	Cheryl		DC_M5507	UCS	K.2.1
LeClaire	Carol		DC_M0095		K.3.14
Ledain	Nicole		DC_M1502	UCS	K.2.1
Lederman	Aurora		DC_M2508	UCS	K.2.1
Lee	Anne		DC_E0347	Womenwith Hill Women's Peace Camp(aign)	K.3.1, K.3.2, K.3.11, K.3.12, K.3.15, K.4
Lee	Brian		DC_M6462	UCS	K.2.1
Lee	Brian		DC_M7030	UCS	K.2.1
Lee	GatheringGrass		DC_M7519	UCS	K.2.1
Lee	Houghton		DC_M6955	UCS	K.2.1
Lee	Jenn		DC_M5871	UCS	K.2.1
Lee	Michael		DC_M1564	UCS	K.2.1
Lee	Todd		DC_M4336	UCS	K.2.1
Leeper	Erik		DC_M3127	UCS	K.2.1
Leeper	Erik		DC_M6267	UCS	K.2.1
Lees	Susie		DC_M2987	UCS	K.2.1
Leffler	Meredith		DC_M0480		K.2.1
Leffmann	Paula		DC_M5044	UCS	K.2.1
Lefsky	Sara		DC_M5817	UCS	K.2.1
Leghart	Linda C.		DC_M3833	UCS	K.2.1
Lehman	Hugh		DC_M7804		K.2.3
Lehmann	Hilde		DC_M0059		K.2.1
Lehmer	Aaron		DC_M5769	UCS	K.2.1
Lehnhoff	Mark		DC_M3269	UCS	K.2.1
Leibman	George		DC_M1008	UCS	K.2.1
Leibowitz	Lynda		DC_M5591	UCS	K.2.1
Leicher	Dorothea		DC_M2217	UCS	K.2.1
Leiderman	Ryan		DC_M1860	UCS	K.2.1
Leifer	Lori		DC_M1139	UCS	K.2.1
Leighton	Andrew		DC_M0053		K.2.1
Leighton	Stephanie		DC_M7066	UCS	K.2.1
Leipzig	Laura		DC_M3547	UCS	K.2.1
Leisey	Monica		DC_M0913	UCS	K.2.1
Leiter	Maria		DC_M4415	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Leman	Craig		DC_E0136		K.3.4, K.3.5, K.3.11
Lemaster	Samma		DC_M5800	UCS	K.2.1
Leming	Jeff		DC_M3521	UCS	K.2.1
Lemmo	Elena		DC_M5162	UCS	K.2.1
Lemmon	Katherine		DC_M1272	UCS	K.2.1
Lempert	Bobbi		DC_M3252	UCS	K.2.1
Lenard	Jim		DC_M0270		K.3.14
Lengen	George		DC_M1340	UCS	K.2.1
Lenk	Joseph		DC_M7600	UCS	K.2.1
Lenny	Siegel		DC_PHO0004	Center for Public Environmental Oversight	K.4
Lenoir	Jane		DC_M7171	UCS	K.2.1
Lent	Jessica		DC_M4332	UCS	K.2.1
Leonard	Andrea		DC_M6651	UCS	K.2.1
Leonard	Barbara		DC_M7031	UCS	K.2.1
Leonard	John		DC_M1336	UCS	K.2.1
Leonard	Jonathan		DC_M6752	UCS	K.2.1
Leonard	Patrick		DC_M6852	UCS	K.2.1
Leonard	Patrick		DC_M6913	UCS	K.2.1
Lepori	Luca		DC_M5452	UCS	K.2.1
Lerman	Michelle		DC_M7263	UCS	K.2.1
Lerner	Albert		DC_M1635	UCS	K.2.1
Lerner	Michelle		DC_M6782	UCS	K.2.1
Lerner	Rachel		DC_M3107	UCS	K.2.1
LeSeure	Charles		DC_M3983	UCS	K.2.1
Lesh	Terry		DC_M2878	UCS	K.2.1
Lesko	Robert		DC_M5037	UCS	K.2.1
Lessans	Vicki		DC_M7434	UCS	K.2.1
Lessmann	Paul		DC_M3474	UCS	K.2.1
Lester	Gail		DC_M2334	UCS	K.2.1
Lette	Constance		DC_M0060		K.2.1
Lettini	Lois		DC_M2711	UCS	K.2.1
Lev	Marjorie		DC_M5908	UCS	K.2.1
Levasseur	Virginia		DC_M6781	UCS	K.2.1
Leventhal	Sallye		DC_M5428	UCS	K.2.1
Levin	Alan		DC_M0764		K.2.1
Levin	Brian		DC_M5706	UCS	K.2.1
Levin	Carol		DC_M6592	UCS	K.2.1
Levine	Michael		DC_M0504		K.2.1
Levine	Stephen		DC_M7722		K.2.3
Levitan	Ruth		DC_M4852	UCS	K.2.1
Levitt	Donna		DC_M5650	UCS	K.2.1
Levno	Rose Beth		DC_E0364	Anchorage Branch of Women's International League for Peace and Freedom, Physicians for Social Responsibility	K.3.1
Levy	Allen		DC_M3601	UCS	K.2.1
Levy	E.J.		DC_M5217	UCS	K.2.1
Levy	Galen		DC_M2445	UCS	K.2.1
Levy	Jill		DC_M4487	UCS	K.2.1
Levy	Natalee		DC_M3848	UCS	K.2.1
Levy	Stella		DC_PHO0029		K.3.12, K.4
Levy	Wendy		DC_M2499	UCS	K.2.1
Lewi	Jack		DC_M0061		K.2.1
Lewis	Anne		DC_M2897	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Lewis	Dick		DC_M7870		K.3.7, K.3.10
Lewis	Gail		DC_M2460	UCS	K.2.1
Lewis	Genevieve K.		DC_M4423	UCS	K.2.1
Lewis	Jessie		DC_M2328	UCS	K.2.1
Lewis	Marvin		DC_E0018		K.2.2
Lewis	Marvin		DC_E0428		K.3.1, K.3.2, K.3.10, K.3.12, K.3.15, K.4
Lewis	Mel		DC_M6947	UCS	K.2.1
Lewis	Russell		DC_M4988	UCS	K.2.1
Lewis	Suford		DC_M7795		K.2.1
Lewis	Tonya		DC_M1107	UCS	K.2.1
Lewitzky	David		DC_M0670		K.2.1
Leyrer	Sarah		DC_M5982	UCS	K.2.1
Li	Danny		DC_PHO0057		K.3.1
Li	Lewyn		DC_M4724	UCS	K.2.1
Liberasi	Hari		DC_M6067	UCS	K.2.1
Liberasi	Hari		DC_M7261	UCS	K.2.1
Libois	Roland		DC_M4773	UCS	K.2.1
Licht	Suzanne		DC_M0062		K.2.1
Lichty	Donald		DC_M7698		K.3.2, K.3.3, K.3.7, K.3.11, K.3.13, K.3.15
Liddil	Bruce		DC_M6331	UCS	K.2.1
Lieb	Louise		DC_M6595	UCS	K.2.1
Lieber	Susan		DC_M4097	UCS	K.2.1
Lieberman	Yehudit		DC_M4252	UCS	K.2.1
Lien	Matthew		DC_M1376	UCS	K.2.1
Lienau	Michael		DC_M3478	UCS	K.2.1
Lieu	Warren		DC_M1438	UCS	K.2.1
Lihs	Ria		DC_M6766	UCS	K.2.1
Lilianthal	Patricia		DC_M2696	UCS	K.2.1
Lilleberg	Allen		DC_M3427	UCS	K.2.1
Lillien	Irving		DC_M7902		K.2.3
Lima	Ann		DC_M3021	UCS	K.2.1
Limbach	Jalaine		DC_M2467	UCS	K.2.1
Lin	Joyce		DC_M7075	UCS	K.2.1
Lin	Lawrence		DC_M0641		K.2.1
Linck	Mary		DC_M2442	UCS	K.2.1
Lincoln	Amelia		DC_M3490	UCS	K.2.1
Lind	Karen		DC_M0104		K.2.1
Linderman	Shawn		DC_M4818	UCS	K.2.1
Linderman	Shawn		DC_M4819	UCS	K.2.1
Lindley	L. Clark		DC_M2894	UCS	K.2.1
Lindor	Carl		DC_M7663	UCS	K.2.1
Lindsay	Elizabeth		DC_M6853	UCS	K.2.1
Lindsay	Jeanne		DC_M4809	UCS	K.2.1
Lindsey	Barbara		DC_M3765	UCS	K.2.1
Lindstrom-Dake	Erica		DC_M6705	UCS	K.2.1
Lingburg	Jim		DC_PHO0017	Friends Committee on Legislation in Califronia	K.3.1, K.3.2, K.3.3, K.3.12, K.3.13
Lininger	Christine		DC_M5396	UCS	K.2.1
Link	Debra		DC_M1111	UCS	K.2.1
Link	Ellen		DC_M4838	UCS	K.2.1
Link	Ursala		DC_M7579	UCS	K.2.1
Linkhorst	Mark		DC_M6365	UCS	K.2.1
Linser	Eliza		DC_M3062	UCS	K.2.1
Liolis	Donna		DC_M1573	UCS	K.2.1
Liolis	Donna		DC_M1574	UCS	K.2.1
Lipari	Philip		DC_M2940	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Lippert	80918		DC_M2527	UCS	K.2.1
Lippert	Timothy		DC_M2967	UCS	K.2.1
Lipponen	Marjo		DC_M6475	UCS	K.2.1
Lipton	Robert		DC_M0466		K.2.1
Listig	Mario		DC_M4931	UCS	K.2.1
Liston	David		DC_M1406	UCS	K.2.1
Lite	Joseph		DC_M4111	UCS	K.2.1
Litfin	Dennis		DC_M2471	UCS	K.2.1
Litt	Judith		DC_M7309	UCS	K.2.1
Little	Dawn		DC_M7042	UCS	K.2.1
Little	James G.		DC_M0513		K.2.1
Little	Terri L		DC_M2450	UCS	K.2.1
Littleton	Kelly		DC_M2619	UCS	K.2.1
Littleton	Walter		DC_M3166	UCS	K.2.1
Litvin	Timothy		DC_M3118	UCS	K.2.1
Litzau	Jack		DC_M0974	UCS	K.2.1
Liu	Ted		DC_M2799	UCS	K.2.1
Livermore	Lewis		DC_M1710	UCS	K.2.1
Livermore	Mike		DC_M7846		K.2.1
Livesay	George		DC_M7823		K.2.3
Livingston	Amy		DC_M6151	UCS	K.2.1
Livingston	James		DC_M2440	UCS	K.2.1
Livingston	Patsy		DC_M0588		K.2.1
Lloyd	Georgia		DC_M4124	UCS	K.2.1
Lloyd	Nancy		DC_M5085	UCS	K.2.1
Loar	Carol		DC_M3006	UCS	K.2.1
Lobel	Colleen		DC_M0724		K.2.1
LoBuglio	Mary		DC_M0264		K.3.14
Locascio	Julie		DC_M4192	UCS	K.2.1
Lochner	Jan		DC_M5739	UCS	K.2.1
Locke	Hollis Hal		DC_M4378	UCS	K.2.1
Locke	Karen		DC_M6895	UCS	K.2.1
Lococo	Lois		DC_M3424	UCS	K.2.1
Loder	Doris		DC_M0294		K.3.2, K.3.3, K.3.4, K.3.6, K.3.7, K.3.13, K.3.15
Loeff	Peter		DC_M2078	UCS	K.2.1
Loerzel	Nicole		DC_M1068	UCS	K.2.1
Lofgren	Mary Joan		DC_E0333		K.3.12
Logan	Chris		DC_M1375	UCS	K.2.1
Logan	Heather		DC_M4587	UCS	K.2.1
Lohr	Diane		DC_M0114		K.2.1
Lok	Munchi		DC_M1538	UCS	K.2.1
Lollar	Lonetta		DC_M5011	UCS	K.2.1
Lombard	Carole		DC_E0269	Sisters of St. Joseph	K.3.1, K.3.2
Lombardi	Stephanie		DC_M3082	UCS	K.2.1
Londowski	Jan		DC_M1261	UCS	K.2.1
Lonergan	Lorena		DC_M5832	UCS	K.2.1
Long	Bonnie		DC_M5820	UCS	K.2.1
Long	Cindy		DC_E0138		K.3.18
Long	Diane		DC_M7237	UCS	K.2.1
Long	Jeanne		DC_M5973	UCS	K.2.1
Long	Kathy		DC_M2690	UCS	K.2.1
Long	Kit		DC_M6586	UCS	K.2.1
Long	Marilyn Jane		DC_M5609	UCS	K.2.1
Long	Mary		DC_M2730	UCS	K.2.1
Longino	Tera		DC_M0243		K.3.14
Longson	Arlene		DC_M5851	UCS	K.2.1
Longson	Arlene		DC_M5852	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Longwell	Medini		DC_E0033		K.3.2, K.3.7, K.3.12, K.3.13, K.3.15
Look	Joanne		DC_M6242	UCS	K.2.1
Loomis	Charles		DC_M2986	UCS	K.2.1
Looney	Stephanie		DC_M6320	UCS	K.2.1
Loosier	Carla Sue		DC_M3505	UCS	K.2.1
Lopez	Eliud		DC_M0602		K.2.1
Lopez	Jose		DC_M2586	UCS	K.2.1
Lopez	Richard		DC_M2277	UCS	K.2.1
Lopez-Strother	Christina		DC_M1612	UCS	K.2.1
Lorang	Joe		DC_M1740	UCS	K.2.1
Lord	Charles	Joy Lord	DC_E0038		K.3.2, K.3.4, K.3.11, K.3.12, K.3.13
Lorent	Kristin		DC_M3846	UCS	K.2.1
Lorgeoux	Anne		DC_M2179	UCS	K.2.1
Loria	Steven		DC_M3775	UCS	K.2.1
Lorts	Tony R.		DC_M4817	UCS	K.2.1
Lorusso	Nichole		DC_M5134	UCS	K.2.1
Loscalzo-Stumpf	Merry		DC_M5935	UCS	K.2.1
Lotz	Jonathan		DC_M4230	UCS	K.2.1
Loughlin	Carol		DC_M2377	UCS	K.2.1
Loughlin	Michaelene		DC_M0191		K.2.1
Louis	Dorothy		DC_M1900	UCS	K.2.1
Louisa			DC_M6350	UCS	K.2.1
Loungreck	Lillia		DC_M0009		K.2.2
Lounsbury	Mary		DC_M6222	UCS	K.2.1
Louthen-Brown	Willie		DC_M2557	UCS	K.2.1
Love	Michael G.		DC_M3974	UCS	K.2.1
Loveall-Rowe	Kristie		DC_M4062	UCS	K.2.1
Loveland	Jim		DC_E0154		K.3.1
Lovett	Dodie		DC_M1039	UCS	K.2.1
Lovett	Marguerite D.		DC_M1196	UCS	K.2.1
Lovett	Marguerite D.		DC_M6453	UCS	K.2.1
Lowe	Brian		DC_M6695	UCS	K.2.1
Lowell	Jacquie		DC_M5377	UCS	K.2.1
Lowry	Kathleen		DC_M1863	UCS	K.2.1
Lowther	Chad		DC_M2462	UCS	K.2.1
Loyd	Aaron		DC_M6933	UCS	K.2.1
Lu	Carole		DC_M0044		K.2.1
Lu	Sharon		DC_M5214	UCS	K.2.1
Luanglue	Melisa		DC_M7328	UCS	K.2.1
Lubbers	Susan E.		DC_M1865	UCS	K.2.1
Lubensky	Earl		DC_M5435	UCS	K.2.1
Lubic	Steve J.		DC_M7744		K.2.1
Lubin	Carolyn		DC_M2492	UCS	K.2.1
Lubinsky	Jennifer		DC_M5952	UCS	K.2.1
Lubofsky	Melissa		DC_M6935	UCS	K.2.1
Lubonovich	D. Jean		DC_M2698	UCS	K.2.1
Lubow	Craig		DC_M0730		K.2.1
Lucas	Adeline		DC_M4597	UCS	K.2.1
Lucas	Amanda		DC_M5750	UCS	K.2.1
Lucas	Amanda		DC_M5750	UCS	K.2.1
Lucas	Lucas		DC_M5007	UCS	K.2.1
Lucey	Marie		DC_M5369	UCS	K.2.1
Lucey	Susan		DC_M3117	UCS	K.2.1
Luck	Curt		DC_M7621	UCS	K.2.1
Luckman	Marleen		DC_M1642	UCS	K.2.1
Ludwig	Frank		DC_M5812	UCS	K.2.1
Ludwig-Levine	Judith		DC_M2632	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Luehrmann	Paul		DC_M5406	UCS	K.2.1
Lueth	David		DC_M0105		K.2.1
Luetkemeyer	Benita		DC_E0284		K.3.3, K.3.4, K.3.5, K.3.11
Lugo	Cristobal		DC_M0908	UCS	K.2.1
Lukachinsky	Mark		DC_M3122	UCS	K.2.1
Lukatch	Miranda		DC_M4482	UCS	K.2.1
Lum	Allen		DC_M0183	member: CARD, UCS	K.3.1, K.3.13, K.3.14
Lumsden	Caron		DC_M3862	UCS	K.2.1
Lund	Elizabeth		DC_M6652	UCS	K.2.1
Lundeen	Eric		DC_M1674	UCS	K.2.1
Lundeen	James		DC_M1271	UCS	K.2.1
Lundell	Peter		DC_M1137	UCS	K.2.1
Lundy	Ava		DC_M3442	UCS	K.2.1
Lundy	Joellen		DC_M2396	UCS	K.2.1
Luppo	Albert		DC_M6002	UCS	K.2.1
Luria	Mayra		DC_M6733	UCS	K.2.1
Lusch	Mark		DC_M4737	UCS	K.2.1
Luxem	David		DC_M2624	UCS	K.2.1
Lyle	John		DC_M0063		K.3.1, K.3.2, K.3.3, K.3.4, K.3.10
Lyles	Jeff		DC_M1815	UCS	K.2.1
Lynch	Michal		DC_M6216	UCS	K.2.1
Lynch	Nancy		DC_M0045		K.3.2, K.3.3, K.3.7, K.3.10, K.3.12, K.3.13, K.3.15
Lynch	Nancy		DC_M0262		K.3.2, K.3.3, K.3.12, K.3.13, K.3.15, K.4
Lynd	Celia N.		DC_M3550	UCS	K.2.1
Lyndly	Jenna		DC_M5567	UCS	K.2.1
Lyndsong	Gwen		DC_M5729	UCS	K.2.1
Lyon	Dawn		DC_M4451	UCS	K.2.1
Lyon	Dawn		DC_M6903	UCS	K.2.1
Lyons	Anthony		DC_M5387	UCS	K.2.1
Lyons	Leah		DC_M2059	UCS	K.2.1
Lyons	Nicole-Marie		DC_M1388	UCS	K.2.1
Lyons	Patricia		DC_M4539	UCS	K.2.1
Mabry	Hunter		DC_M2242	UCS	K.2.1
MacAdam-Miller	Jennifer		DC_M2084	UCS	K.2.1
MacAlpine	Deirdre		DC_M7054	UCS	K.2.1
Macaluso	Marie		DC_M5055	UCS	K.2.1
MacArthur	June		DC_M4656	UCS	K.2.1
Macaulay	Katharine		DC_M2501	UCS	K.2.1
MacCallum	Crawford		DC_M4503	UCS	K.2.1
MacCaughey	Caroline		DC_M7413	UCS	K.2.1
Macchia	Tom		DC_PHO0041		K.3.1, K.3.2, K.3.7, K.3.10
MacDonald	Barbara		DC_M5464	UCS	K.2.1
MacDonald	Graeme		DC_M7088	UCS	K.2.1
MacDonald	Lynn		DC_M1300	UCS	K.2.1
MacDonald	Meilani		DC_M7179	UCS	K.2.1
MacDonald	Myra		DC_M6612	UCS	K.2.1
MacDonald	Paula		DC_M4295	UCS	K.2.1
Macdonald	Rod		DC_PHO0010		K.3.2, K.3.11, K.3.15, K.4
MacFadyen	John P		DC_M3729	UCS	K.2.1
Maciboba	Leila		DC_M7666	UCS	K.2.1
Mack	Ben		DC_M2846	UCS	K.2.1
Mack	Judy		DC_M7836		K.2.1
Mack	Rainbow		DC_M1586	UCS	K.2.1
MacKanic	Janice		DC_M2171	UCS	K.2.1
Mackay	William P.		DC_M4197	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Mackenzie	Douglass		DC_M3749	UCS	K.2.1
MacKenzie	Kendra		DC_M1970	UCS	K.2.1
Mackenzie	Kenneth		DC_M1163	UCS	K.2.1
Mackenzie	Susan		DC_M3576	UCS	K.2.1
Mackey	Frederick		DC_M4553	UCS	K.2.1
MacLaughlin	Jan		DC_M2875	UCS	K.2.1
Macmillan	Elizabeth		DC_M6314	UCS	K.2.1
MacMillan	Jan		DC_M7682	UCS	K.2.1
MacNichol	Susan		DC_M5471	UCS	K.2.1
Macphail	Jean		DC_M7032	UCS	K.2.1
MacRae	D		DC_M5785	UCS	K.2.1
Macvicar	Mary		DC_M3989	UCS	K.2.1
Macy	Dan		DC_M6055	UCS	K.2.1
Madarasz	Michael		DC_M4701	UCS	K.2.1
Madden	Mary		DC_M4087	UCS	K.2.1
Maddox	Melvyn		DC_M0982	UCS	K.2.1
Madison	Mary		DC_M0523		K.2.1
Madsen	Libbe		DC_M4739	UCS	K.2.1
Magee	George		DC_M2193	UCS	K.2.1
Magee	P		DC_M3356	UCS	K.2.1
Magee	Richard		DC_M0350		K.2.1
Magers	Sally		DC_M5928	UCS	K.2.1
Magnavita	Helen		DC_M7078	UCS	K.2.1
Magnusson	Freddy		DC_E0310		K.3.2, K.3.3, K.3.12, K.3.13, K.3.15
Magzis	Laura		DC_M1136	UCS	K.2.1
Mahajan	Romi		DC_M1775	UCS	K.2.1
Mahan	Mary Jane		DC_M0311		K.2.1
Mahan	Trevor		DC_M7423	UCS	K.2.1
Mahiques	Diane		DC_M1638	UCS	K.2.1
Mahoney	Linda		DC_M6258	UCS	K.2.1
Mahoney	Matt		DC_M0681		K.2.1
Mahrt	Jack		DC_M6261	UCS	K.2.1
Maier	Margaret		DC_M0002		K.2.2
Maifeld	Greg		DC_M3226	UCS	K.2.1
Main	Isabel		DC_M2112	UCS	K.2.1
Majkowicz	Lester		DC_M1609	UCS	K.2.1
Mak	Vivian		DC_M1369	UCS	K.2.1
Maker	Janet		DC_M7024	UCS	K.2.1
Makowski	James		DC_M5446	UCS	K.2.1
Makruski	Adam		DC_M4303	UCS	K.2.1
Mal	Mal		DC_M1160	UCS	K.2.1
Malcolm	Pat		DC_M7382	UCS	K.2.1
Malek	Ariel		DC_M0237		K.2.1
Malkus	Karen		DC_M4885	UCS	K.2.1
Mallard	Ann		DC_M1309	UCS	K.2.1
Malloy	Ben		DC_M6494	UCS	K.2.1
Malmuth	Sonja		DC_M7043	UCS	K.2.1
Malone	Joan		DC_M0115		K.3.2, K.3.6, K.3.7, K.3.15
Malone	Sheila		DC_M5061	UCS	K.2.1
Maloney	Ken		DC_M0978	UCS	K.2.1
Maloney	Ken		DC_M0981	UCS	K.2.1
Maloney	Paul		DC_M1424	UCS	K.2.1
Malouf	Fred		DC_M7058	UCS	K.2.1
Malter	Rosalie		DC_M2022	UCS	K.2.1
Manalo	Michael		DC_M1523	UCS	K.2.1
Mancini	Janice		DC_M6561	UCS	K.2.1
Mandel	Dorothy		DC_M3054	UCS	K.2.1
Manganiello	Paul		DC_M5437	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Mangapit	Marion		DC_M1646	UCS	K.2.1
Mangino	Pat		DC_M1224	UCS	K.2.1
Mangione	Raymond		DC_M4407	UCS	K.2.1
Mangum	Carl		DC_M6986	UCS	K.2.1
Manhan	Diana		DC_M2861	UCS	K.2.1
Manis	Lisa		DC_M6338	UCS	K.2.1
Mank	Jean		DC_M1108	UCS	K.2.1
Mann	Matthew		DC_M3894	UCS	K.2.1
Manning	(Family)		DC_M1961	UCS	K.2.1
Manning	Christel		DC_M2606	UCS	K.2.1
Manning	Dona		DC_M4901	UCS	K.2.1
Manning	Gary		DC_M3323	UCS	K.2.1
Manning	Mackenzie		DC_M3872	UCS	K.2.1
Manning	Paul		DC_M7614	UCS	K.2.1
Manoj	Paul		DC_M0474		K.2.1
Manon	Peter		DC_M2523	UCS	K.2.1
Manousos	Anthony		DC_E0264		K.2.3
Mansell	Christinia		DC_M1520	UCS	K.2.1
Manske	Jill		DC_M0608		K.2.1
Mantey	Christine		DC_M2315	UCS	K.2.1
Marantz	Kenneth		DC_M7462	UCS	K.2.1
Marceau	Rachel		DC_M2914	UCS	K.2.1
Marcel	Lorretta		DC_M6062	UCS	K.2.1
March	Lori		DC_M0676		K.2.1
March	Lori		DC_M4250	UCS	K.2.1
Marcia	Merithew		DC_M3892	UCS	K.2.1
Marcialis	Donna		DC_M2407	UCS	K.2.1
Marciniak	Cathy		DC_M5740	UCS	K.2.1
Marcontell	Brian		DC_M4942	UCS	K.2.1
Marcus	Marvin		DC_M1871	UCS	K.2.1
Marcus	MS		DC_M6173	UCS	K.2.1
Marcus	Naomi		DC_M0951	UCS	K.2.1
Mares	Robert		DC_M4082	UCS	K.2.1
Maresca	Josh		DC_M0698		K.2.1
Margaret	Maier		DC_E0059		K.2.2
Marhefka	Gladys		DC_M0238	Social Justice Coordinator, The Grey Nuns	K.2.2
Maria	T.		DC_M3655	UCS	K.2.1
Maricque	Mitchell		DC_M6263	UCS	K.2.1
Marie	Sylvia		DC_M7225	UCS	K.2.1
Marilyn	Wilson		DC_E0225	Women's Office Sisters of Charity	K.2.2
Marion	Jeanne		DC_M2178	UCS	K.2.1
Marjoricastle	Val		DC_M0806	UCS	K.2.1
Markham	Thomas		DC_M3825	UCS	K.2.1
Markley	Shannon		DC_M4058	UCS	K.2.1
Markman	Cheryl		DC_M5482	UCS	K.2.1
Markowitz	Stephen		DC_M6738	UCS	K.2.1
Marks	MK	Peter Marks	DC_M5450	UCS	K.2.1
Marks	N. Lee		DC_M1378	UCS	K.2.1
Markum	Constance		DC_M3380	UCS	K.2.1
Markus	Mary		DC_M1814	UCS	K.2.1
Markus	Mary		DC_M6438	UCS	K.2.1
Marlier	Emilie		DC_M1973	UCS	K.2.1
Marlow	Eric		DC_M5327	UCS	K.2.1
Marnusson-Schmidt	Diane		DC_M7270	UCS	K.2.1
Maron	Country		DC_M4354	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Maron	Country		DC_M5414	UCS	K.2.1
Maron	Country		DC_M5415	UCS	K.2.1
Marquardt	Paul		DC_M2246	UCS	K.2.1
Marquis-Homeyer	Catherine		DC_E0331	Peace Economy Project	K.3.1, K.3.2, K.3.3, K.3.4, K.3.7, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15
Marquis-Homeyer	Catherine		DC_E0400		K.3.1, K.3.2, K.3.3, K.3.4, K.3.7, K.3.10, K.3.11, K.3.12,K.3.13, K.3.15
Marquis-Homeyer	Catherine		DC_M0339		K.2.1
Marr	Melina		DC_M0867	UCS	K.2.1
Marriott	David		DC_M7397	UCS	K.2.1
Mars	Paul		DC_E0058		K.3.4, K.3.7
Marsh	Betty		DC_M5279	UCS	K.2.1
Marsh	Betty		DC_M7512	UCS	K.2.1
Marsh	Melba		DC_M5745	UCS	K.2.1
Marsh	Timothy		DC_M1634	UCS	K.2.1
Marshall	Bryan		DC_M0859	UCS	K.2.1
Marshall	David		DC_M1221	UCS	K.2.1
Marshall	Elizabeth		DC_M7720		K.2.3
Marshall	Garry		DC_M3379	UCS	K.2.1
Marshall	Jeanne		DC_M3132	UCS	K.2.1
Marshall	Laurence D. M.		DC_M4166	UCS	K.2.1
Marshall	Lisa		DC_M6248	UCS	K.2.1
Marshall	Margaret		DC_M7400	UCS	K.2.1
Marsot	Alain		DC_M4855	UCS	K.2.1
Marston	Natasha		DC_M5241	UCS	K.2.1
Martell	Catherine		DC_M0219		K.3.2, K.3.10, K.3.14
Martell	Jonathan		DC_M2772	UCS	K.2.1
Martha	Waltman		DC_M4264	UCS	K.2.1
Martin	Alice F.		DC_M4346	UCS	K.2.1
Martin	Angela		DC_M1100	UCS	K.2.1
Martin	Bette		DC_M7352	UCS	K.2.1
Martin	Carol		DC_M3450	UCS	K.2.1
Martin	Chad		DC_M3705	UCS	K.2.1
Martin	Charles		DC_M2167	UCS	K.2.1
Martin	Christopher		DC_M0965	UCS	K.2.1
Martin	David		DC_E0150		K.3.14
Martin	David III		DC_M1731	UCS	K.2.1
Martin	Deb		DC_M5255	UCS	K.2.1
Martin	Diane		DC_M4723	UCS	K.2.1
Martin	Diane		DC_M5142	UCS	K.2.1
Martin	Elandriel		DC_M6138	UCS	K.2.1
Martin	Jayne		DC_M3146	UCS	K.2.1
Martin	Jill		DC_M0519		K.2.1
Martin	Joseph		DC_M1645	UCS	K.2.1
Martin	Kathleen		DC_M7728		K.2.1
Martin	Lisa Ann		DC_M3780	UCS	K.2.1
Martin	Maria		DC_M1762	UCS	K.2.1
Martin	Michele		DC_M6994	UCS	K.2.1
Martin	Nancy		DC_M3238	UCS	K.2.1
Martin	Suanne		DC_M4324	UCS	K.2.1
Martin	Thomas		DC_M3556	UCS	K.2.1
Martin	Tim		DC_M2431	UCS	K.2.1
Martineau	Claire		DC_M0159		K.3.10, K.3.14
Martinez	Candida		DC_M3050	UCS	K.2.1
Martinez	Carol		DC_M3104	UCS	K.2.1
Martinez	Nelly		DC_M1760	UCS	K.2.1
Martino	Nicole		DC_M2308	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Martino	Robert		DC_M3167	UCS	K.2.1
Martinsen	Paul		DC_M1322	UCS	K.2.1
Martorell	Elizabeth		DC_E0184		K.3.1, K.3.2, K.3.3, K.3.11, K.3.12
Marty	Elsa		DC_M3007	UCS	K.2.1
Martz	Russell		DC_M2963	UCS	K.2.1
Martz	Russell		DC_M6674	UCS	K.2.1
Marvin	James		DC_M5932	UCS	K.2.1
Masi	Melody		DC_M3806	UCS	K.2.1
Masic	Dunja		DC_M6957	UCS	K.2.1
Maslanek	Micheal		DC_M2514	UCS	K.2.1
Maslyar	George		DC_M2251	UCS	K.2.1
Mason	Anita		DC_E0373		K.3.1, K.3.2, K.3.3, K.3.4, K.3.11, K.3.12, K.3.15, K.4
Mason	Dave		DC_M4993	UCS	K.2.1
Mason	Donita		DC_M3033	UCS	K.2.1
Mason	Henry		DC_M5022	UCS	K.2.1
Mason	Patricia		DC_M0008		K.3.1, K.3.2, K.3.6, K.3.7, K.3.10, K.3.12, K.3.13, K.3.15
Mason	Virginia		DC_M2537	UCS	K.2.1
Massafra	Samuel		DC_M6003	UCS	K.2.1
Massarella	Nance		DC_M1618	UCS	K.2.1
Massimini	Esther		DC_M2928	UCS	K.2.1
Masters	Dale Lee		DC_M1681	UCS	K.2.1
Mastrella	Elizabeth		DC_M0429		K.2.1
Mastrogiovanni	Jessica		DC_M4828	UCS	K.2.1
Masuret	Dorothea		DC_E0313		K.3.12
Mata	Muriel		DC_M4114	UCS	K.2.1
Mateer	Bob	Bernie Mateer	DC_M4059	UCS	K.2.1
Matellaro	Karen		DC_M0757		K.2.1
Materna	Gayle		DC_M7594	UCS	K.2.1
Mathaler	Sabrina		DC_M5950	UCS	K.2.1
Mathes	Fred		DC_M5322	UCS	K.2.1
Mathews	Richard		DC_M0749		K.2.1
Mathews	Tamara		DC_M3014	UCS	K.2.1
Mathews	Thomas		DC_M5410	UCS	K.2.1
Mathrani	Vandana		DC_M7762		K.2.1
Matlock	KL		DC_M4044	UCS	K.2.1
Matthews	David		DC_M3426	UCS	K.2.1
Matthews	Kelly		DC_M1679	UCS	K.2.1
Mattingly	Victoria		DC_M7908		K.2.1
Mattison	Scott		DC_M2952	UCS	K.2.1
Matton	Joyce		DC_M1952	UCS	K.2.1
Mattson	Karen		DC_M2487	UCS	K.2.1
Matz	Tamara		DC_M6004	UCS	K.2.1
Mau	Gregg		DC_M4715	UCS	K.2.1
Mauk	Caryl		DC_M4789	UCS	K.2.1
Mauritz	Kristal		DC_M6034	UCS	K.2.1
Maus	Jim		DC_M0969	UCS	K.2.1
Mausteller	Tapherine		DC_M1590	UCS	K.2.1
Maxfield	Richard		DC_M7630	UCS	K.2.1
Maxfield	Tania Gonzales		DC_M7048	UCS	K.2.1
May	Julie		DC_M2743	UCS	K.2.1
May	Linda D.		DC_M5102	UCS	K.2.1
Maybury	John		DC_M6093	UCS	K.2.1
Mayer	Deb		DC_M0367		K.2.1
Mayer	Vic		DC_M7688		K.2.1
Mayers	Mindy		DC_M7461	UCS	K.2.1
Mayhew	Paul		DC_M0078		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Maynard	Aurelia		DC_M5988	UCS	K.2.1
Maynard	Barbara		DC_M0604		K.2.1
Maynard	Heather		DC_M4512	UCS	K.2.1
Mazur	Ruth		DC_E0122		K.3.9
McAdam	Kyle		DC_M6942	UCS	K.2.1
McAdoo	Gail		DC_M2802	UCS	K.2.1
McAdoo	Nancy		DC_M6131	UCS	K.2.1
McAfee	Beth		DC_M0211		K.2.1
McAfee	Beth		DC_M6485	UCS	K.2.1
McAlear	Ehummer		DC_M6229	UCS	K.2.1
Mcaneny	Priscilla		DC_M6623	UCS	K.2.1
McAninch	Edwyna		DC_M5882	UCS	K.2.1
McAnnally	Karen		DC_M2081	UCS	K.2.1
McAnnally	Karen		DC_M2082	UCS	K.2.1
McBride	Alicia		DC_E0108		K.3.3, K.3.4, K.3.7, K.3.10, K.3.13, K.3.15
McCabe	James		DC_M1350	UCS	K.2.1
McCable	Charlotte		DC_M2512	UCS	K.2.1
McCahill	Jay		DC_M6879	UCS	K.2.1
McCann	Cathleen		DC_M6362	UCS	K.2.1
McCann	Kathy		DC_M5779	UCS	K.2.1
McCardell	Jean		DC_M6381	UCS	K.2.1
McCarthy	Barbara		DC_M2076	UCS	K.2.1
McCarthy	Camille		DC_M4427	UCS	K.2.1
McCarthy	Deborah		DC_M6775	UCS	K.2.1
McCarthy	Joellen	Peggy Nolan and Mary Ann Zollmann	DC_M0239	Sisters of Charity of the Blessed Virgin Mary	K.2.2
McCarty	Michael		DC_M5666	UCS	K.2.1
McCarty	Patricia		DC_M1414	UCS	K.2.1
McCarty	Tom		DC_M2111	UCS	K.2.1
McChesney	Evelyn		DC_M5517	UCS	K.2.1
McClain	Anne		DC_M3504	UCS	K.2.1
McClatchey	Walter P.		DC_M1049	UCS	K.2.1
McCleary	Harriet		DC_M5672	UCS	K.2.1
McClure	Joanna		DC_M5056	UCS	K.2.1
McClure	Sandy		DC_M2773	UCS	K.2.1
McCollom	Scott		DC_M5024	UCS	K.2.1
McCombs	Avery		DC_M3624	UCS	K.2.1
McConnell	Amanda		DC_M1673	UCS	K.2.1
McConochie	Micah		DC_M0464		K.2.1
McCool	Joseph		DC_M2170	UCS	K.2.1
McCormack	Kevin		DC_M0580		K.2.1
McCormack	Mary Ann		DC_M2535	UCS	K.2.1
McCormack	Rita		DC_E0303		K.3.12
McCormick	Jennifer		DC_M4608	UCS	K.2.1
McCormick	Theresa		DC_M5323	UCS	K.2.1
McCoy	Kim		DC_M5606	UCS	K.2.1
McCoy	Sandra		DC_M0891	UCS	K.2.1
McCradic	Kris		DC_M5111	UCS	K.2.1
McCrea	Melanie		DC_M0659		K.2.1
McCredie	Brian		DC_M5021	UCS	K.2.1
McCuistion	Kathleen		DC_M1729	UCS	K.2.1
McCuistion	Kathleen		DC_M6123	UCS	K.2.1
McCullough	Al		DC_M7780		K.3.1, K.3.2, K.3.3, K.3.4, K.3.5, K.3.10, K.3.11, K.3.13, K.3.15
McCullough	Charles W.		DC_M1327	UCS	K.2.1
McCullough	Megan		DC_M6143	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
McCullough	Paula		DC_M4477	UCS	K.2.1
McDaniel	Jennifer		DC_M7856		K.2.1
McDaniel	Marsha		DC_M6225	UCS	K.2.1
McDaniel	Marsha		DC_M6226	UCS	K.2.1
McDermond	Timothy		DC_M3313	UCS	K.2.1
McDermott	Mark		DC_M7898		K.3.3, K.3.7, K.3.10, K.3.13, K.3.14
McDermott	Rosalind		DC_M6667	UCS	K.2.1
McDermott-Burns	Kelley		DC_M6771	UCS	K.2.1
McDonald	Daniel		DC_E0187		K.2.4
McDonald	Judy		DC_M4229	UCS	K.2.1
McDonald	Kathy		DC_M4895	UCS	K.2.1
McDonald	Lori		DC_M0819	UCS	K.2.1
McDonald	Shari		DC_M0895	UCS	K.2.1
McDonald	William		DC_M3745	UCS	K.2.1
McDowell	Christine		DC_M3271	UCS	K.2.1
McEachern	Cathy		DC_M4700	UCS	K.2.1
McEachron Taylor	Linda Lee		DC_M6098	UCS	K.2.1
McEathron	Rosemary		DC_M0106		K.2.1
McElhill	Betty		DC_E0137		K.3.10, K.3.12, K.3.14
McElroy	Lucy		DC_M5518	UCS	K.2.1
McEntee	Janet		DC_M3406	UCS	K.2.1
McFadyen	Victoria		DC_M7401	UCS	K.2.1
McFarland	Mary Ann		DC_M7374	UCS	K.2.1
McGary	Robin		DC_M4261	UCS	K.2.1
McGaughy	Robert E.		DC_M1474	UCS	K.2.1
McGee	Bob		DC_E0379		K.3.10, K.3.14
McGee	John		DC_M3535	UCS	K.2.1
McGee Jr	Brian		DC_M2409	UCS	K.2.1
McGettigan	Kellie		DC_M6719	UCS	K.2.1
McGinnis	Kathleen M.		DC_M7250	UCS	K.2.1
McGinty	Alison		DC_M7303	UCS	K.2.1
McGivern	Mary Ann		DC_E0214		K.2.2 and K.3.10
McGlone	Colleen		DC_M0410		K.2.1
McGlone	Gail		DC_M6490	UCS	K.2.1
McGonagle	Rachel		DC_M4241	UCS	K.2.1
McGrath	Mark	Mary McGrath	DC_M1086	UCS	K.2.1
Mcgrath	Moira		DC_M6117	UCS	K.2.1
McGregor	RobRoy		DC_M5496	UCS	K.2.1
McGregor	Teresa		DC_M6907	UCS	K.2.1
McGuire	Megan		DC_M3949	UCS	K.2.1
McIlwaine	Andy		DC_M2659	UCS	K.2.1
McIntyre	Heather		DC_M0856	UCS	K.2.1
McIntyre	Susan		DC_M6563	UCS	K.2.1
McKay	Chris		DC_M6061	UCS	K.2.1
McKee	Brian		DC_M0804	UCS	K.2.1
McKeel	Diane		DC_M0443		K.2.1
McKeever	Timothy		DC_M3986	UCS	K.2.1
McKeirnan	Leigh		DC_M6786	UCS	K.2.1
McKelvey	Don		DC_M0533		K.2.1
McKelvey	Don		DC_M1399	UCS	K.2.1
McKenna	Shayla		DC_M7493	UCS	K.2.1
McKenzie	Catherine		DC_M5968	UCS	K.2.1
McKenzie	Laura		DC_M0331		K.2.1
McKeon	Sheila		DC_M1614	UCS	K.2.1
McKeon	Susan		DC_M5927	UCS	K.2.1
McKinley	Mark		DC_M5334	UCS	K.2.1
McKinney	Marilyn		DC_M4616	UCS	K.2.1
McKinney	Sam		DC_M4678	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
McKinstry	Dennis and Carol		DC_M2367	UCS	K.2.1
McKown	Julie		DC_M2588	UCS	K.2.1
McLane	John		DC_M0444		K.2.1
McLaughlin	Amanda		DC_M2706	UCS	K.2.1
Mclaughlin	Rachelle		DC_M1984	UCS	K.2.1
McLaurin	Megan		DC_M7503	UCS	K.2.1
McLean	Christina		DC_M0163		K.2.1
McLellan	Tracy		DC_E0004		K.2.2
McLeod	Damien		DC_M4541	UCS	K.2.1
McLoryd	Merry		DC_M1725	UCS	K.2.1
McMahan	Janet		DC_M3215	UCS	K.2.1
McMahon	Kenneth		DC_M4323	UCS	K.2.1
McMahon	Paul		DC_M7272	UCS	K.2.1
McManus	Micheal		DC_M3016	UCS	K.2.1
McMillan	Erik		DC_M1188	UCS	K.2.1
McMillen	Joseph		DC_M1151	UCS	K.2.1
McMillen	Joseph		DC_M1153	UCS	K.2.1
McMullan	A. Dale		DC_M7612	UCS	K.2.1
McMullin	William		DC_M2230	UCS	K.2.1
McMurray	Shane		DC_E0164		K.3.1, K.3.11
McMurtry	James M.		DC_M2038	UCS	K.2.1
McNamara	Timothy		DC_M2511	UCS	K.2.1
McNamara	Vivian		DC_M3713	UCS	K.2.1
McNeil	Alesa		DC_M7012	UCS	K.2.1
McNeil	JG		DC_M1977	UCS	K.2.1
McNichol	Lynn		DC_M0347		K.2.1
McNichol	Tim		DC_M0906	UCS	K.2.1
McNichols	Keith		DC_M7793		K.2.1
McNie	Helen		DC_M5436	UCS	K.2.1
McPeek	John		DC_M4929	UCS	K.2.1
McPhee	Nicole		DC_M3499	UCS	K.2.1
McPherson	Nevada		DC_M0454		K.2.1
McPherson	Suzanne		DC_M6964	UCS	K.2.1
McRae	Brandon		DC_M1017	UCS	K.2.1
McSwain	Robert		DC_M7686		K.2.1
McVarish	Linda		DC_M6785	UCS	K.2.1
McVoy	E.		DC_M6097	UCS	K.2.1
McWherter	Fran		DC_M6754	UCS	K.2.1
McWilliams	Cynthia		DC_M3627	UCS	K.2.1
Meacham	Julie		DC_M1386	UCS	K.2.1
Meacham	Michelle		DC_M0704		K.2.1
Mead	Benjamin		DC_M7033	UCS	K.2.1
Mead	Howard		DC_M7840		K.3.7, K.3.10, K.3.11, K.3.13, K.3.15
Mead	John		DC_M2995	UCS	K.2.1
Mead	Kathleen		DC_M3956	UCS	K.2.1
Mead	Kathleen		DC_M6074	UCS	K.2.1
Mead	Kathryn		DC_M5712	UCS	K.2.1
Mead	Marjorie		DC_M1857	UCS	K.2.1
Mead	Sam		DC_M2549	UCS	K.2.1
Meadows	Lynn		DC_E0175		K.2.2
Meagher	Ilona		DC_M7318	UCS	K.2.1
Meagher	Kathleen		DC_M5644	UCS	K.2.1
Media	Teresa		DC_M2948	UCS	K.2.1
Medious	Simone		DC_M2587	UCS	K.2.1
Medzihradsky	Oliver		DC_M7696		K.2.1
Mee	Diane		DC_M0093		K.2.1
Meehan	Nancy		DC_M0472		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Meek	Ted		DC_M6473	UCS	K.2.1
Meeks	B. Spencer		DC_M2660	UCS	K.2.1
Mehling-Wilson	Maryann		DC_M6727	UCS	K.2.1
Mehring	Walter		DC_M2939	UCS	K.2.1
Meierotto	Richard	Joan Meirerotto	DC_M0167		K.3.2, K.3.3, K.3.6, K.3.7, K.3.10, K.3.11
Meisner	Lorrain F		DC_M0968	UCS	K.2.1
Melby	Deborah		DC_M6536	UCS	K.2.1
Mellett	Ken		DC_M3987	UCS	K.2.1
Mellica	Jason		DC_M2312	UCS	K.2.1
Melling	Laura		DC_M5177	UCS	K.2.1
Melom	Jean		DC_M6335	UCS	K.2.1
Melone	Lisa		DC_M4774	UCS	K.2.1
Meloney	John		DC_M3732	UCS	K.2.1
Melsa	Linda		DC_M0897	UCS	K.2.1
Melvin	Robert L.		DC_M3957	UCS	K.2.1
Menard	David		DC_M6649	UCS	K.2.1
Menard	Jana		DC_M2876	UCS	K.2.1
Mendelsohn	Ellen		DC_M3805	UCS	K.2.1
Mendias	Jennifer		DC_M0470		K.2.1
Mendoza	E.		DC_M7457	UCS	K.2.1
Mennel-Bell	Mari		DC_M2923	UCS	K.2.1
Menyuk	Paula		DC_M2649	UCS	K.2.1
Mercer	Carol		DC_M6195	UCS	K.2.1
Mercer	E.		DC_M5030	UCS	K.2.1
Merchant	Sally		DC_M0892	UCS	K.2.1
Meredith	John		DC_M7189	UCS	K.2.1
Meresca	Josh		DC_M6121	UCS	K.2.1
Meridian	A.B.		DC_M3099	UCS	K.2.1
Merkh	Rebecca		DC_M0326		K.2.1
Merkin	Aaron		DC_M1463	UCS	K.2.1
Merrick	Kate		DC_M1668	UCS	K.2.1
Merrill	Ruth		DC_M3756	UCS	K.2.1
Merriman	Holly		DC_M6273	UCS	K.2.1
Merritt	Chanel		DC_M1866	UCS	K.2.1
Mertens	Stephanie		DC_M0010	Adorers of the Blood of Christ	K.2.2
Mertens	Stephanie		DC_M6555	UCS	K.2.1
Mertz	Robert		DC_M4347	UCS	K.2.1
Merz	Eugene		DC_E0183		K.2.2
Merz	Eugene		DC_E0195		K.2.2 and K.2.4
Messina	Annette		DC_M5806	UCS	K.2.1
Metcalf	A.		DC_M3954	UCS	K.2.1
Metcalf	Connie		DC_M0192		K.3.2, K.3.3, K.3.4, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15
Metheny	Nicholas		DC_M5150	UCS	K.2.1
Metsinger	PL		DC_M2297	UCS	K.2.1
Metsinger	PL		DC_M2298	UCS	K.2.1
Mettam	Diane		DC_M3303	UCS	K.2.1
Mettler	Bill		DC_M1584	UCS	K.2.1
Metzger	James	Judith Metzger	DC_M0203		K.3.4, K.3.6, K.3.7, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15
Meyer	Deanna		DC_M0919	UCS	K.2.1
Meyer	Mildred		DC_M7248	UCS	K.2.1
Meyer	Patricia		DC_M5065	UCS	K.2.1
Meyers	DeJay		DC_M7151	UCS	K.2.1
Meyers	Linda		DC_M2548	UCS	K.2.1
Meyers	M.S.		DC_M0418		K.2.1
Meyers	Marie		DC_M1983	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Meyerson	Howard		DC_M6734	UCS	K.2.1
Mich	Pam		DC_M6503	UCS	K.2.1
Michael	Ulrich		DC_M4302	UCS	K.2.1
Michaelides	Sarah		DC_M1135	UCS	K.2.1
Michal	Donald		DC_M6443	UCS	K.2.1
Michalak	Robert		DC_M1332	UCS	K.2.1
Micheals	Patricia		DC_M3044	UCS	K.2.1
Michel	Joseph		DC_M4184	UCS	K.2.1
Michelson	Kristen		DC_M6751	UCS	K.2.1
Middletown	Terri		DC_M0208		K.2.1
Midgett	Suz-Anne		DC_M6565	UCS	K.2.1
Mihalko	Kim		DC_M6554	UCS	K.2.1
Mihaly	Robert		DC_M4116	UCS	K.2.1
Mikalson	Claire		DC_M4215	UCS	K.2.1
Mikkelsen	David		DC_M5182	UCS	K.2.1
Mikkelson	Bette		DC_M0989	UCS	K.2.1
Milby	Lyle		DC_M4642	UCS	K.2.1
Milch	Mario		DC_M3115	UCS	K.2.1
Miles	Mara		DC_M4647	UCS	K.2.1
Miles	Ted		DC_M7146	UCS	K.2.1
Milianta	Merideth		DC_M5309	UCS	K.2.1
Militzer-Kopperl	Jennifer		DC_M3191	UCS	K.2.1
Millard	H.M.		DC_M0958	UCS	K.2.1
Millard	Jennifer		DC_M3694	UCS	K.2.1
Miller	Amy		DC_M2206	UCS	K.2.1
Miller	Anne Norton		DC_M0276	United States Environmental Protection Agency	K.5
Miller	Bret		DC_M7942		K.2.1
Miller	Brett		DC_M4783	UCS	K.2.1
Miller	Catherine		DC_M0090		K.2.1
Miller	Cheryl		DC_M7525	UCS	K.2.1
Miller	Clyde		DC_M1991	UCS	K.2.1
Miller	Clyde		DC_M1992	UCS	K.2.1
Miller	Dana		DC_M5922	UCS	K.2.1
Miller	Dianne		DC_M7053	UCS	K.2.1
Miller	Dona		DC_M2782	UCS	K.2.1
Miller	Doug		DC_M0427		K.2.1
Miller	Eric		DC_M5856	UCS	K.2.1
Miller	Francine		DC_M3305	UCS	K.2.1
Miller	Gabriel		DC_M3658	UCS	K.2.1
Miller	Gloria		DC_M7348	UCS	K.2.1
Miller	Griff		DC_M1849	UCS	K.2.1
Miller	Gutherie		DC_M7830		K.3.1
Miller	Jackie		DC_M3739	UCS	K.2.1
Miller	Joel		DC_M4316	UCS	K.2.1
Miller	Jon		DC_M3308	UCS	K.2.1
Miller	Juda		DC_M0244		K.2.1
Miller	Kathleen E.		DC_M6966	UCS	K.2.1
Miller	Kathryn		DC_M1014	UCS	K.2.1
Miller	Kathryn		DC_M1247	UCS	K.2.1
Miller	Kendrick W		DC_M2025	UCS	K.2.1
Miller	Margaret		DC_P0009		K.3.14
Miller	Mary		DC_M3361	UCS	K.2.1
Miller	Mary L.		DC_M7509	UCS	K.2.1
Miller	Matthew		DC_M6068	UCS	K.2.1
Miller	Nancy		DC_M4467	UCS	K.2.1
Miller	Neil		DC_M5029	UCS	K.2.1
Miller	Patricia		DC_M1299	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Miller	Paul		DC_M3106	UCS	K.2.1
Miller	Ralph		DC_M2874	UCS	K.2.1
Miller	Rebecca		DC_M1303	UCS	K.2.1
Miller	Stan		DC_E0081		K.2.2
Miller	Steven		DC_M4280	UCS	K.2.1
Miller	Susan		DC_M1704	UCS	K.2.1
Miller	Susan		DC_M1926	UCS	K.2.1
Miller	Thomas G.		DC_M1753	UCS	K.2.1
Miller-Tanner	Susan		DC_M3090	UCS	K.2.1
Milligan	Jennifer		DC_M7380	UCS	K.2.1
Milliman	John		DC_M1793	UCS	K.2.1
Milliman	John		DC_M6036	UCS	K.2.1
Mills	Coeta		DC_M7670	UCS	K.2.1
Mills	Cortney		DC_E0389		K.3.2, K.3.3, K.3.11, K.3.12, K.3.13, K.3.15
Mills	Kevin		DC_M0693		K.2.1
Mills	Marybeth		DC_E0034		K.3.6, K.3.7, K.3.11
Mills	Melva		DC_M1713	UCS	K.2.1
Mills	Rosemary		DC_M3192	UCS	K.2.1
Mills	Roy		DC_M4976	UCS	K.2.1
Milne	Bryan		DC_M4331	UCS	K.2.1
Milon	Joe		DC_M5096	UCS	K.2.1
Milstein	Karen		DC_M1036	UCS	K.2.1
Milton	J.W.	Mary Lee Milton	DC_M3312	UCS	K.2.1
Milton	J.W. & Mary Lee		DC_M2030	UCS	K.2.1
Minault	Kent		DC_M7319	UCS	K.2.1
Minaya	Christian		DC_M1208	UCS	K.2.1
Mingle	Jessica		DC_M3255	UCS	K.2.1
Minick	Jim		DC_M7194	UCS	K.2.1
Miniclier	Nicole		DC_M4136	UCS	K.2.1
Minnix	Amanda		DC_M6072	UCS	K.2.1
Minshull	Jeremy		DC_M1259	UCS	K.2.1
Minshull	Jeremy		DC_M5305	UCS	K.2.1
Mirabella	Joe		DC_E0365		K.2.2
Miramontes-Johnson	DaniLe		DC_M7494	UCS	K.2.1
Miranda	Denicolai		DC_M1649	UCS	K.2.1
Mirantz	Dorothy		DC_M2520	UCS	K.2.1
Misirlic	Lola		DC_M4350	UCS	K.2.1
Misner	Anthony		DC_M6186	UCS	K.2.1
Misner	Meredith		DC_M7149	UCS	K.2.1
Mitchel	Sharon A.		DC_M4356	UCS	K.2.1
Mitchell	Alrlene		DC_M3001	UCS	K.2.1
Mitchell	Barbara		DC_M6989	UCS	K.2.1
Mitchell	Colin		DC_E0321		K.2.2
Mitchell	Margaret		DC_M2748	UCS	K.2.1
Mitchell	Mary		DC_M0849	UCS	K.2.1
Mitchell	Pauline		DC_E0374	Campaign for International Co-operation and Disarmament	K.3.1, K.3.2, K.3.7, K.3.11, K.3.12, K.3.13, K.3.15
Mitchell	Rosamond		DC_M1934	UCS	K.2.1
Mitchell	Rosamond		DC_M1935	UCS	K.2.1
Mitchell	Sheri		DC_M5934	UCS	K.2.1
Mitchell	Tony		DC_M5131	UCS	K.2.1
Mitman	Tammalene		DC_M2496	UCS	K.2.1
Mitton	Darren		DC_M7155	UCS	K.2.1
Mizell	Mike		DC_M7661	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Mo	Donna		DC_M7571	UCS	K.2.1
Mock	Jean		DC_M6653	UCS	K.2.1
Moe	John		DC_M7657	UCS	K.2.1
Moehle	Henry		DC_M5293	UCS	K.2.1
Moeller	Mary		DC_M7198	UCS	K.2.1
Moeller	Valerie		DC_M2371	UCS	K.2.1
Moeller	Valerie		DC_M2385	UCS	K.2.1
Moench	Heather		DC_M0748		K.2.1
Mogen	Ayako		DC_M5761	UCS	K.2.1
Mohlman	Ambur		DC_M0316		K.2.1
Mohn	Corey		DC_M2584	UCS	K.2.1
Mohr	Alexis		DC_M1915	UCS	K.2.1
Mohr	Alexis		DC_M3593	UCS	K.2.1
Moidel	Jeffrey		DC_M2975	UCS	K.2.1
Moir	David W.		DC_M6422	UCS	K.2.1
Mojica	L.		DC_M0508		K.2.1
Molchan-Fitzgerald	Nan		DC_M1732	UCS	K.2.1
Mollenhauer	Paul		DC_M7785		K.2.1
Molnar	Nollie		DC_M4966	UCS	K.2.1
Molnar	Nollie		DC_M6858	UCS	K.2.1
Molyneaux	Kathie		DC_M6250	UCS	K.2.1
Momsen	Eric		DC_M1914	UCS	K.2.1
Monahan	Carol		DC_M5582	UCS	K.2.1
Monahan	John		DC_M6515	UCS	K.2.1
Monasky	Michael		DC_PHO0024		K.3.1, K.3.2, K.3.15, K.4
Mondschein	Elizabeth		DC_M6688	UCS	K.2.1
Mone	Carolyn		DC_M5046	UCS	K.2.1
Montague	Susan		DC_M6148	UCS	K.2.1
Montalvo	Monica		DC_M2581	UCS	K.2.1
Montana	Peter		DC_M2250	UCS	K.2.1
Montelleon	Marjorie		DC_M4513	UCS	K.2.1
Montgomery	Charles		DC_M2910	UCS	K.2.1
Montore	Michael		DC_M1651	UCS	K.2.1
Mood	Patricia		DC_M4706	UCS	K.2.1
Moon	Carolyn		DC_M1129	UCS	K.2.1
Moon	Maryann		DC_M2452	UCS	K.2.1
Mooney	Sara		DC_M3184	UCS	K.2.1
Moor	Gary R.		DC_M1044	UCS	K.2.1
Moore	Elizabeth Davis		DC_M1128	UCS	K.2.1
Moore	Evelyn		DC_M3071	UCS	K.2.1
Moore	Gwendolyn		DC_M5960	UCS	K.2.1
Moore	Kelly		DC_M3537	UCS	K.2.1
Moore	Kristine Stroad		DC_M4953	UCS	K.2.1
Moore	Leann		DC_M6389	UCS	K.2.1
Moore	Linda		DC_M4550	UCS	K.2.1
Moore	Lorian		DC_M3738	UCS	K.2.1
Moore	Lynne		DC_M6147	UCS	K.2.1
Moore	Margaret		DC_M3943	UCS	K.2.1
Moore	Sharon		DC_M3493	UCS	K.2.1
Moore	Sherrie		DC_M4446	UCS	K.2.1
Moore	Tammy		DC_M5230	UCS	K.2.1
Moore	Tom		DC_M7773		K.2.1
Moore	Kathleen		DC_M1746	UCS	K.2.1
Moore-Ortiz	Cheryl		DC_M1661	UCS	K.2.1
Morales	Carmen		DC_M2127	UCS	K.2.1
Moran	Kathleen		DC_M2824	UCS	K.2.1
Morarre	Thomas A		DC_M2289	UCS	K.2.1
Moravitz	Stefanie		DC_M4351	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Morawitz	Terry		DC_M6822	UCS	K.2.1
Mordan	William		DC_M1532	UCS	K.2.1
Moreau	Jacqueline		DC_M0799	UCS	K.2.1
Moreira	Nancy		DC_M7327	UCS	K.2.1
Morello	Phyl		DC_M1175	UCS	K.2.1
Moreno	Gilbert		DC_M0735		K.2.1
Moreno	Heidi		DC_M4812	UCS	K.2.1
Moreton	Marion		DC_M0821	UCS	K.2.1
Moreton	Marion		DC_M1001	UCS	K.2.1
Morgan	David		DC_M1280	UCS	K.2.1
Morgan	Jane		DC_M7162	UCS	K.2.1
Morgan	Kathryn		DC_M1243	UCS	K.2.1
Morgan	Marianne		DC_M2839	UCS	K.2.1
Morgan	Melissa		DC_M2709	UCS	K.2.1
Morgan	Michelle		DC_M6437	UCS	K.2.1
Morgan	Patricia		DC_M2854	UCS	K.2.1
Morgan	Rian		DC_M6681	UCS	K.2.1
Morgan	Susan		DC_M5810	UCS	K.2.1
Morgan	Wendy		DC_M6182	UCS	K.2.1
Morganstern	Roberta		DC_M4521	UCS	K.2.1
Morghen	Sigrit		DC_M3331	UCS	K.2.1
Moriarty	Paula		DC_M4744	UCS	K.2.1
Morin	Linda		DC_M4690	UCS	K.2.1
Morin	Lynn		DC_M4329	UCS	K.2.1
Morinville	Lynette		DC_M0622		K.2.1
Morkovsky	Mary C.		DC_M0987	UCS	K.2.1
Morley	Deborah		DC_M1467	UCS	K.2.1
morley	Julaine		DC_M6323	UCS	K.2.1
Mornel	Theodore		DC_M2693	UCS	K.2.1
Moroney	M.L.		DC_M5149	UCS	K.2.1
Moros	Fancoise		DC_M3571	UCS	K.2.1
Moroz	Lela		DC_M6862	UCS	K.2.1
Moroz	Vira		DC_M4717	UCS	K.2.1
Morr	Dirk		DC_M2658	UCS	K.2.1
Morrel-Samuels	Palmer		DC_E0325		K.3.1, K.3.2
Morrill	Douglas		DC_M3824	UCS	K.2.1
Morris	Billie		DC_M3218	UCS	K.2.1
Morris	Lynne		DC_M3938	UCS	K.2.1
Morris	Michael		DC_M4602	UCS	K.2.1
Morris	Ray		DC_M5530	UCS	K.2.1
Morris	Sean		DC_E0344	Menwith Hill Forum	K.2.2
Morris	Sharon		DC_M4301	UCS	K.2.1
Morrisey	Michael		DC_M3679	UCS	K.2.1
Morrison	Catherine		DC_M0956	UCS	K.2.1
Morrison	Courtney		DC_M2465	UCS	K.2.1
Morrison	Donald		DC_M7593	UCS	K.2.1
Morrison	Halle		DC_M0137		K.2.1
Morrison	Jerry		DC_E0440		K.3.14
Morrison	Kristofor		DC_M3937	UCS	K.2.1
Morrison	Lara		DC_PHO0027		K.3.3, K.3.13, K.3.15, K.3.18
Morrison	Margaret		DC_M0212		K.3.14
Morrison	Mary Lou		DC_M7910		K.2.1
Morrison	Susan		DC_M2183	UCS	K.2.1
Morrison	Wendy		DC_M2166	UCS	K.2.1
Morrow	Panny A		DC_M2353	UCS	K.2.1
Morrow	Quenby		DC_M5542	UCS	K.2.1
Morrow	Thomas E.		DC_M1228	UCS	K.2.1
Morse	Kathryn		DC_M2791	UCS	K.2.1
Morse	Penney		DC_M0361		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Mortellaro	Robert		DC_M2623	UCS	K.2.1
Mortenson	Darlene		DC_M2761	UCS	K.2.1
Mortenson	Joan		DC_M5975	UCS	K.2.1
Morton	Martha		DC_M7539	UCS	K.2.1
Moscicki	Natalia		DC_M5714	UCS	K.2.1
Moseley	Ray		DC_M2999	UCS	K.2.1
Moser	Hans-Rudolf		DC_M6053	UCS	K.2.1
Moser	Judy		DC_M3425	UCS	K.2.1
Moses	H.R.		DC_M5708	UCS	K.2.1
Mosher	Allyn		DC_M2478	UCS	K.2.1
Mosher	Craig		DC_M4330	UCS	K.2.1
Mosher	Holly		DC_M7605	UCS	K.2.1
Mosher	Scott		DC_M5657	UCS	K.2.1
Mosier	Gretchen		DC_M3330	UCS	K.2.1
Mosket	Jef		DC_M2130	UCS	K.2.1
Moss	Laurel		DC_M2938	UCS	K.2.1
Moss	Laurel		DC_M5607	UCS	K.2.1
Mossman	Jake		DC_M3284	UCS	K.2.1
Mott	Ashleigh		DC_M3962	UCS	K.2.1
Mott	Carolyn		DC_M1165	UCS	K.2.1
Motyka	Mark		DC_M7232	UCS	K.2.1
Mouer	Sylvia		DC_M4459	UCS	K.2.1
Moulton	Paul Charbonnet		DC_E0126		K.2.2
Moxley	Diana		DC_M7460	UCS	K.2.1
Moyer	Hariet		DC_M3567	UCS	K.2.1
Moyher	Joan		DC_M3017	UCS	K.2.1
Mrozinski	Debbie		DC_M1556	UCS	K.2.1
Muehlenkamp	Angel		DC_M2569	UCS	K.2.1
Muehlenkamp	Angel		DC_M6291	UCS	K.2.1
Mueller	Debra		DC_M6959	UCS	K.2.1
Mueller	Karsten		DC_M3993	UCS	K.2.1
Mueller	Kurt-Charles		DC_M0863	UCS	K.2.1
Mugge	Paul		DC_M2086	UCS	K.2.1
Mujica	Juliana		DC_M7199	UCS	K.2.1
Mukada	Maraid		DC_M4922	UCS	K.2.1
Mukavetz	Megan		DC_M2157	UCS	K.2.1
Mull	Dave		DC_E0353		K.3.16
Mullane	Danny		DC_M7110	UCS	K.2.1
Mullane	Sharon		DC_M0950	UCS	K.2.1
Mullen	George		DC_M0406		K.2.1
Muller	Don		DC_M5394	UCS	K.2.1
Muller	Peter		DC_M0708		K.2.1
Mulligan	Dana		DC_M3347	UCS	K.2.1
Mulligan	Michael		DC_M5178	UCS	K.2.1
Mulligan	Ruth J.		DC_M6128	UCS	K.2.1
Mullins	Jeff		DC_M7523	UCS	K.2.1
Muniz	Rich		DC_M3564	UCS	K.2.1
Munro	Karen		DC_M0689		K.2.1
Munson	Jacob		DC_M6446	UCS	K.2.1
Munson	Peter		DC_M1893	UCS	K.2.1
Murdock	Linda		DC_M5725	UCS	K.2.1
Murphy	Daniel		DC_M5519	UCS	K.2.1
Murphy	Dennis		DC_M4017	UCS	K.2.1
Murphy	Doris		DC_M3183	UCS	K.2.1
Murphy	Doris		DC_M3572	UCS	K.2.1
Murphy	Elizabeth		DC_M4795	UCS	K.2.1
Murphy	Esther		DC_M4769	UCS	K.2.1
Murphy	Garrett		DC_M7447	UCS	K.2.1
Murphy	Jean		DC_M5228	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Murphy	John D.		DC_E0202	Jesuit Community Santa Clara University	K.2.4
Murphy	Karen		DC_M7676	UCS	K.2.1
Murphy	Marilyn		DC_M6171	UCS	K.2.1
Murphy	Michael		DC_M7113	UCS	K.2.1
Murphy	Peg Boucher		DC_M7081	UCS	K.2.1
Murphy	Stephen		DC_M2280	UCS	K.2.1
Murphy	Susan		DC_M3704	UCS	K.2.1
Murphy	Timothy		DC_M6954	UCS	K.2.1
Murr	Bobbee		DC_M0479		K.2.1
Murray	Karen		DC_PHO0060		K.3.12
Murray	Linda		DC_M0482		K.2.1
Murray	Mark		DC_M7808		K.3.17
Murtha	Sharon		DC_M1598	UCS	K.2.1
Muse	Philip		DC_E0234		K.2.3
Muser	Mary		DC_M5836	UCS	K.2.1
Musial	Kim		DC_M3842	UCS	K.2.1
Musialowski	Susan		DC_M4856	UCS	K.2.1
Musser	Marcie		DC_M5098	UCS	K.2.1
Musson	Maureen		DC_M2834	UCS	K.2.1
Muto	Kris		DC_M2274	UCS	K.2.1
Muzzy	Coralie		DC_E0361		K.2.3
Myer	Scott		DC_M0257		K.2.1
Myers	Adele		DC_M6177	UCS	K.2.1
Myers	Amie		DC_M5089	UCS	K.2.1
Myers	David		DC_M4245	UCS	K.2.1
Myers	George		DC_M2446	UCS	K.2.1
Myers	Natasha		DC_E0012		K.2.2
Myers	Pamela		DC_M4726	UCS	K.2.1
Myers	Robert		DC_M3708	UCS	K.2.1
Myers	Susan		DC_M6617	UCS	K.2.1
Myers	Sylvia		DC_M3025	UCS	K.2.1
Myers	Victoria		DC_M6514	UCS	K.2.1
Mykoff	Robert		DC_M7347	UCS	K.2.1
Myles	Sarah		DC_M6366	UCS	K.2.1
Naccarato	Grace		DC_M0168		K.3.14
Nacheff	Marni		DC_M2708	UCS	K.2.1
Naclerio	Lynda		DC_M2954	UCS	K.2.1
Nadelman	Fred		DC_M1468	UCS	K.2.1
Nadelman	Fred		DC_M5330	UCS	K.2.1
Naeseth	Joan		DC_M5367	UCS	K.2.1
Nagendra	Saray		DC_M5848	UCS	K.2.1
Nagle	Rob		DC_M3747	UCS	K.2.1
Nagy	Mary Jo		DC_M6846	UCS	K.2.1
Nam	S.		DC_M7427	UCS	K.2.1
Napoleon	Laura		DC_M2363	UCS	K.2.1
Narang	Vikrant		DC_E0415		K.3.1, K.3.4, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15
Narveson	Robert		DC_M6019	UCS	K.2.1
Nasbaum	Cyndi		DC_M4507	UCS	K.2.1
Nash	Andrew		DC_M0245		K.2.2
Nash	Chelsea		DC_M0475		K.2.1
Nash	Chelsea		DC_M3513	UCS	K.2.1
Nasif	Maria		DC_M5615	UCS	K.2.1
Nason	Zena		DC_M3344	UCS	K.2.1
Nassikas	Chris		DC_M4408	UCS	K.2.1
Nassiri-Rahimi	Roya		DC_M1593	UCS	K.2.1
Nassrine	Farhoody		DC_M3578	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Nast	John		DC_M4897	UCS	K.2.1
Natali	Steven		DC_M7787		K.3.1, K.3.7
Natarajan	Soundaran		DC_M5193	UCS	K.2.1
Natarajan	Soundaran		DC_M6793	UCS	K.2.1
Nativi	Lisa		DC_M3477	UCS	K.2.1
Natvig	Carol		DC_M3506	UCS	K.2.1
Naujokas	Deborah		DC_M3336	UCS	K.2.1
Naujokas	Ginto		DC_M3335	UCS	K.2.1
Naurath	David		DC_M2027	UCS	K.2.1
Navarra	Nancy		DC_M5953	UCS	K.2.1
Navarrete	Jennifer Shaw		DC_M3194	UCS	K.2.1
Navarrete	Patty		DC_M0600		K.2.1
Nave	Sally		DC_M3179	UCS	K.2.1
Naylor	Elisha		DC_M2953	UCS	K.2.1
Nazari	Mohsen		DC_M6133	UCS	K.2.1
Neace	Mb		DC_M1655	UCS	K.2.1
Neace	Mb		DC_M7072	UCS	K.2.1
Neale	Colin		DC_M4544	UCS	K.2.1
Nealon	Sandra		DC_M4861	UCS	K.2.1
Nealy	Carol		DC_M4545	UCS	K.2.1
Nebitt	Dale		DC_E0366	East Bay Peace Action	K.3.1, K.3.2, K.3.3, K.3.6, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Needham	Meredith		DC_M2950	UCS	K.2.1
Needs	Steven		DC_M3712	UCS	K.2.1
Neff	Grace		DC_M4996	UCS	K.2.1
Neff	Joanna		DC_M0756		K.2.1
Neff	Samuel		DC_M0323		K.2.1
Neff	Ted		DC_E0133		K.2.3
Nefstead	Margaret		DC_E0078		K.3.3, K.3.4
Neidell	Merle		DC_M6135	UCS	K.2.1
Neidich	Theresa Donatiello		DC_M7548	UCS	K.2.1
Neil	Linda		DC_M7203	UCS	K.2.1
Neimark	M.S.		DC_M7184	UCS	K.2.1
Nelson	Carol		DC_M3486	UCS	K.2.1
Nelson	Cris		DC_M7879		K.2.1
Nelson	George		DC_M6410	UCS	K.2.1
Nelson	James		DC_M5226	UCS	K.2.1
Nelson	Janet		DC_M2039	UCS	K.2.1
Nelson	Kanoa		DC_PHO0053		K.3.15
Nelson	Kathleen		DC_M5797	UCS	K.2.1
Nelson	Kristie		DC_M7850		K.2.3
Nelson	Pam		DC_M1385	UCS	K.2.1
Nelson	Thomas		DC_M6645	UCS	K.2.1
Nerode	Gregory		DC_M0484		K.2.1
Nestlinger	Alan		DC_M3643	UCS	K.2.1
Neswald	Barbara		DC_M2530	UCS	K.2.1
Neu	Cy		DC_M3237	UCS	K.2.1
Neu	Gary		DC_M3162	UCS	K.2.1
Neuberger	Egon		DC_M3686	UCS	K.2.1
Neumann	Elizabeth		DC_M6476	UCS	K.2.1
Neumeyer	Debbie L.		DC_M0120		K.2.1
Neuzil	Denise		DC_M1321	UCS	K.2.1
Neville	Polly		DC_M3394	UCS	K.2.1
Neville	Willis		DC_M1664	UCS	K.2.1
New	Andrea		DC_M6241	UCS	K.2.1
New	Marianne		DC_M3645	UCS	K.2.1
Newberg	Stephen		DC_M1943	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Newberry	Roxie		DC_M7603	UCS	K.2.1
Newcomer	Kayly		DC_M4418	UCS	K.2.1
Newkirk	Lindsey		DC_M6317	UCS	K.2.1
Newland	Jane		DC_M1870	UCS	K.2.1
Newman	Alicia		DC_M3716	UCS	K.2.1
Newman	Rae		DC_M4870	UCS	K.2.1
Newman	Sarah		DC_M3072	UCS	K.2.1
Newman-Jennison	Julie		DC_M6762	UCS	K.2.1
Newman-Smith	Ann		DC_M6875	UCS	K.2.1
Newsom	Marcia		DC_M2947	UCS	K.2.1
Newsom	Scott		DC_M3614	UCS	K.2.1
Newsom	Teri		DC_M4015	UCS	K.2.1
Newton	Elizabeth		DC_M4823	UCS	K.2.1
Newton	Peter		DC_M0922	UCS	K.2.1
Nguyen	Andrew		DC_M4164	UCS	K.2.1
Nguyen	Tuan-Linh		DC_M1643	UCS	K.2.1
Niblack	Catharine		DC_M3223	UCS	K.2.1
Niccoli	Cheryl		DC_M0003		K.3.2, K.3.12
Nicholas	Patricia		DC_M3100	UCS	K.2.1
Nicholas	Steve		DC_M3701	UCS	K.2.1
Nichols	Allan		DC_M5087	UCS	K.2.1
Nichols	Randilea		DC_M6581	UCS	K.2.1
Nichols	William		DC_M0302		K.2.1
Nichols	William		DC_M1471	UCS	K.2.1
Nichols	William		DC_M5161	UCS	K.2.1
Nicholson	David		DC_E0056		K.3.1, K.3.2, K.3.7, K.3.10, K.3.15
Nicholson-Schenk	Marguerite		DC_M6444	UCS	K.2.1
Nickels	Charlene		DC_M7019	UCS	K.2.1
Nickerson	Bradford		DC_M4469	UCS	K.2.1
Nickerson	Dan		DC_M3304	UCS	K.2.1
Nicklaus	Christine		DC_M0439		K.2.1
Nicolow	Jim		DC_M6359	UCS	K.2.1
Nicols	Colin		DC_M3130	UCS	K.2.1
Nicosia	Chris		DC_M6535	UCS	K.2.1
Nielsen	Benjamin		DC_M7789		K.2.3
Nienkark	Shirley		DC_M6808	UCS	K.2.1
Nierhaus	Florian		DC_M3000	UCS	K.2.1
Niernberger	Jana Webb		DC_M6812	UCS	K.2.1
Nigro	Janice		DC_M6302	UCS	K.2.1
Nihipali	Michele		DC_M1060	UCS	K.2.1
Niksic	Joyce		DC_M5574	UCS	K.2.1
Nisinson	Carolyn		DC_M5422	UCS	K.2.1
Nisinson	Carolyn		DC_M5423	UCS	K.2.1
Nissley	Connie		DC_M7889		K.2.1
Nivola	Che		DC_M0097		K.3.1, K.3.2, K.3.4, K.3.5, K.3.10
Noah	Ian		DC_M5551	UCS	K.2.1
Noah	Sandra		DC_M0520		K.2.1
Nocella	Scott		DC_M3178	UCS	K.2.1
Noda	Robin		DC_M1126	UCS	K.2.1
Nodel	Fred		DC_M7301	UCS	K.2.1
Noel	John		DC_M0848	UCS	K.2.1
Noel	John		DC_M2790	UCS	K.2.1
Noel	Lee		DC_M2962	UCS	K.2.1
Noethen	Mark		DC_M4567	UCS	K.2.1
Nolan	Anmorya		DC_M4508	UCS	K.2.1
Nolan	Antoinette		DC_M7163	UCS	K.2.1
Nolan	John		DC_M6280	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Nolte	Linda		DC_M3835	UCS	K.2.1
Noon	Rev Dr Wendy		DC_M2015	UCS	K.2.1
Noon	Rev Dr Wendy		DC_M2016	UCS	K.2.1
Noon	Rev Dr Wendy		DC_M2017	UCS	K.2.1
Noon	Wendy Yona		DC_M0677		K.2.1
Noon	Wendy Yona		DC_M4282	UCS	K.2.1
Noon	Wendy Yona		DC_M4284	UCS	K.2.1
Nord	Jill A.		DC_M0412		K.2.1
Nordberg	Heidi		DC_M5343	UCS	K.2.1
Norddahl	Birgir		DC_M1000	UCS	K.2.1
Nordquist	Susan		DC_M7876		K.2.1
Nordskog	Aubrie		DC_M2142	UCS	K.2.1
Norell	Judith		DC_M6814	UCS	K.2.1
Norian	Lyse		DC_M7764		K.2.1
Norman	Chris		DC_M2955	UCS	K.2.1
Norman	Sonya		DC_M0437		K.2.1
Norman	Tyler		DC_M7214	UCS	K.2.1
Norris	Brian		DC_M4011	UCS	K.2.1
Norris	Susan		DC_M5381	UCS	K.2.1
Norris	Wendy		DC_M7156	UCS	K.2.1
Norsen	Evelyn		DC_P0005		K.3.1, K.3.2, K.3.3, K.3.10, K.3.13
North	Elizabeth		DC_M5955	UCS	K.2.1
North	Harry		DC_M4752	UCS	K.2.1
North	Sheryl		DC_M7851		K.2.1
Norton	Nicholas		DC_M3135	UCS	K.2.1
Not Given	Nina		DC_M6379	UCS	K.2.1
Nottingham	Ashley		DC_M1874	UCS	K.2.1
Novak	Kurt		DC_M1123	UCS	K.2.1
Novak	Trina		DC_M7592	UCS	K.2.1
Novick	Mindy		DC_E0307		K.2.2
Novkov	Russell		DC_M3121	UCS	K.2.1
Nowicki	Kristen		DC_M1831	UCS	K.2.1
Ntiz	Jen		DC_M1672	UCS	K.2.1
Nuess	Mike		DC_M7140	UCS	K.2.1
Nuffer	Paul		DC_M6465	UCS	K.2.1
Nugent	Jaip		DC_M3886	UCS	K.2.1
Nun	Marion		DC_M4005	UCS	K.2.1
Nunes	David		DC_M3043	UCS	K.2.1
Nunes	Lisa		DC_M0529		K.2.1
Nunes	Lisa		DC_M1325	UCS	K.2.1
Nunez	Carlos A.		DC_M5581	UCS	K.2.1
Nunez-Hinestrosa	Julio E.		DC_M0934	UCS	K.2.1
Nunlist	Kathy		DC_M2540	UCS	K.2.1
Nunneker	Amy		DC_M5979	UCS	K.2.1
Nuria	Rodriguez		DC_M7724		K.2.1
Nuytinck	Pieter		DC_M2934	UCS	K.2.1
Nwokoye	Anne		DC_M7181	UCS	K.2.1
Nyborg	Yvonne		DC_M5613	UCS	K.2.1
Nystrom	Mark		DC_M4684	UCS	K.2.1
O' Brian	Frances		DC_M3112	UCS	K.2.1
O' Brian	ME		DC_M2042	UCS	K.2.1
O' Quinn	Garland		DC_M2364	UCS	K.2.1
O.	C.		DC_M6583	UCS	K.2.1
Oakes	Jacqueline		DC_M1148	UCS	K.2.1
Oaklander	Violet		DC_M0138		K.2.1
Oakley	Charmaine		DC_M4868	UCS	K.2.1
Oaks	Lucy		DC_M7007	UCS	K.2.1
Oates	Noel		DC_M2054	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Oberbillig	Molly		DC_M6869	UCS	K.2.1
Oberlander	Jane		DC_M6800	UCS	K.2.1
Obermeier	Anita		DC_M7547	UCS	K.2.1
Oberzut	Carlotta		DC_M5472	UCS	K.2.1
Obeso	Angela		DC_M6678	UCS	K.2.1
Oblas	Ella H.		DC_M6930	UCS	K.2.1
Obler	Paul		DC_M0317		K.2.1
Obrian	Dorothy		DC_M2021	UCS	K.2.1
O'Brien	Florcence		DC_M5695	UCS	K.2.1
O'Brien	Frances		DC_M0741		K.2.1
O'Brien	M.E.		DC_M1260	UCS	K.2.1
O'brien	Melissa		DC_M6295	UCS	K.2.1
O'Brien	Theresa		DC_M4278	UCS	K.2.1
Obuszewski	Max		DC_E0020		K.2.2
Ochal	Melissa		DC_M3276	UCS	K.2.1
Ochoa	Gilbert		DC_M3299	UCS	K.2.1
Oclott	Betty		DC_M2389	UCS	K.2.1
O'Connor	Gary		DC_M2006	UCS	K.2.1
O'Connor	Monica		DC_M1700	UCS	K.2.1
Odell	Dena		DC_M7312	UCS	K.2.1
Odell	Ken		DC_M7414	UCS	K.2.1
Odonnell	Amy		DC_M1106	UCS	K.2.1
O'Donnell	Ann		DC_M5523	UCS	K.2.1
O'Donnell	Barbara		DC_M2728	UCS	K.2.1
O'Donnell	Dawn		DC_M2403	UCS	K.2.1
O'Donnell	Julie		DC_M6116	UCS	K.2.1
O'Drobinak	John		DC_M3401	UCS	K.2.1
Oehlman	Gloria		DC_M7060	UCS	K.2.1
Offield	Doug		DC_M5256	UCS	K.2.1
Ogas	Daniel		DC_M4213	UCS	K.2.1
Ogletree	Wanda		DC_M5474	UCS	K.2.1
Ogren	Lorrie		DC_M6209	UCS	K.2.1
Ogren	Mike		DC_M7653	UCS	K.2.1
Ohaire	Hugh		DC_M2075	UCS	K.2.1
O'Halloran	James		DC_M2528	UCS	K.2.1
O'Halloran	James		DC_M5281	UCS	K.2.1
O'Hara	David		DC_M1776	UCS	K.2.1
Okazaki	Laura		DC_M1053	UCS	K.2.1
O'Keefe	Leanne		DC_M1845	UCS	K.2.1
O'Kelley	Donald		DC_M0840	UCS	K.2.1
O'Kennedy	Elaine		DC_M3029	UCS	K.2.1
Oklander	Martha		DC_M0176		K.2.1
Okstel	Carol		DC_M6024	UCS	K.2.1
Olch	Paula		DC_E0434	4201 E. Monte Vista #G106 Tucson, AZ 85712	K.3.1, K.3.14
Olch	Paula J.		DC_M0386		K.2.1
O'Leary	Kathryn		DC_M0478		K.2.1
Olejniczak	Anne		DC_M4546	UCS	K.2.1
Oleskevich	Diana		DC_E0267	Sisters of St. Joseph of Carondelet	K.2.2
Oleskevich	Diana-Jim		DC_E0416		K.3.1, K.3.2, K.3.3, K.3.4, K.3.7, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15
Oliva	Anthony		DC_M2275	UCS	K.2.1
Oliver	Della		DC_M6791	UCS	K.2.1
Oliver	Grace		DC_M3338	UCS	K.2.1
Olivieri	Jennifer		DC_M3920	UCS	K.2.1
Olivieri	Jennifer		DC_M3942	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Ollis	Jessica		DC_M2406	UCS	K.2.1
Olsen	Eileen		DC_M5509	UCS	K.2.1
Olsen	Webster		DC_M6694	UCS	K.2.1
Olson	Dorothy		DC_M7305	UCS	K.2.1
Olson	Gary		DC_M2686	UCS	K.2.1
Olson	Kurt N.		DC_M1949	UCS	K.2.1
Olson	Rod	Carol Olson	DC_M4910	UCS	K.2.1
Olson	Ruth		DC_M4047	UCS	K.2.1
Olson	Sara		DC_M6553	UCS	K.2.1
Olstein	Deborah		DC_M2578	UCS	K.2.1
Olver	Martha		DC_M3400	UCS	K.2.1
Om	Joy		DC_M3055	UCS	K.2.1
Omdalen	Ruth		DC_M7150	UCS	K.2.1
Oneal	Terry		DC_M7563	UCS	K.2.1
O'Neal	Joan B.		DC_M5383	UCS	K.2.1
O'Neal	Megan		DC_M7125	UCS	K.2.1
O'Neil	Brigid		DC_M7242	UCS	K.2.1
Oneill	Brian		DC_M0477		K.2.1
O'Neill	John		DC_M1987	UCS	K.2.1
Ong	Wen		DC_M1179	UCS	K.2.1
O'Niel	Lyn		DC_M6787	UCS	K.2.1
Onorato	John		DC_M4677	UCS	K.2.1
Opfer	Mary Alice		DC_M1630	UCS	K.2.1
Opipari	Linda		DC_M1109	UCS	K.2.1
Opton	Edward		DC_M6087	UCS	K.2.1
Ordonez	Richard		DC_M0381		K.2.1
Ordway	William		DC_M1255	UCS	K.2.1
Orffeo	Joseph		DC_M0643		K.2.1
Orians	Gordon		DC_M1899	UCS	K.2.1
Orliner	Robin		DC_M6540	UCS	K.2.1
Orndorff	Jerry		DC_M6696	UCS	K.2.1
Ornduff	JoEllen		DC_M6371	UCS	K.2.1
Orne	Richard		DC_M7285	UCS	K.2.1
Orr	Jenny		DC_M5538	UCS	K.2.1
Orr	Pam		DC_M2920	UCS	K.2.1
Orsary	Stephen		DC_M7623	UCS	K.2.1
Ortega	Ana		DC_M1427	UCS	K.2.1
Ortega	Lulu		DC_M1058	UCS	K.2.1
Ortiz	Barbie		DC_M7278	UCS	K.2.1
Ortiz	Joseph		DC_E0369		K.2.3
Ortlip	Jason		DC_M1398	UCS	K.2.1
Orwick	Clark		DC_M7901		K.3.1, K.3.2, K.3.10
Osborn	Nic		DC_M5563	UCS	K.2.1
Osborn	Rex		DC_M0397		K.2.1
Osborne	Kim		DC_M0888	UCS	K.2.1
Osborne	Olga		DC_M1981	UCS	K.2.1
Oshiro	Barry		DC_M4283	UCS	K.2.1
Osisek	Damian		DC_M1554	UCS	K.2.1
Osowecki	Steve		DC_M6316	UCS	K.2.1
Oster	Harriet s.		DC_M1600	UCS	K.2.1
Ostrand	Susan Linn		DC_M0121		K.2.1
Ostrander	Carolyn		DC_M0089		K.2.1
Ostrander	Marie		DC_M6442	UCS	K.2.1
Oswald	Lesley		DC_M2388	UCS	K.2.1
Ottenberg	Marjorie		DC_M3109	UCS	K.2.1
Ottersberg	Steve		DC_M7716		K.2.3
Ottina-Cserr	Tracy		DC_M1465	UCS	K.2.1
Otto	Brent		DC_E0159		K.2.3
Ouellette	Tracy		DC_M1013	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Overhiser	Elizabeth		DC_M3510	UCS	K.2.1
Overholt	Roger		DC_M2674	UCS	K.2.1
Overstreet	Jan		DC_M5240	UCS	K.2.1
Overton	Hans		DC_M1192	UCS	K.2.1
Oviat	Stephen		DC_M0411		K.2.1
Ow	Sandra		DC_M1633	UCS	K.2.1
Owen	A.J.		DC_M0532		K.2.1
Owen	Benjamin		DC_M1982	UCS	K.2.1
Owen	Douglass		DC_M1910	UCS	K.2.1
Owen	J.		DC_M4365	UCS	K.2.1
Owen	Jim		DC_M4489	UCS	K.2.1
Owens	Brenda		DC_M6272	UCS	K.2.1
Owens	Carly		DC_M4944	UCS	K.2.1
Owens	Dwight		DC_M6961	UCS	K.2.1
Owens	Gail		DC_M5328	UCS	K.2.1
Owens	Gary		DC_M2850	UCS	K.2.1
Owens	Sharon E.		DC_M1007	UCS	K.2.1
Owens	Susan		DC_M5191	UCS	K.2.1
Owings	Kathleen		DC_M6489	UCS	K.2.1
Oxyer	Jim		DC_M5513	UCS	K.2.1
Ozer	Alan		DC_M1371	UCS	K.2.1
P	C.N.		DC_M2697	UCS	K.2.1
P	Mara		DC_M5054	UCS	K.2.1
Paatrey	Jonathan		DC_PHO0023	Physicians for Social Responsibility	K.3.9, K.4
Packer	Iaila		DC_E0091		K.3.3, K.3.12, K.3.13
Paden	Dori		DC_M6115	UCS	K.2.1
Paden	Dori A.		DC_M5209	UCS	K.2.1
Padfield	Clare		DC_M2600	UCS	K.2.1
Paez	Tim		DC_M6497	UCS	K.2.1
Pagano	Cathy		DC_M4051	UCS	K.2.1
Page	Robert		DC_M7076	UCS	K.2.1
Pagliaro	Raymond		DC_M1279	UCS	K.2.1
Paine	Paul		DC_M6448	UCS	K.2.1
Pais	Julia		DC_M0517		K.2.1
Paisley	Anne		DC_M3031	UCS	K.2.1
Paldi	Nana J.		DC_M1818	UCS	K.2.1
Paley	Shawn A		DC_M7029	UCS	K.2.1
Palma-Glennie	Janice		DC_M7087	UCS	K.2.1
Palmer	John		DC_E0160		K.3.2, K.3.7, K.3.10, K.3.14
Palmer	Kirstie		DC_M6215	UCS	K.2.1
Palmer	Mara		DC_M1390	UCS	K.2.1
Palmer	Noel		DC_E0251		K.3.2, K.3.3, K.3.12, K.3.15
Palrud	Robert		DC_M1546	UCS	K.2.1
Palumbo	Matt		DC_M3555	UCS	K.2.1
Pamela	G.		DC_M3948	UCS	K.2.1
Panelli	Andrew		DC_M5355	UCS	K.2.1
Pann	Robert		DC_M3760	UCS	K.2.1
Panna	Panna		DC_M2901	UCS	K.2.1
Pantelidou	Kiriaki		DC_M2365	UCS	K.2.1
Pape	Louise		DC_M6931	UCS	K.2.1
Papelardo	Beverly		DC_M1226	UCS	K.2.1
Papelardo	Beverly		DC_M5923	UCS	K.2.1
Papke	Carolyn		DC_M6203	UCS	K.2.1
Paquette	Joyce		DC_M7862		K.2.1
Paradise	Jack		DC_M3941	UCS	K.2.1
Paraszewski	Joseph		DC_M5318	UCS	K.2.1
Parciak	Wendy		DC_M5540	UCS	K.2.1
Pares	Ciara		DC_M6965	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Parfrey	Jonathan	John and Carole Kartunen, James and Christine Huben, Kevin Cody, Beverly Baird, Jane Williams, John McAndrew, Joseph Lyou, Lyle Talbot, Dennis Apel, Tensie Hernandez, Jim Murr, Luis Segui, Robert Armstrong, Cynthia Babich	DC_E0375		K.3.9
Parfrey	Jonathan		DC_E0395	Physicians for Social Responsibility	K.3.9, K.3.12, K.3.15, K.4
Parfrey	Jonathan		DC_E0425		K.4
Park	KJ		DC_M3548	UCS	K.2.1
Park	Sharyn		DC_M1842	UCS	K.2.1
Parker	Augustin		DC_M4911	UCS	K.2.1
Parker	Charlotte		DC_M7887		K.2.1
Parker	J.T.		DC_M2152	UCS	K.2.1
Parker	Jeanne		DC_M7132	UCS	K.2.1
Parker	Julie	Gary Anderson	DC_E0006		K.3.7
Parker	Julie	Gary Anderson	DC_M0966	UCS	K.2.1
Parker	Lawrence		DC_M7765		K.2.1
Parker	Melissa		DC_M5354	UCS	K.2.1
Parker	Sheryl		DC_M0573		K.2.1
Parker-Boone	Megan		DC_M3011	UCS	K.2.1
Parkinson	Mandy		DC_M1665	UCS	K.2.1
Parkinson	Robert		DC_M1898	UCS	K.2.1
Parks	Jennifer		DC_M7589	UCS	K.2.1
Parmett	Richard		DC_M0977	UCS	K.2.1
Parnay	Dana		DC_M6730	UCS	K.2.1
Paro	Roberta		DC_M2069	UCS	K.2.1
Parrillo	Monica		DC_M4297	UCS	K.2.1
Parrish	Jennifer		DC_M1380	UCS	K.2.1
Parsons	Barry		DC_E0019		K.3.1, K.3.2, K.3.4, K.3.6, K.3.7, K.3.10, K.3.12
Parsons	J.		DC_M7827		K.2.1
Parsons	Jean C.		DC_M6810	UCS	K.2.1
Parsons	Jerome		DC_M4519	UCS	K.2.1
Partenfelder	Mary		DC_M0209		K.2.1
Pasciak	Lisa		DC_M1903	UCS	K.2.1
Pascone	Romeo		DC_M6276	UCS	K.2.1
Pasichnyk	Richard		DC_M3420	UCS	K.2.1
Passmore	Loren		DC_M0392		K.2.1
Pasternack	Kathy		DC_M0729		K.2.1
Paterson	Geoff		DC_M3378	UCS	K.2.1
Patrick	A		DC_M6175	UCS	K.2.1
Patrie	Lewis		DC_E0112	Western North Carolina Physicians for Social Responsibility	K.3.2, K.3.7, K.3.10, K.3.11, K.3.12, K.3.13, K.3.14, K.3.15
Patrie	Lewis		DC_E0297	Western North Carolina Physicians for Social Responsibility	K.2.2
Patrizzi	Lee		DC_M2090	UCS	K.2.1
Patsy	Donna		DC_M4312	UCS	K.2.1
Pattanyus	Nikolas		DC_M2829	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Patterson	Miles		DC_E0223		K.3.1, K.3.2, K.3.13, K.3.14
Patterson	Phyllis		DC_M4341	UCS	K.2.1
Patterson	Traci		DC_M6770	UCS	K.2.1
Patton	Margaret		DC_M1715	UCS	K.2.1
Patumanoan	Nancy		DC_M3630	UCS	K.2.1
Paul	Davida		DC_M5455	UCS	K.2.1
Paul	Kay		DC_M4757	UCS	K.2.1
Paul	Linda M.		DC_M0575		K.2.1
Paul	Roalie Tyler		DC_E0204		K.3.12, K.4
Paul	Skip J.		DC_M7141	UCS	K.2.1
Pauley	Susan		DC_M3985	UCS	K.2.1
Paulk	Kelly		DC_M6495	UCS	K.2.1
Paulsen	David		DC_M1944	UCS	K.2.1
Paulsen	Thomas		DC_M1738	UCS	K.2.1
Pavley	Richard		DC_M7475	UCS	K.2.1
Paxson	Robert		DC_M3925	UCS	K.2.1
Payne	Lisa		DC_M3908	UCS	K.2.1
Payne	Richard E.		DC_M5508	UCS	K.2.1
Payton	Marick		DC_M1057	UCS	K.2.1
Peabody	Kathleen		DC_M2359	UCS	K.2.1
Peabody	William N.		DC_M4765	UCS	K.2.1
Peach	Hugh G.		DC_M1088	UCS	K.2.1
Peacock-Broyles	Trinity		DC_M5160	UCS	K.2.1
Peak	Bruce		DC_M1636	UCS	K.2.1
Pearce	Ellen		DC_M1363	UCS	K.2.1
Pearre	Benjamin		DC_M7700		K.2.1
Pearsall	Donald		DC_M2742	UCS	K.2.1
Pearson	Janet		DC_M4456	UCS	K.2.1
Pearson	Sandra		DC_M5105	UCS	K.2.1
Pease	Glenn		DC_M6069	UCS	K.2.1
Peck	Graham		DC_M6676	UCS	K.2.1
Peck	Jean		DC_M3673	UCS	K.2.1
Peckler	Leslie		DC_M6141	UCS	K.2.1
Peckner	Lloyd		DC_M3316	UCS	K.2.1
Pedelaborde	Claude		DC_M2665	UCS	K.2.1
Pedelty	Jeffrey		DC_M0805	UCS	K.2.1
Pedro	Stephanie		DC_M1854	UCS	K.2.1
Peebles	Dawn		DC_M5933	UCS	K.2.1
Peer	Barbara A.		DC_M1445	UCS	K.2.1
Peggar	Kathleen		DC_M4470	UCS	K.2.1
Pehkonen	Laura		DC_M4688	UCS	K.2.1
Peirce	Jana		DC_M2080	UCS	K.2.1
Pelletier	Joline		DC_M5936	UCS	K.2.1
Peloso	Christopher		DC_M2566	UCS	K.2.1
Peltz	William I.		DC_M6478	UCS	K.2.1
Pence	K.R.		DC_M2296	UCS	K.2.1
Pendergast	Mary		DC_M5164	UCS	K.2.1
Penninman	Vivian		DC_M4038	UCS	K.2.1
Penprase	Sharon		DC_M7403	UCS	K.2.1
Penrose	Walter D		DC_M2447	UCS	K.2.1
Peppard	Jeanne		DC_M4827	UCS	K.2.1
Percy	Lindis	Anni Rainbow	DC_E0413	Campaign for the Accountablity of American Bases (CAAB) UK	K.3.1, K.3.2, K.3.3, K.3.4, K.3.6, K.3.10, K.3.11, K.3.12, K.3.13
Perez	Luiz		DC_M4424	UCS	K.2.1
Perini	Louise		DC_M6729	UCS	K.2.1
Perkins	Guy		DC_M3362	UCS	K.2.1
Perkins	Joel		DC_M5487	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Perkins	Lewis		DC_M2458	UCS	K.2.1
Perkins	Marie		DC_M5997	UCS	K.2.1
Perkins	Randi		DC_M0496		K.2.1
Perkins	Tom		DC_M7330	UCS	K.2.1
Perkins	William		DC_M2651	UCS	K.2.1
Perko	John		DC_M6187	UCS	K.2.1
Perko	John		DC_M6188	UCS	K.2.1
Perko	John		DC_M6303	UCS	K.2.1
Perkus	Marion		DC_M7035	UCS	K.2.1
Perlman	Frances		DC_M0994	UCS	K.2.1
Perlman	Lori		DC_M2793	UCS	K.2.1
Perlmutter	Deborah		DC_M0809	UCS	K.2.1
Perloe	Deborah		DC_M7229	UCS	K.2.1
Perreault	Laura		DC_M0018		K.2.2
Perrotto	Dianna		DC_M0398		K.2.1
Perry	Alysia		DC_M5954	UCS	K.2.1
Perry	Debbie		DC_M3569	UCS	K.2.1
Perry	Diana		DC_M3512	UCS	K.2.1
Perry	Mary-Ellen		DC_M6613	UCS	K.2.1
Perry	S.		DC_M1119	UCS	K.2.1
Pesec	Vanessa		DC_M2056	UCS	K.2.1
Peters	Jenny		DC_M7595	UCS	K.2.1
Petersen	Jeff		DC_M5786	UCS	K.2.1
Petersen	Phyllis		DC_M2272	UCS	K.2.1
Peterson	Amy		DC_M2116	UCS	K.2.1
Peterson	Arlo	Caron Wetter	DC_M0193		K.2.1
Peterson	Christina		DC_M7791		K.2.1
Peterson	Debby		DC_M2026	UCS	K.2.1
Peterson	Eileen		DC_M5796	UCS	K.2.1
Peterson	Erika		DC_M1996	UCS	K.2.1
Peterson	Ingrid		DC_M7337	UCS	K.2.1
Peterson	Jordan		DC_M6764	UCS	K.2.1
Peterson	Julie		DC_M5245	UCS	K.2.1
Peterson	Sandy		DC_M2134	UCS	K.2.1
Peterson	Wescott		DC_M6576	UCS	K.2.1
Peterson	William		DC_M2838	UCS	K.2.1
Petkus	Diane		DC_M5809	UCS	K.2.1
Petretti	Robert		DC_M3773	UCS	K.2.1
Petricig	Kenneth		DC_M1469	UCS	K.2.1
Petrocelli	Johnny M.		DC_M0116		K.2.1
Petruzella	Gerol		DC_M4106	UCS	K.2.1
Petteway	Susan		DC_M6417	UCS	K.2.1
Pettey	C.		DC_M1262	UCS	K.2.1
Pfeifer	John		DC_M6627	UCS	K.2.1
Pfeiffer	Peter		DC_M7650	UCS	K.2.1
Pflug	Maria A.		DC_M4098	UCS	K.2.1
Phelan	John		DC_M7763		K.3.3, K.3.10, K.3.13
Phelps	James		DC_M0669		K.2.1
Phelps	Jerry		DC_M5775	UCS	K.2.1
Phelps	Priscilla		DC_M2945	UCS	K.2.1
Phillips	Anthony		DC_M6264	UCS	K.2.1
Phillips	Grace		DC_M4749	UCS	K.2.1
Phillips	Kevin		DC_M4906	UCS	K.2.1
Phillips	Michael		DC_M4253	UCS	K.2.1
Phillips	Pamela		DC_M4721	UCS	K.2.1
Phillips	Patricia		DC_M5879	UCS	K.2.1
Phillips	Susan		DC_E0072		K.2.2
Phillips	Thomas		DC_M0971	UCS	K.2.1
Phillips	Tomi		DC_M4143	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Phillips-Gutchell	Evelyn		DC_M6509	UCS	K.2.1
Philpot	J.		DC_M6144	UCS	K.2.1
Phinney	Ruth		DC_M2424	UCS	K.2.1
Phipps	Ma		DC_M1091	UCS	K.2.1
Phipps	Michael		DC_E0035		K.2.2
Photinos	Janet		DC_M6192	UCS	K.2.1
Piani	James		DC_M6898	UCS	K.2.1
Piazza	Felice		DC_M5842	UCS	K.2.1
Picardy	Jonathan		DC_M3725	UCS	K.2.1
Pickell	Lindsay		DC_M6845	UCS	K.2.1
Pickett	Don		DC_M2158	UCS	K.2.1
Pickrell	Gayle		DC_E0391		K.2.2
Pickup	Del		DC_E0087		K.2.2
Piechuta	Sarah		DC_M4570	UCS	K.2.1
Piehl	Eric		DC_M2733	UCS	K.2.1
Pielaszckyk	Donna		DC_M5733	UCS	K.2.1
Pieper	John		DC_M4076	UCS	K.2.1
Pierce	Bob		DC_M0967	UCS	K.2.1
Pierce	Caitlin		DC_M3419	UCS	K.2.1
Pierce	Crystal		DC_M1539	UCS	K.2.1
Pierce	Karen		DC_M5301	UCS	K.2.1
Pierce	Merrill W.		DC_M0877	UCS	K.2.1
Pierpont	Leslie		DC_M7572	UCS	K.2.1
Pierquet	Kat		DC_M5080	UCS	K.2.1
Pierson	James A.		DC_M0567		K.2.1
Pierson	Lacey		DC_M3689	UCS	K.2.1
Pierson	Lacey		DC_M3695	UCS	K.2.1
Pietras	Ted		DC_M2318	UCS	K.2.1
Piett	Sharon		DC_M2577	UCS	K.2.1
Pigeon	Maura		DC_M3964	UCS	K.2.1
Pigeon	Sarah		DC_M1429	UCS	K.2.1
Pihl	Julie		DC_M2978	UCS	K.2.1
Pikus	Barbara		DC_E0283		K.3.2, K.3.3, K.3.11, K.3.12, K.3.13, K.3.15
Pilcher	Bonnie		DC_M5015	UCS	K.2.1
Pilcher	Bonnie		DC_M5016	UCS	K.2.1
Pilisuk	Mark		DC_E0015	Professor Univeristy of California Saybrook Graduate School	K.3.3, K.3.5, K.3.6, K.3.11, K.3.12
Pinkel	Georgia		DC_M7418	UCS	K.2.1
Pinkerton	Ann		DC_M1459	UCS	K.2.1
Pintavalle	Micheal		DC_M3058	UCS	K.2.1
Piper	Cynthia		DC_M2050	UCS	K.2.1
Pippin	Carol		DC_M3059	UCS	K.2.1
Piro	Peter		DC_M6337	UCS	K.2.1
Pirolo	Frank		DC_M4296	UCS	K.2.1
Pisano	Lisa		DC_M6073	UCS	K.2.1
Pisenti	Neal		DC_M3841	UCS	K.2.1
Pita	Adrianna		DC_M7820		K.2.1
Pitkin	Peter B		DC_M3066	UCS	K.2.1
Pittenger	Robert		DC_M4705	UCS	K.2.1
Pitz	Greg		DC_M1656	UCS	K.2.1
Pivonka	Jim		DC_M2985	UCS	K.2.1
Piwonka-Corle	Timothy		DC_M2310	UCS	K.2.1
Pizzini	Louis		DC_M7323	UCS	K.2.1
Pizzo	Julie		DC_M2260	UCS	K.2.1
Pla	Andy		DC_M5430	UCS	K.2.1
Plack	Bernice		DC_M7437	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Planisek	Amanda		DC_M1773	UCS	K.2.1
Platt	Paul		DC_M4651	UCS	K.2.1
Plesh	Dave	Pat Davis	DC_M5376	UCS	K.2.1
Plotnick	Steven		DC_M7504	UCS	K.2.1
Plotnik	Neal		DC_M5688	UCS	K.2.1
Plucinski	Katherine		DC_M2066	UCS	K.2.1
Plumley	Constance V.		DC_M1193	UCS	K.2.1
Plummer	Carrie		DC_M7559	UCS	K.2.1
Plummer	John		DC_M5784	UCS	K.2.1
Podesta	J.D.		DC_M4249	UCS	K.2.1
Podietz	David		DC_M2960	UCS	K.2.1
Pogue	William		DC_M0646		K.2.1
Pohs	Cecilia		DC_M2114	UCS	K.2.1
Polce	Rocco		DC_M6866	UCS	K.2.1
Polejes	Brian		DC_E0266		K.2.3
Polk	Alisa		DC_M0130		K.2.1
Polk	Janine		DC_M7517	UCS	K.2.1
Pollack	Sasha		DC_M7429	UCS	K.2.1
Pollak	Gisela		DC_M7489	UCS	K.2.1
Pollard	Bev		DC_M3867	UCS	K.2.1
Pollard	Eloise		DC_M0025		K.2.2
Pollock	Celest		DC_M4716	UCS	K.2.1
Pollock	Jeri		DC_M5624	UCS	K.2.1
Pollock	Leafy		DC_M2833	UCS	K.2.1
Pollock	Marina		DC_M6483	UCS	K.2.1
Polly	Jonathon		DC_M5478	UCS	K.2.1
Polokoff	Beverly		DC_M4133	UCS	K.2.1
Pomerantz	Fred		DC_M4212	UCS	K.2.1
Pomerantz	Gigi		DC_M5593	UCS	K.2.1
Pool	Elayne		DC_PHO0045		K.3.1, K.3.2, K.3.3, K.3.4, K.3.10, K.3.11, K.3.13, K.3.15, K.4
Pool	Elayne	Honolulu Friends (Quaker) Meeting	DC_PHW0011		K.2.3
Poole	Anne-Marie		DC_M3310	UCS	K.2.1
Poosakey	Poosakey		DC_M6400	UCS	K.2.1
Pope	Sarah		DC_M4718	UCS	K.2.1
Popodi	Ellen		DC_M1531	UCS	K.2.1
Popolizio	Carlo		DC_M7530	UCS	K.2.1
Popper	Serge		DC_M3967	UCS	K.2.1
Porter	Cheri		DC_M3004	UCS	K.2.1
Porter	David		DC_M5458	UCS	K.2.1
Porter	David		DC_M7544	UCS	K.2.1
Porter	Marian Jane		DC_M4322	UCS	K.2.1
Porter	Maya		DC_E0084		K.3.2, K.3.3, K.3.6, K.3.10, K.3.12, K.3.15
Portillo	Roni		DC_M0823	UCS	K.2.1
Poruks	Yasmin		DC_M0599		K.2.1
Posey	Amie		DC_M4540	UCS	K.2.1
Posner	David		DC_M5315	UCS	K.2.1
Potopowicz	Patrick		DC_M3740	UCS	K.2.1
Pototsky	Myrna		DC_M3802	UCS	K.2.1
Potter	Brandon		DC_M5907	UCS	K.2.1
Potter	Stephanie		DC_M3309	UCS	K.2.1
Potts	Tina M.		DC_M4949	UCS	K.2.1
Povec	Karen		DC_M5511	UCS	K.2.1
Powanda	Kim		DC_M3736	UCS	K.2.1
Powell	Diane		DC_M3383	UCS	K.2.1
Powell	Felix		DC_E0201		K.2.3

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Powell	John		DC_M3351	UCS	K.2.1
Powell	Kandis		DC_M1897	UCS	K.2.1
Powell	Ralph		DC_M2685	UCS	K.2.1
Power	Martin		DC_M4806	UCS	K.2.1
Powers	James		DC_M5595	UCS	K.2.1
Powers	Layne Edward		DC_M1195	UCS	K.2.1
Praigg	Eleanor		DC_M2933	UCS	K.2.1
Prather	Beth		DC_M2390	UCS	K.2.1
Pratt	Bryan		DC_M6421	UCS	K.2.1
Pratt	Chris		DC_M4926	UCS	K.2.1
Pratt	Don		DC_M2433	UCS	K.2.1
Pratt	L. Darlene		DC_M6202	UCS	K.2.1
Prazenka	S.M.		DC_M0649		K.2.1
Premlall	Anandi		DC_M5678	UCS	K.2.1
Prescott	Daniel		DC_M2149	UCS	K.2.1
Prescott	Stephen		DC_M4834	UCS	K.2.1
Presnell	Katy		DC_M4078	UCS	K.2.1
Press	Roland A.		DC_M0611		K.2.1
Press	Roland A.		DC_M3369	UCS	K.2.1
Prestwood	Carrie		DC_M0935	UCS	K.2.1
Prewitt	Isabel		DC_M2425	UCS	K.2.1
Price	Edwin		DC_M0079		K.2.1
Price	Maria Young		DC_M1222	UCS	K.2.1
Price	Susan		DC_M7597	UCS	K.2.1
Price	Terri		DC_M7813		K.2.3
Pridgeon	Carol		DC_M2266	UCS	K.2.1
Prigge	Diane		DC_M5632	UCS	K.2.1
Pringer	Christopher		DC_M1209	UCS	K.2.1
Pringle	Virginia		DC_M1337	UCS	K.2.1
Prins	Rose Marie		DC_M3354	UCS	K.2.1
Pritchard	Morgan		DC_M4380	UCS	K.2.1
Prochowski	Walter		DC_M2843	UCS	K.2.1
Proctor	Rebecca		DC_M2667	UCS	K.2.1
Proeger	Terry		DC_M4145	UCS	K.2.1
Progebin	Marshall		DC_M0164		K.2.1
Prokopow	Jean		DC_M6472	UCS	K.2.1
Pronio	Michaela		DC_M1083	UCS	K.2.1
Prosperie	Johnnie		DC_M7384	UCS	K.2.1
Prosser	James		DC_M5895	UCS	K.2.1
Prost	Carol		DC_M1444	UCS	K.2.1
Prostko	Linda		DC_M0420		K.2.1
Provenzano	James		DC_M1526	UCS	K.2.1
Pruden	Lynda		DC_M6883	UCS	K.2.1
Puca	Laurie		DC_M7044	UCS	K.2.1
Puchta	George		DC_M0866	UCS	K.2.1
Pudzianowski	Lydia		DC_M7307	UCS	K.2.1
Puett	James		DC_M2559	UCS	K.2.1
Puga	Ramon		DC_E0039		K.3.2, K.3.4, K.3.6, K.3.11, K.3.12, K.3.13
Pulling	Steven T.		DC_M0634		K.2.1
Pulvino	John		DC_M0927	UCS	K.2.1
Purchase	Daryl L.		DC_M0349		K.2.1
Purchase	Daryl L.		DC_M3542	UCS	K.2.1
Purchase	Daryl L.		DC_M7693		K.2.1
Purvis	Cheryl		DC_M1374	UCS	K.2.1
Pusel	Joyce L.		DC_M6601	UCS	K.2.1
Putnam	Jeff		DC_M6924	UCS	K.2.1
Putzel	Mary		DC_M1605	UCS	K.2.1
Putzi	Marie		DC_M4342	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Quammen	Parker		DC_M3067	UCS	K.2.1
Quart	Leonard		DC_M4030	UCS	K.2.1
Queen	Carol		DC_M1567	UCS	K.2.1
Quellas	Matthew		DC_M4627	UCS	K.2.1
Quereshi	Amna		DC_M1675	UCS	K.2.1
Quick	Heather		DC_M5926	UCS	K.2.1
Quick	Heather		DC_M6493	UCS	K.2.1
Quinlan	Alby		DC_M0107		K.2.1
Quinn	Caritas		DC_M5211	UCS	K.2.1
Quinn	James		DC_M4121	UCS	K.2.1
Quinn	James		DC_M7322	UCS	K.2.1
Quinn	Luther		DC_M1497	UCS	K.2.1
Quinn	Michael		DC_M0537		K.2.1
Quinn	Michael		DC_M3654	UCS	K.2.1
Quintana	Barbara		DC_M1739	UCS	K.2.1
Quintana	David M.		DC_M3810	UCS	K.2.1
Quirk	Dawn		DC_M4067	UCS	K.2.1
Raab	Art		DC_M3120	UCS	K.2.1
Raaste	Pentti		DC_M2644	UCS	K.2.1
Raber	Dima		DC_M4262	UCS	K.2.1
Rabin	Barry		DC_M3089	UCS	K.2.1
Rabiolo	James		DC_M2333	UCS	K.2.1
Race	Mary		DC_M4957	UCS	K.2.1
Racela	Jason		DC_M2176	UCS	K.2.1
Racela	Susan		DC_M1978	UCS	K.2.1
Raczkiewicz	Susier		DC_M5550	UCS	K.2.1
Radbil	Alexandra		DC_M3384	UCS	K.2.1
Rader	Doug		DC_M3767	UCS	K.2.1
Radford	Lemoine		DC_M2071	UCS	K.2.1
Radisic	Nikola		DC_M4321	UCS	K.2.1
Radzik	Karen		DC_M3881	UCS	K.2.1
Rae	Charlotte		DC_E0017		K.3.2, K.3.7, K.3.11, K.3.12
Rae	Robin		DC_M4452	UCS	K.2.1
Raghav	Shyla		DC_M1549	UCS	K.2.1
Ragle	Nancy		DC_M3959	UCS	K.2.1
Rahman	Karen		DC_M2544	UCS	K.2.1
Rain	Patricia		DC_M6923	UCS	K.2.1
Raine	Steven C.		DC_M0514		K.2.1
Raines	Mary Elizabeth		DC_M6794	UCS	K.2.1
Rainey	Dorli		DC_M6744	UCS	K.2.1
Rains	Gail		DC_M5250	UCS	K.2.1
Rains	Meg		DC_M5559	UCS	K.2.1
Rakoczy	Paul M.		DC_M4195	UCS	K.2.1
Ralabate	Teresa		DC_M1087	UCS	K.2.1
Ralph	Neil		DC_M5826	UCS	K.2.1
Rambaund	Rob		DC_M0505		K.2.1
Ramberg	David J		DC_M2340	UCS	K.2.1
Ramey	Kevin		DC_M2844	UCS	K.2.1
Ramirez	Marie T.		DC_M5260	UCS	K.2.1
Ramlow	Marguerite		DC_M7136	UCS	K.2.1
Ramos	Edna		DC_M3283	UCS	K.2.1
Ramp	Barbara		DC_M6414	UCS	K.2.1
Ramsey	Jeffery		DC_M2484	UCS	K.2.1
Ramstead	Julie		DC_M3418	UCS	K.2.1
Rand	Mary		DC_M4968	UCS	K.2.1
Randall	eliza		DC_M6284	UCS	K.2.1
Rando	Ernest		DC_M0148		K.2.1
Rando	Kim		DC_M7755		K.2.1
Ranford	Alan		DC_M3294	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Rankin	HL		DC_M3906	UCS	K.2.1
Ransom	G. Harry		DC_M6270	UCS	K.2.1
Ransome	Susan		DC_M6946	UCS	K.2.1
Rao	Dinesh		DC_M2567	UCS	K.2.1
Raphael	D. Donna		DC_M1048	UCS	K.2.1
Raphael	Ravid		DC_E0409		K.3.1, K.3.3, K.3.5, K.3.10, K.3.11, K.3.13
Rapport	Ari		DC_M5058	UCS	K.2.1
Rarick	Lucinda		DC_M0963	UCS	K.2.1
Rasmussen	Stephen		DC_M7564	UCS	K.2.1
Ratcliffe	John		DC_M3457	UCS	K.2.1
Ratley	Emily		DC_M2292	UCS	K.2.1
Rauch	Matt		DC_M6017	UCS	K.2.1
Raven	Jacqueline		DC_M3617	UCS	K.2.1
Ravey	Donald		DC_E0097		K.3.1, K.3.2, K.3.3, K.3.4, K.3.11, K.3.13, K.3.14
Rawlings	Joseph		DC_M2992	UCS	K.2.1
Rawlinson	Richard		DC_M5248	UCS	K.2.1
Ray	Gisela		DC_M0247		K.3.2, K.3.10, K.3.13, K.3.14
Ray	Gisela		DC_M2716	UCS	K.2.1
Ray	Richard		DC_M3539	UCS	K.2.1
Raymer	K.		DC_M3746	UCS	K.2.1
Raynis	ST		DC_M1621	UCS	K.2.1
Rea	Donald	Elizabeth Rea	DC_M0220		K.3.1, K.3.2, K.3.3, K.3.13
Rea	Kim		DC_M0233		K.3.2, K.3.10, K.3.14
Read	Seth		DC_M1112	UCS	K.2.1
Reader	Robert D.	Mary S. Reader	DC_M5207	UCS	K.2.1
Reagel	Peter		DC_M6900	UCS	K.2.1
Reams	Gail J.		DC_M1447	UCS	K.2.1
reaume	Greg		DC_M6608	UCS	K.2.1
Reaume	James		DC_M7371	UCS	K.2.1
Rebello	Leo		DC_E0198	World Constitution and Parliament Association (WCPA)	K.3.2, K.3.3, K.3.4, K.3.6, K.3.7, K.3.11, K.3.12, K.3.15, K.3.18
Redd	Sherry		DC_M0433		K.2.1
Redding	Sherley		DC_M5533	UCS	K.2.1
Redgate	Edward		DC_M2211	UCS	K.2.1
Redish	Maryellen		DC_M4393	UCS	K.2.1
Redmond	Molly		DC_M0542		K.2.1
Redoutey	Colleen		DC_M1533	UCS	K.2.1
Redwine	Rebecca		DC_M3741	UCS	K.2.1
Reece	Catherine		DC_M2680	UCS	K.2.1
Reece	Gregory A.		DC_M6689	UCS	K.2.1
Reece	Monique		DC_M1819	UCS	K.2.1
Reed	Andrew		DC_M0524		K.2.1
Reed	Casey		DC_M3797	UCS	K.2.1
Reed	Jacqueline		DC_M2299	UCS	K.2.1
Reed	James		DC_M6281	UCS	K.2.1
Reed	Lisa		DC_M1141	UCS	K.2.1
Reed	Patricia		DC_M5722	UCS	K.2.1
Reed	Phyllis		DC_M2411	UCS	K.2.1
Reed	S		DC_M0884	UCS	K.2.1
Reed	Shannon		DC_M0985	UCS	K.2.1
Reed	Thomas		DC_M0929	UCS	K.2.1
Reef	Jack		DC_M1688	UCS	K.2.1
Rees	Phyllis		DC_M4220	UCS	K.2.1
Reese	Carol		DC_M7828		K.2.3
Reeser	Cheryl		DC_M7675	UCS	K.2.1
Regan	Carol		DC_M2880	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Regan	Mary-Helen		DC_M2375	UCS	K.2.1
Regan	Monica		DC_M0593		K.2.1
Rehm	Rush		DC_M4699	UCS	K.2.1
Rehwinkel	Christine		DC_M6018	UCS	K.2.1
Reice	Kelly		DC_M5682	UCS	K.2.1
Reich	Helen		DC_M5225	UCS	K.2.1
Reichardt	Dorothy		DC_M3147	UCS	K.2.1
Reichenbach	Bob		DC_M7892		K.3.2, K.3.3
Reichert	Gregory		DC_M4986	UCS	K.2.1
Reichman	Christine		DC_PHO0040		K.3.1, K.3.3, K.3.7, K.3.11, K.3.13, K.3.15
Reid	Alison		DC_M5792	UCS	K.2.1
Reid	Christi		DC_P0010		K.3.9
Reid	Glen A.		DC_M0122		K.2.1
Reid	Kelly		DC_M0742		K.2.1
Reid	Leonard		DC_M0824	UCS	K.2.1
Reid	M.		DC_M4555	UCS	K.2.1
Reidinger	Melinda		DC_M1667	UCS	K.2.1
Reif	Frederick		DC_M2427	UCS	K.2.1
Reif	Patricia		DC_M7257	UCS	K.2.1
Reilly	Sheila		DC_M4606	UCS	K.2.1
Reimers	David		DC_M5917	UCS	K.2.1
Reindl	Leslie		DC_E0205		K.3.2, K.3.4, K.3.12
Reinhard	David		DC_M0558		K.2.1
Reis	Walter		DC_M1182	UCS	K.2.1
Reissen	Gail		DC_M5645	UCS	K.2.1
Reiter	Michael		DC_E0099		K.3.1, K.3.4, K.3.7, K.3.10, K.3.13, K.3.14
Rejman	Diane		DC_E0050		K.3.2, K.3.7, K.3.10, K.3.12
Relyea	Bruce		DC_M1301	UCS	K.2.1
Relyea	Tezel		DC_M6669	UCS	K.2.1
Remington	Margaret		DC_M0064		K.2.1
Remington	Margaret		DC_M3733	UCS	K.2.1
Rengers	Edward		DC_M6979	UCS	K.2.1
Renner	Robert		DC_M2646	UCS	K.2.1
Reno	Joanne		DC_M3258	UCS	K.2.1
Reppe	Peter		DC_M3161	UCS	K.2.1
Revuluri	Sendhil		DC_M1680	UCS	K.2.1
Reycraft	Astarte		DC_M0535		K.2.1
Reyes	Fran		DC_M6185	UCS	K.2.1
Reynolds	Patricia		DC_M2536	UCS	K.2.1
Reynolds	William		DC_M1766	UCS	K.2.1
Reynoldson	George		DC_M2603	UCS	K.2.1
Reynols	Jonelle		DC_M2525	UCS	K.2.1
Rhine	Pam		DC_M6427	UCS	K.2.1
Rhoads	Kirk		DC_M6548	UCS	K.2.1
Rhodes	Anne		DC_M5034	UCS	K.2.1
Rhodes	Thompson		DC_E0191		K.3.3, K.3.12, K.3.13
Rhodin	Micheal		DC_M2235	UCS	K.2.1
Rice	Jan	Lake Connolly	DC_M0172		K.2.1
Rice	Joan		DC_M5390	UCS	K.2.1
Rice	Thomas		DC_M6668	UCS	K.2.1
Ricevuto	Chuck		DC_M0674		K.2.1
Ricevuto	Chuck		DC_M3428	UCS	K.2.1
Rice-Williams	Lisa		DC_M0844	UCS	K.2.1
Rich	Dave		DC_E0275		K.3.14
Rich	David		DC_M7436	UCS	K.2.1
Rich	Nathan		DC_M1919	UCS	K.2.1
Rich	Winnie		DC_M4209	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Rich	Dave		DC_M7550	UCS	K.2.1
Richard	Louis		DC_M1365	UCS	K.2.1
Richard	N		DC_M2455	UCS	K.2.1
Richard	Christine		DC_M7541	UCS	K.2.1
Richardson	Don		DC_M0139		K.3.2, K.3.3, K.3.4, K.3.5, K.3.6, K.3.10, K.3.12
Richardson	Heather		DC_M0503		K.2.1
Richardson	J.		DC_M7377	UCS	K.2.1
Richardson	Linda		DC_M6828	UCS	K.2.1
Richardson	Marianna F.		DC_M3891	UCS	K.2.1
Richardson	Michael		DC_M1585	UCS	K.2.1
Richardson	Mike		DC_M0314		K.2.1
Richmond	Lonna		DC_M2099	UCS	K.2.1
Richmond	Lonna		DC_M2102	UCS	K.2.1
Richmond	Lonna		DC_M2103	UCS	K.2.1
Richmond	Susan		DC_M4693	UCS	K.2.1
Richter	Lane		DC_M6477	UCS	K.2.1
Rick	Carol		DC_E0061		K.3.1, K.3.5, K.3.7
Rick	Margie		DC_M3667	UCS	K.2.1
Rickard	Mary		DC_M2712	UCS	K.2.1
Ricker	Charlene		DC_E0217		K.2.2
Rickman	Dana		DC_M4844	UCS	K.2.1
Ricks	Linda		DC_M6205	UCS	K.2.1
Riddell	Colette		DC_M1494	UCS	K.2.1
Riddell	Colette		DC_M1495	UCS	K.2.1
Rider	Barbara		DC_M5292	UCS	K.2.1
Ridot	Faith		DC_M0527		K.2.1
Rieber	Emily		DC_M4578	UCS	K.2.1
Riecke	Hermann		DC_M4695	UCS	K.2.1
Riehart	Dale		DC_M2412	UCS	K.2.1
Riehl	Linda		DC_M5222	UCS	K.2.1
Riehle	Barry		DC_M7690		K.2.1
Rieken	Henry		DC_M6435	UCS	K.2.1
Riell	Dana		DC_M3618	UCS	K.2.1
Rigali	Susan		DC_M1888	UCS	K.2.1
Riggins	Patricia		DC_M7825		K.2.1
Riggs	Charles		DC_M3975	UCS	K.2.1
Riggs	Richard		DC_M4754	UCS	K.2.1
Riley	Barbara		DC_M1972	UCS	K.2.1
Riley	Benjamin		DC_M7704		K.3.4, K.3.11
Riley	Ray		DC_M1030	UCS	K.2.1
Rimbos	Peter		DC_M7737		K.3.1, K.3.2, K.3.7, K.3.10, K.3.11, K.3.13, K.3.14
Ringer	Ramona		DC_E0248		K.2.3
Rinzler	Deborah		DC_M3785	UCS	K.2.1
Ripple	Joan M.		DC_M1999	UCS	K.2.1
Risedorph	Jamie		DC_M4024	UCS	K.2.1
Riseley	Viv		DC_M7069	UCS	K.2.1
Rish	Shirley		DC_M6643	UCS	K.2.1
Ritchey	Melissa		DC_M1344	UCS	K.2.1
Ritchings	Anne		DC_M3386	UCS	K.2.1
Ritchison	Ric	Debbie Ritchison	DC_M3444	UCS	K.2.1
Rittenhouse	Calvin		DC_M3536	UCS	K.2.1
Ritter	Alissa		DC_M0816	UCS	K.2.1
Ritter	Sam		DC_M6552	UCS	K.2.1
Rittle	Lori		DC_M7717		K.2.1
Ritz	John		DC_E0417		K.3.2, K.3.3, K.3.7, K.3.13
Ritz	John		DC_E0419		K.3.2, K.3.3, K.3.7, K.3.13
Ritz	John		DC_E0422		K.3.2, K.3.3, K.3.7, K.3.13

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Ritzman	Michael	Genevieve	DC_M0258		K.3.7
Rivera	Carmen G.		DC_M3659	UCS	K.2.1
Rives	Barbara		DC_M5321	UCS	K.2.1
Rivin	Jean		DC_M4000	UCS	K.2.1
Roark	Juanita		DC_M4919	UCS	K.2.1
Roba	Anthony		DC_M1464	UCS	K.2.1
Robbins	Brett		DC_M1577	UCS	K.2.1
Robbins	Jan		DC_M5892	UCS	K.2.1
Robbins	Kandi		DC_M7357	UCS	K.2.1
Robbins	Richard		DC_M1097	UCS	K.2.1
Roben	Terri		DC_M6952	UCS	K.2.1
Roberti	Billii		DC_M2966	UCS	K.2.1
Roberts	Courtney		DC_M0574		K.2.1
Roberts	F.J.		DC_M0828	UCS	K.2.1
Roberts	James		DC_M0924	UCS	K.2.1
Roberts	James		DC_M7806		K.3.4, K.3.5, K.3.7, K.3.10, K.3.11, K.3.13, K.3.15, K.4
Roberts	Norman		DC_M2570	UCS	K.2.1
Roberts	Rebekah		DC_M1597	UCS	K.2.1
Roberts	Seth G.		DC_M1902	UCS	K.2.1
Robertson	Cornelia		DC_M2809	UCS	K.2.1
Robertson	James		DC_E0315		K.3.5, K.3.6, K.3.12, K.3.15
Robertson	Jenna		DC_M4154	UCS	K.2.1
Robertson	Katherine		DC_M2652	UCS	K.2.1
Robertson	Merilie		DC_M4259	UCS	K.2.1
Robinson	Barbara		DC_M3750	UCS	K.2.1
Robinson	Crystal		DC_M4144	UCS	K.2.1
Robinson	David		DC_M7609	UCS	K.2.1
Robinson	George		DC_M6824	UCS	K.2.1
Robinson	Jacqueline		DC_M2789	UCS	K.2.1
Robinson	Jennifer		DC_M7254	UCS	K.2.1
Robinson	Joan		DC_M5499	UCS	K.2.1
Robinson	Marcia		DC_M5677	UCS	K.2.1
Robinson	Maxine		DC_M4050	UCS	K.2.1
Robinson	Richard		DC_M1930	UCS	K.2.1
Robinson	Saliane		DC_M2483	UCS	K.2.1
Robinson	Susan		DC_M4595	UCS	K.2.1
Robinson	Tammy		DC_M6412	UCS	K.2.1
Robintree	Robin		DC_M6253	UCS	K.2.1
Robles	Rosalie		DC_M4119	UCS	K.2.1
Robson	Marilyn		DC_M2311	UCS	K.2.1
Rocchio	Gina		DC_M3560	UCS	K.2.1
Rocheleau	Jessica		DC_M1482	UCS	K.2.1
Rochlin	Robert		DC_M7056	UCS	K.2.1
Rockefeller	Edward		DC_M2638	UCS	K.2.1
Rockhill	Lois		DC_E0104	Second Harvest Food Bank	K.3.1
Rockhold	John		DC_M7855		K.2.3
Rocks	Sue		DC_M6423	UCS	K.2.1
Rockwell	Linda		DC_M4679	UCS	K.2.1
Rodack	Soretta		DC_M2258	UCS	K.2.1
Roddy	Jane		DC_M4829	UCS	K.2.1
Rode	Forrest		DC_M3114	UCS	K.2.1
Rode	Katharine		DC_M0720		K.2.1
Rode	Katharine		DC_M6305	UCS	K.2.1
Roden	Tessa		DC_M6170	UCS	K.2.1
Rodgers	Julie		DC_M6449	UCS	K.2.1
Rodgers	Patricia		DC_M7326	UCS	K.2.1
Rodine	Jean		DC_M0355		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Rich	Dave		DC_M7550	UCS	K.2.1
Richard	Louis		DC_M1365	UCS	K.2.1
Richard	N		DC_M2455	UCS	K.2.1
Richard	Christine		DC_M7541	UCS	K.2.1
Richardson	Don		DC_M0139		K.3.2, K.3.3, K.3.4, K.3.5, K.3.6, K.3.10, K.3.12
Richardson	Heather		DC_M0503		K.2.1
Richardson	J.		DC_M7377	UCS	K.2.1
Richardson	Linda		DC_M6828	UCS	K.2.1
Richardson	Marianna F.		DC_M3891	UCS	K.2.1
Richardson	Michael		DC_M1585	UCS	K.2.1
Richardson	Mike		DC_M0314		K.2.1
Richmond	Lonna		DC_M2099	UCS	K.2.1
Richmond	Lonna		DC_M2102	UCS	K.2.1
Richmond	Lonna		DC_M2103	UCS	K.2.1
Richmond	Susan		DC_M4693	UCS	K.2.1
Richter	Lane		DC_M6477	UCS	K.2.1
Rick	Carol		DC_E0061		K.3.1, K.3.5, K.3.7
Rick	Margie		DC_M3667	UCS	K.2.1
Rickard	Mary		DC_M2712	UCS	K.2.1
Ricker	Charlene		DC_E0217		K.2.2
Rickman	Dana		DC_M4844	UCS	K.2.1
Ricks	Linda		DC_M6205	UCS	K.2.1
Riddell	Colette		DC_M1494	UCS	K.2.1
Riddell	Colette		DC_M1495	UCS	K.2.1
Rider	Barbara		DC_M5292	UCS	K.2.1
Ridot	Faith		DC_M0527		K.2.1
Rieber	Emily		DC_M4578	UCS	K.2.1
Riecke	Hermann		DC_M4695	UCS	K.2.1
Riehart	Dale		DC_M2412	UCS	K.2.1
Riehl	Linda		DC_M5222	UCS	K.2.1
Riehle	Barry		DC_M7690		K.2.1
Rieken	Henry		DC_M6435	UCS	K.2.1
Riell	Dana		DC_M3618	UCS	K.2.1
Rigali	Susan		DC_M1888	UCS	K.2.1
Riggins	Patricia		DC_M7825		K.2.1
Riggs	Charles		DC_M3975	UCS	K.2.1
Riggs	Richard		DC_M4754	UCS	K.2.1
Riley	Barbara		DC_M1972	UCS	K.2.1
Riley	Benjamin		DC_M7704		K.3.4, K.3.11
Riley	Ray		DC_M1030	UCS	K.2.1
Rimbos	Peter		DC_M7737		K.3.1, K.3.2, K.3.7, K.3.10, K.3.11, K.3.13, K.3.14
Ringer	Ramona		DC_E0248		K.2.3
Rinzler	Deborah		DC_M3785	UCS	K.2.1
Ripple	Joan M.		DC_M1999	UCS	K.2.1
Risedorph	Jamie		DC_M4024	UCS	K.2.1
Riseley	Viv		DC_M7069	UCS	K.2.1
Rish	Shirley		DC_M6643	UCS	K.2.1
Ritchey	Melissa		DC_M1344	UCS	K.2.1
Ritchings	Anne		DC_M3386	UCS	K.2.1
Ritchison	Ric	Debbie Ritchison	DC_M3444	UCS	K.2.1
Rittenhouse	Calvin		DC_M3536	UCS	K.2.1
Ritter	Alissa		DC_M0816	UCS	K.2.1
Ritter	Sam		DC_M6552	UCS	K.2.1
Rittle	Lori		DC_M7717		K.2.1
Ritz	John		DC_E0417		K.3.2, K.3.3, K.3.7, K.3.13
Ritz	John		DC_E0419		K.3.2, K.3.3, K.3.7, K.3.13
Ritz	John		DC_E0422		K.3.2, K.3.3, K.3.7, K.3.13

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Rosenfield	Nancy		DC_M3172	UCS	K.2.1
Rosenlicht-Zingarelli	Carla		DC_M2725	UCS	K.2.1
Rosenow	Wayne		DC_M3893	UCS	K.2.1
Rosenstein	Robert		DC_M1858	UCS	K.2.1
Rosenstein	Robert		DC_M1859	UCS	K.2.1
Rosenthal	Ann		DC_M6166	UCS	K.2.1
Rosenthal	Marvin		DC_M4308	UCS	K.2.1
Rosenzweig	Aline		DC_M4355	UCS	K.2.1
Rosetti	Leana		DC_M6543	UCS	K.2.1
Rosher	Ellen		DC_M1881	UCS	K.2.1
Roska	Sue		DC_M6441	UCS	K.2.1
Ross	Aimee		DC_M0893	UCS	K.2.1
Ross	Andrea		DC_M0315		K.2.1
Ross	L. Marie		DC_M7627	UCS	K.2.1
Ross	Mary		DC_M0277		K.3.14
Ross	Michelle		DC_M4474	UCS	K.2.1
Ross	Pam		DC_M2177	UCS	K.2.1
Ross	Robert		DC_E0068		K.3.2, K.3.4, K.3.11, K.3.12, K.3.13, K.3.15
Ross	Susan		DC_M7097	UCS	K.2.1
Ross	Sylvia		DC_M5948	UCS	K.2.1
Rossetto	Kate		DC_M3734	UCS	K.2.1
Rossini	Giovanni		DC_M5429	UCS	K.2.1
Rossiter	Kel		DC_E0246		K.3.2, K.3.11, K.3.12
Rossman	Norman		DC_M6911	UCS	K.2.1
Roth	Heather		DC_M3726	UCS	K.2.1
Roth	Kurt		DC_M4248	UCS	K.2.1
Roth	Peter		DC_M5687	UCS	K.2.1
Rothermund	Jodi		DC_M1960	UCS	K.2.1
Rotholz	Abigail		DC_M4743	UCS	K.2.1
Rothwell	Shelley		DC_M3124	UCS	K.2.1
Rough	Anna		DC_M2136	UCS	K.2.1
Roundtree	Marthea		DC_F0003	United States Environmental Protection Agency	K.5
Rouse	George		DC_M4069	UCS	K.2.1
Rousu	Dwight		DC_E0030		K.3.2, K.3.3, K.3.4, K.3.6, K.3.7, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Row	Donna		DC_M6282	UCS	K.2.1
Rowe	Jeff		DC_M1553	UCS	K.2.1
Rowland	Liz		DC_M6505	UCS	K.2.1
Rowland	Theodore		DC_M5073	UCS	K.2.1
Roy	Jean		DC_M6714	UCS	K.2.1
Royack	Walter		DC_M2067	UCS	K.2.1
Royall	Chrys		DC_M4622	UCS	K.2.1
Roylance	Stephen		DC_M0933	UCS	K.2.1
Rozella	Dona		DC_M3597	UCS	K.2.1
Rubbert	Dawn		DC_E0252		K.2.2
Rubin	Leonard		DC_M4233	UCS	K.2.1
Rublev	E.J.		DC_M7161	UCS	K.2.1
Ruch	Aixa		DC_M1496	UCS	K.2.1
Ruch	Dave		DC_M1490	UCS	K.2.1
Ruch	Elizabeth		DC_M1498	UCS	K.2.1
Ruch	Lisette		DC_M1613	UCS	K.2.1
Ruch	Lisette		DC_M6544	UCS	K.2.1
Ruch II	David		DC_M1616	UCS	K.2.1
Ruckdeschel	Jenny		DC_M4913	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Rucker	Delicia		DC_M2047	UCS	K.2.1
Rudolph	Chari		DC_M7881		K.2.1
Rues	Nathan		DC_M4340	UCS	K.2.1
Ruff	Nicole		DC_M6126	UCS	K.2.1
Rugh	Dave		DC_M6809	UCS	K.2.1
Rugh	Ruthe		DC_M4605	UCS	K.2.1
Rugh	Ruthe		DC_M7496	UCS	K.2.1
Rugh	Ruthe		DC_M7501	UCS	K.2.1
Rugh	Ruthe		DC_M7526	UCS	K.2.1
Rui-z Castillo	Norma Alejandra		DC_M2490	UCS	K.2.1
Rule	Juliann		DC_M2374	UCS	K.2.1
Rumbaugh	Jane		DC_M0607		K.2.1
Rumberger	Sharon		DC_M6397	UCS	K.2.1
Runkle	Tori		DC_M2565	UCS	K.2.1
Ruopp	Kathy		DC_M7921		K.2.3
Ruppel	Elisabeth		DC_M2087	UCS	K.2.1
Ruscoe	Sandra		DC_M1828	UCS	K.2.1
Rush	Barbara		DC_M7223	UCS	K.2.1
Rusk	Steve		DC_M0726		K.2.1
Russell	Claire H.		DC_M7101	UCS	K.2.1
Russell	Coral		DC_M4055	UCS	K.2.1
Russell	Dwight		DC_M7832		K.2.1
Russell	John		DC_M1320	UCS	K.2.1
Russell	Maureen		DC_M4251	UCS	K.2.1
Russell	Sandra		DC_M0953	UCS	K.2.1
Russini	Elizabeth		DC_M4796	UCS	K.2.1
Russo	Cheryl		DC_M3682	UCS	K.2.1
Russo	Rita		DC_M1806	UCS	K.2.1
Rusten	June		DC_M2710	UCS	K.2.1
Ruta	George		DC_M5612	UCS	K.2.1
Ruth	Phyllis		DC_M1557	UCS	K.2.1
Rutheiser	Michele		DC_M0597		K.2.1
Ryan	Alice May		DC_E0194		K.2.4
Ryan	Mari		DC_E0292		K.3.2, K.3.12
Ryan	Pamela		DC_M1662	UCS	K.2.1
Ryan	Patricia		DC_M4305	UCS	K.2.1
Rydant	Margaret		DC_M7016	UCS	K.2.1
Ryder	William		DC_M0851	UCS	K.2.1
Rymer	Craig		DC_M5790	UCS	K.2.1
S	Alexandra		DC_M2800	UCS	K.2.1
S	Simiya		DC_M5372	UCS	K.2.1
S	Stephanie		DC_M6864	UCS	K.2.1
Sabar	Stephanie		DC_M5723	UCS	K.2.1
Sabers	Kenneth		DC_M5691	UCS	K.2.1
Sabinson	Mara		DC_M0336		K.2.1
Sack	Jason		DC_M5488	UCS	K.2.1
Sadanand	Ashwinee		DC_M0746		K.2.1
Sadowski	Joan		DC_M1735	UCS	K.2.1
Sadowsky	Laura		DC_M6672	UCS	K.2.1
Saeger	Jeff		DC_M7858		K.2.1
Safran	Marcia		DC_M2668	UCS	K.2.1
Safran	Marcia		DC_M2669	UCS	K.2.1
Sagan	Sharon		DC_M4654	UCS	K.2.1
Sage	Joan		DC_M1256	UCS	K.2.1
Sage	Joan		DC_M5510	UCS	K.2.1
Sagen	Jacqueline		DC_M3403	UCS	K.2.1
Sager	Robert		DC_M3441	UCS	K.2.1
Sager	Tom		DC_M5679	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Sahhar	Dianna		DC_M5915	UCS	K.2.1
Sahlberg	Gabriella		DC_M1572	UCS	K.2.1
Saichek	Dianne		DC_M7324	UCS	K.2.1
Said	Peter		DC_M2058	UCS	K.2.1
Saidi	Jasmin		DC_M0417		K.2.1
Sailer	Randy		DC_M3610	UCS	K.2.1
Sakaguchi	Christine		DC_M7852		K.2.1
Sakun	Nina		DC_M7107	UCS	K.2.1
Sala	Nadia		DC_M4563	UCS	K.2.1
Salader	Roger		DC_M4029	UCS	K.2.1
Salas	Carol		DC_M6641	UCS	K.2.1
Salgado	Diego		DC_M4893	UCS	K.2.1
Salmestrelli	Jennifer		DC_M1669	UCS	K.2.1
Salmon	Herb		DC_M4917	UCS	K.2.1
Salmon	Kate		DC_M6269	UCS	K.2.1
Salotti	Susan E		DC_M7738		K.2.1
Salpeter	Ed		DC_E0245		K.3.1, K.3.2, K.3.4, K.3.11, K.3.14
Salpeter	Edwin		DC_M0001		K.3.4, K.3.7, K.3.12, K.3.14
Salpeter	Edwin		DC_M4877	UCS	K.2.1
Salvaggio	John		DC_M0709		K.2.1
Salvaggio	John		DC_M3453	UCS	K.2.1
Salvail	Michele		DC_M2771	UCS	K.2.1
Salzman	Judith		DC_E0178		K.2.2
Samberg	Helen		DC_M0019		K.2.2
Samelson	Audrey		DC_M4265	UCS	K.2.1
Sammons	Susanna		DC_M2225	UCS	K.2.1
Samples	Linda		DC_M7442	UCS	K.2.1
Samson	Victoria		DC_E0401	Center for Defense Information	K.4
Samson	Victoria		DC_PHO0001	Center for Defense Information	K.3.2, K.3.3, K.3.10, K.3.11, K.3.12, K.3.13, K.3.14, K.3.15, K.4
Samson	Victoria		DC_PHW0002	Center for Defense Information	K.3.12, K.3.15, K.4
Samuels	Janet		DC_M6007	UCS	K.2.1
Samuels	Joyce		DC_M3152	UCS	K.2.1
Samuels	William		DC_M1065	UCS	K.2.1
Samuelson	Barbara A		DC_M3019	UCS	K.2.1
San Filippo	Michael	Catherine San Filippo	DC_M0290		K.3.14
Sanchez	Alvaro		DC_M4779	UCS	K.2.1
Sanchez	Gabriele		DC_M4588	UCS	K.2.1
Sanchez	Hector		DC_M2683	UCS	K.2.1
Sanchez	Janette		DC_M3538	UCS	K.2.1
Sandall	Hilary		DC_M7210	UCS	K.2.1
Sandefur	Karen		DC_M2563	UCS	K.2.1
Sanders	Gary		DC_M0388		K.2.1
Sanders	Joanna		DC_M4411	UCS	K.2.1
Sanders	Ralph W.		DC_M1660	UCS	K.2.1
Sanders	Richard		DC_M3008	UCS	K.2.1
Sanders	Steve		DC_M7467	UCS	K.2.1
Sanders	Susan		DC_M5252	UCS	K.2.1
Sandford	Sophia Von		DC_M3684	UCS	K.2.1
Sandine	Al		DC_M0160		K.3.2, K.3.3, K.3.7, K.3.10, K.3.12, K.3.13
Sandler	Noah Doane		DC_M4219	UCS	K.2.1
Sandoval	Ani		DC_M1830	UCS	K.2.1
Sands	Kris		DC_M4008	UCS	K.2.1
Sant	Judyth		DC_M2615	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Sant	Judyth and Barbara		DC_M2616	UCS	K.2.1
Santana	Jose M Olmos		DC_M0577		K.2.1
Santana	Jose M Olmos		DC_M0692		K.2.1
Santana	Jose M Olmos		DC_M2977	UCS	K.2.1
Santana	Kathryn		DC_M4558	UCS	K.2.1
Santangelo	Matthew F.		DC_M6749	UCS	K.2.1
Santerre	Roger		DC_M0665		K.2.1
Santerre	Roger		DC_M4134	UCS	K.2.1
Santos	Christel		DC_M0351		K.2.1
Santowski	Celia		DC_M6326	UCS	K.2.1
Santoyo	Marlene		DC_M7483	UCS	K.2.1
Santulli	Carrie		DC_M6542	UCS	K.2.1
Sapiro	Mark		DC_M3140	UCS	K.2.1
Sappenfield	Patricia		DC_M2522	UCS	K.2.1
Sargent	Lloyd		DC_M6390	UCS	K.2.1
Sarinelli	Lisa		DC_M2732	UCS	K.2.1
Sariol	Teresa		DC_M7297	UCS	K.2.1
Sarja	Jennifer		DC_M6745	UCS	K.2.1
Sarr	Bob		DC_M5421	UCS	K.2.1
Sarrett	Ellen		DC_M7204	UCS	K.2.1
Sartini	Emily		DC_M6537	UCS	K.2.1
Sasser	Kristin		DC_M2426	UCS	K.2.1
Sauerberg-Amland	K. Kay		DC_M7186	UCS	K.2.1
Saum	George		DC_M4831	UCS	K.2.1
Saus	Steven		DC_M5094	UCS	K.2.1
Sausser	Chris		DC_M6189	UCS	K.2.1
Savage	Denise		DC_M0494		K.2.1
Savage	Matt		DC_M0700		K.2.1
Saveage	John	Patricia Savage	DC_M7798		K.2.1
Savino	Annette		DC_M2301	UCS	K.2.1
Savion	Susan		DC_M4021	UCS	K.2.1
Sawdon	Rosemarie		DC_M5350	UCS	K.2.1
Sawdon	Rosemarie		DC_M6048	UCS	K.2.1
Sawyer	Christy		DC_M4664	UCS	K.2.1
Sawyer	Fannette		DC_E0110		K.3.14
Saxe	Dorothy		DC_M5716	UCS	K.2.1
Sayer	Marjorie		DC_M3027	UCS	K.2.1
Sayers	Rick		DC_M7445	UCS	K.2.1
Saylan	Charles		DC_M7619	UCS	K.2.1
Sayre	Jean		DC_M2161	UCS	K.2.1
Sbrissa	Joellen		DC_M2661	UCS	K.2.1
Scadidi	Frances		DC_M0087		K.3.2, K.3.3, K.3.4, K.3.7, K.3.10, K.3.12
Scalise	Nancy		DC_M4872	UCS	K.2.1
Scallen	Janet		DC_E0393		K.3.2, K.3.3, K.3.7, K.3.12, K.3.15
Scamahorn	Mark		DC_M7317	UCS	K.2.1
Scanlon	Sean		DC_M7452	UCS	K.2.1
Scarl	Daniel		DC_M7842		K.3.4, K.3.7, K.3.11, K.3.13
Scarlata	Angela		DC_M6301	UCS	K.2.1
Scarlott	Charles		DC_M1896	UCS	K.2.1
Scarpone	Tom		DC_M1263	UCS	K.2.1
Schaad	James		DC_M0354		K.2.1
Schabitzer	Diane		DC_M6746	UCS	K.2.1
Schabitzer	Diane		DC_M7481	UCS	K.2.1
Schaefer	Dolores		DC_M3940	UCS	K.2.1
Schaefer	Dolores		DC_M6394	UCS	K.2.1
Schafer	Ann		DC_E0176		K.2.2

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Schafer	Ann		DC_M4476	UCS	K.2.1
Schaff	Sarah		DC_M4227	UCS	K.2.1
Schagrin	Morton L.		DC_M0838	UCS	K.2.1
Scharlack	Meyer		DC_M4554	UCS	K.2.1
Schatz	Bernie		DC_M3786	UCS	K.2.1
Schau	C		DC_M2855	UCS	K.2.1
Schauffler	Ann		DC_M5808	UCS	K.2.1
Scheele	Robert B.		DC_M6718	UCS	K.2.1
Scheiferstein	Jeanne		DC_M0289		K.2.1
Scheiner	Ellen		DC_M6616	UCS	K.2.1
Schepers	Marlyn		DC_M2223	UCS	K.2.1
Scheyd	Suzanne		DC_M4247	UCS	K.2.1
Scheyer	Marguerite		DC_M4157	UCS	K.2.1
Schick	Katherine		DC_M4425	UCS	K.2.1
Schieffer	Jennifer		DC_M6168	UCS	K.2.1
Schier	Will		DC_M4159	UCS	K.2.1
Schiller	Raymond		DC_M6650	UCS	K.2.1
Schipper	Peter		DC_M5705	UCS	K.2.1
Schivera	Diane		DC_M7286	UCS	K.2.1
Schlacter	Judith		DC_M7336	UCS	K.2.1
Schlagal	Robert		DC_M1770	UCS	K.2.1
Schlageter	Martin		DC_M2727	UCS	K.2.1
Schleidt	Monika		DC_E0046		K.3.2, K.3.3, K.3.7, K.3.11, K.3.12
Schleupner	Mark		DC_M3664	UCS	K.2.1
Schloessinger	Kathleen		DC_M7070	UCS	K.2.1
Schlosberg	Lester		DC_M7227	UCS	K.2.1
Schloss	Richard		DC_M3855	UCS	K.2.1
Schlosser	Jenna		DC_M6711	UCS	K.2.1
Schmid	Diane		DC_M3552	UCS	K.2.1
Schmid	George		DC_M1339	UCS	K.2.1
Schmidt	Caroline		DC_PHO0035		K.3.18
Schmidt	Ellen	Oskar Schmidt	DC_E0203		K.2.2
Schmidt	Gary		DC_M5653	UCS	K.2.1
Schmidt	Misti		DC_M7015	UCS	K.2.1
Schmidt	Sara		DC_M7412	UCS	K.2.1
Schmidt	William		DC_M7714		K.2.1
Schmitt	Ariel		DC_M2182	UCS	K.2.1
Schmitt	Joan		DC_M5516	UCS	K.2.1
Schmitt	Johanna		DC_M6451	UCS	K.2.1
Schmitt	Richard	Kathy Schmitt	DC_M6491	UCS	K.2.1
Schmitt	Robert J.		DC_M5294	UCS	K.2.1
Schmitthenner	Christine		DC_M4412	UCS	K.2.1
Schmitz	Gladys		DC_E0265		K.2.2
Schmitz	Patrick		DC_M0902	UCS	K.2.1
Schmitz	Ruth		DC_M5483	UCS	K.2.1
Schmotzer	Michael		DC_M0123		K.3.10, K.3.14
Schmotzer	Michael		DC_M0609		K.2.1
Schmultzer	Joe		DC_M5795	UCS	K.2.1
Schnaars	Michael		DC_M1283	UCS	K.2.1
Schnabel	Erik		DC_M5941	UCS	K.2.1
Schneider	Pauline		DC_M5076	UCS	K.2.1
Schnidler	Mark		DC_M5374	UCS	K.2.1
Schochet	Joy		DC_M5136	UCS	K.2.1
Schochet	Joy		DC_M6896	UCS	K.2.1
Schoder-Ehri	Ruthe		DC_M0874	UCS	K.2.1
Schoeler	Mikel		DC_M0080		K.2.1
Schoen	Tim		DC_M2851	UCS	K.2.1
Schoenacher	Naren		DC_M2418	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Schoene	Andrew		DC_M5106	UCS	K.2.1
Schoene	Clare		DC_M5857	UCS	K.2.1
Schoenthal	Nathan		DC_M4680	UCS	K.2.1
Schoenweiss	Paul		DC_M4102	UCS	K.2.1
Schoettler	Joanna		DC_M0564		K.2.1
Scholtes	Nick		DC_M0550		K.2.1
Schoppert	Amy King		DC_M4377	UCS	K.2.1
Schosser	Claire		DC_M7882		K.2.1
Schowalter	David		DC_M2197	UCS	K.2.1
Schrader	Kimberly		DC_M0566		K.2.1
Schrader	Susan		DC_M4981	UCS	K.2.1
Schramm	Bea		DC_M3010	UCS	K.2.1
Schramm	Peggy		DC_M1534	UCS	K.2.1
Schreffler	Lisa		DC_M5371	UCS	K.2.1
Schregel	Keri		DC_M0578		K.2.1
Schreiber	Pat		DC_M7147	UCS	K.2.1
Schreiber	Ramona		DC_E0403	NOAA	K.5
Schriner	Macie		DC_M7051	UCS	K.2.1
Schroeder	Bonnie		DC_M6513	UCS	K.2.1
Schroeder	Florence		DC_M0658		K.2.1
Schroeder	Joy		DC_M7733		K.2.1
Schroeder	Pablo		DC_M3203	UCS	K.2.1
Schubert	Gabriele		DC_M7807		K.2.1
Schuetz	Bettina		DC_M0992	UCS	K.2.1
Schulman	Edwina		DC_M6456	UCS	K.2.1
Schulof	Bob		DC_M5347	UCS	K.2.1
Schulte	Eileen		DC_M6268	UCS	K.2.1
Schulte	Michael		DC_M1342	UCS	K.2.1
Schultz	Claire		DC_M4290	UCS	K.2.1
Schultz	Judith		DC_M3196	UCS	K.2.1
Schultz	Richard		DC_E0074	Professor Division os Biochemistry Stritch School of Mdeicine Loyola University	K.3.2, K.3.10, K.3.11, K.3.13
Schulz	Jim		DC_M4075	UCS	K.2.1
Schulze	Karen		DC_M5525	UCS	K.2.1
Schumacher	Carl A		DC_M3052	UCS	K.2.1
Schumacher	Joan	David Friedman	DC_M0131		K.2.1
Schuman	James		DC_M1458	UCS	K.2.1
Schut	Dini		DC_M1517	UCS	K.2.1
Schutzius	Robert		DC_E0330		K.2.2
Schuurman	Gregor		DC_M6843	UCS	K.2.1
Schwartz	David		DC_M3037	UCS	K.2.1
Schwartz	Elaine		DC_M2969	UCS	K.2.1
Schwartz	Ellen		DC_PHO0019	Women's International League for Peace and Freedom, United States Section	K.3.1, K.3.4, K.3.5, K.3.10, K.3.11, K.3.15, K.4
Schwartz	Jami		DC_M3036	UCS	K.2.1
Schwartz	Kaye		DC_M5232	UCS	K.2.1
Schwartz	Liz		DC_M3687	UCS	K.2.1
Schwartz	Marie		DC_M1076	UCS	K.2.1
Schwartz	Nancy		DC_M0320		K.2.1
Schwartz	Norman		DC_M0569		K.2.1
Schwartz	Norman		DC_M0703		K.2.1
Schwartz	Renee		DC_M7356	UCS	K.2.1
Schwartz	Sally		DC_M0976	UCS	K.2.1
Schwartz	Sally		DC_M5274	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Schwartz	Steven		DC_M0184		K.2.1
Schwartz	Cindy		DC_M6361	UCS	K.2.1
Schwartzman	Maia		DC_M4975	UCS	K.2.1
Schweibish	Jean		DC_M4291	UCS	K.2.1
Schweitzer	John P.		DC_M0813	UCS	K.2.1
Schwering	Catherine		DC_M1187	UCS	K.2.1
Schwick	Keplin		DC_M5944	UCS	K.2.1
Schwytzer	John		DC_M6429	UCS	K.2.1
Scianna	Paolo		DC_M3281	UCS	K.2.1
Scire	Dawn		DC_M7652	UCS	K.2.1
Scivoletti	Michael		DC_M0842	UCS	K.2.1
Scott	Alan		DC_M1419	UCS	K.2.1
Scott	Anwyl		DC_M5459	UCS	K.2.1
Scott	Dorinda		DC_M7176	UCS	K.2.1
Scott	John Craig		DC_M1158	UCS	K.2.1
Scott	John P.		DC_M5356	UCS	K.2.1
Scott	Kathryn		DC_M4266	UCS	K.2.1
Scott	Robert E.		DC_M0207	member UCS	K.3.2, K.3.10, K.3.14
Scott	Tracy		DC_M6501	UCS	K.2.1
Scotton	Bruce		DC_M2150	UCS	K.2.1
Scuder	Amanda		DC_M3928	UCS	K.2.1
Scully	Helene		DC_M3531	UCS	K.2.1
Scwartz	Nancy		DC_M3129	UCS	K.2.1
Seabold	Danielle		DC_M6372	UCS	K.2.1
Seabrook	Kathy		DC_M3366	UCS	K.2.1
Seals	Wayne		DC_M1929	UCS	K.2.1
Sealy	Ramsey L		DC_M3293	UCS	K.2.1
Searain	Brenan		DC_M5158	UCS	K.2.1
Searfos	Polly		DC_M4285	UCS	K.2.1
Sebesta	Carla		DC_M2028	UCS	K.2.1
Seeley	Laurel		DC_M5127	UCS	K.2.1
Seeley	Lynda		DC_M5762	UCS	K.2.1
Seeley	Treacy		DC_M1541	UCS	K.2.1
Segal	Evalyn		DC_M4649	UCS	K.2.1
Segal	Jeffrey		DC_M4643	UCS	K.2.1
Segall-Anable	Linda		DC_M4485	UCS	K.2.1
Segar	James		DC_M4772	UCS	K.2.1
Segreto	Mary		DC_M3234	UCS	K.2.1
Seidel	Joan Wade		DC_M0473		K.2.1
Seidel	Peter		DC_M2645	UCS	K.2.1
Seifert	Richard		DC_M3579	UCS	K.2.1
Seigal	Nancy		DC_M0637		K.2.1
Seigal	Nancy		DC_M1122	UCS	K.2.1
Seigal	Nancy		DC_M1995	UCS	K.2.1
Seitzer	David		DC_M1191	UCS	K.2.1
Sekhon	Kanwaldeep K		DC_M2958	UCS	K.2.1
Selbin	Joel		DC_M1248	UCS	K.2.1
Selig	Kanti		DC_M4498	UCS	K.2.1
Sellers	Gayle		DC_M1640	UCS	K.2.1
Sellers	Jennifer		DC_M3566	UCS	K.2.1
Sellitto	Antoinette		DC_M1637	UCS	K.2.1
Sells	Greg		DC_M1404	UCS	K.2.1
Selten	Anne		DC_M3570	UCS	K.2.1
Seman	George		DC_M7771		K.2.1
Sennhauser	Robert		DC_M6342	UCS	K.2.1
Senuta	John		DC_M6386	UCS	K.2.1
Seppa	David		DC_M3532	UCS	K.2.1
Seraso	Laura		DC_M4799	UCS	K.2.1
Sergent	Jacqueline		DC_M4965	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Serim	Ari		DC_M5494	UCS	K.2.1
Serlin	Steve		DC_M0359		K.2.1
Serrano	Jennifer		DC_M3921	UCS	K.2.1
Sersig	Margery		DC_M5579	UCS	K.2.1
Servais	James		DC_M3917	UCS	K.2.1
Sessine	Linda		DC_M5325	UCS	K.2.1
Seth	Barry		DC_M7050	UCS	K.2.1
Severinghaus	Ed		DC_E0083		K.3.1, K.3.2, K.3.5, K.3.10, K.3.11, K.3.13
Sewell	Jerry W.		DC_M7450	UCS	K.2.1
Sewick	Karen		DC_M6409	UCS	K.2.1
Seymour	Donna		DC_M4522	UCS	K.2.1
Shackelford	Edgar		DC_M0020		K.3.1, K.3.2, K.3.7, K.3.12
Shafchuk	Patsy		DC_M7416	UCS	K.2.1
Shafer	James		DC_M7402	UCS	K.2.1
Shafer	Mary Frances		DC_M0246		K.2.2
Shafer	Mort		DC_M7932		K.2.3
Shafer	Padriac		DC_M6307	UCS	K.2.1
Shaffer	Barbara		DC_M4370	UCS	K.2.1
Shaffer	Janet		DC_M5605	UCS	K.2.1
Shafnisky	Luke		DC_M6557	UCS	K.2.1
Shafroth	Stephen		DC_M6919	UCS	K.2.1
Shain	Davira		DC_M5050	UCS	K.2.1
Shalda	Elise		DC_M3280	UCS	K.2.1
Shand	Sandra		DC_M6936	UCS	K.2.1
Shannon	Crystal		DC_M5886	UCS	K.2.1
Shapiro	Eve		DC_M5570	UCS	K.2.1
Shapiro	Gerrie		DC_M4851	UCS	K.2.1
Shapiro	Martin		DC_M3632	UCS	K.2.1
Shapland	James		DC_M4444	UCS	K.2.1
Sharkey	Debra		DC_M3699	UCS	K.2.1
Sharp	Ron		DC_M6388	UCS	K.2.1
Sharp	Stephen K		DC_M3243	UCS	K.2.1
Sharpes	Cara		DC_M7158	UCS	K.2.1
Shattls	Trudy		DC_M1213	UCS	K.2.1
Shatzkin	Earl H.		DC_M0832	UCS	K.2.1
Shaughnessy	Diane		DC_M4674	UCS	K.2.1
Shaver	Katherine		DC_M3837	UCS	K.2.1
Shaw	Angelina		DC_M0488		K.2.1
Shay-Tomer	Patricia		DC_M2438	UCS	K.2.1
Sheak	Bob		DC_M0594		K.2.1
Shearfor	Douglas H.		DC_M3919	UCS	K.2.1
Shedd	Elisabeth		DC_M2313	UCS	K.2.1
Shedd	Rebecca		DC_M5815	UCS	K.2.1
Shedd	Rebecca		DC_M6416	UCS	K.2.1
Sheilds	Mary		DC_E0105		K.3.2, K.3.3, K.3.9, K.3.10
Sheinwald	Ann		DC_M2643	UCS	K.2.1
Sheinwald	Ann		DC_M4811	UCS	K.2.1
Shelley	Ian		DC_M4453	UCS	K.2.1
Shelnett	Robert T		DC_M3012	UCS	K.2.1
Shelton	Carole L.		DC_M3314	UCS	K.2.1
Shelton	Dan		DC_E0167		K.3.14
Shelton	Mary		DC_M0423		K.2.1
Shelton	Mary		DC_M0424		K.2.1
Shelton	Mary		DC_M4741	UCS	K.2.1
Shelton	Mary		DC_M7502	UCS	K.2.1
Shenk	Patricia L.		DC_M4967	UCS	K.2.1
Shepard	John	Linda Shepard	DC_E0121		K.3.2, K.3.14
Shepherd	Elizabeth		DC_M0684		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Shepherd	Elizabeth		DC_M3182	UCS	K.2.1
Shepler	Joan		DC_M4077	UCS	K.2.1
Sheppard	Amy		DC_M6235	UCS	K.2.1
Sheppard	Amy		DC_M6236	UCS	K.2.1
Sheppard	Samona		DC_M6382	UCS	K.2.1
Sheppard	Somona		DC_M6384	UCS	K.2.1
Sheppard	Starr		DC_M4311	UCS	K.2.1
Sher	Steven		DC_M3367	UCS	K.2.1
Sherer	H		DC_M5821	UCS	K.2.1
Sheridan	Rose		DC_M5276	UCS	K.2.1
Sheridan	Ruth		DC_E0070		K.3.9
Sheridan	Ruth		DC_E0144		K.3.1, K.3.2, K.3.4, K.3.7, K.3.10, K.3.14
Sheridan	Suzanne		DC_M3984	UCS	K.2.1
Sherman	Carl		DC_M1644	UCS	K.2.1
Sherman	Diane		DC_M3145	UCS	K.2.1
Sherman	Eugenia B.		DC_M5201	UCS	K.2.1
Sherman	Harriet J.		DC_M5737	UCS	K.2.1
Sherman	Richard		DC_M6406	UCS	K.2.1
Sherriff	Steve		DC_M5597	UCS	K.2.1
Sherrill	Stephen		DC_M5445	UCS	K.2.1
Sherwood	Brian		DC_M2585	UCS	K.2.1
Sherwood	Courtney		DC_M4832	UCS	K.2.1
Sherwood	I-Hsien		DC_M4940	UCS	K.2.1
Shestak	Erica		DC_M0581		K.2.1
Shestak	Erica		DC_M1476	UCS	K.2.1
Shields	Lynne		DC_E0329		K.3.2, K.3.3, K.3.4, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15
Shihab	S		DC_M2220	UCS	K.2.1
Shimer	Sue		DC_M5282	UCS	K.2.1
Shin	Thomas		DC_M4434	UCS	K.2.1
Shine	Kim		DC_M3429	UCS	K.2.1
Shine	Patricia		DC_E0071	Lyndon State College	K.2.2
Shinnerl	Joseph		DC_M2175	UCS	K.2.1
Shinnerl	Mary		DC_M2268	UCS	K.2.1
Shipley	Scott		DC_M2387	UCS	K.2.1
Shirar	Alycia		DC_M1064	UCS	K.2.1
Shirey	Keith		DC_M2647	UCS	K.2.1
Shitama	Celeste		DC_M4147	UCS	K.2.1
Shively	Kelly		DC_M7683	UCS	K.2.1
Shively	Phyllis		DC_M4924	UCS	K.2.1
Shiverly	Daniel		DC_M0165		K.3.14
Shlackman	Mara		DC_M2943	UCS	K.2.1
Shockley	James		DC_M5577	UCS	K.2.1
Shockley	Mark		DC_M5670	UCS	K.2.1
Sholtz	Laura		DC_M0390		K.2.1
Shoop	Karen M.		DC_M1962	UCS	K.2.1
Shore	Joel		DC_M7753		K.2.1
Shoulderblade	Magoo		DC_M6840	UCS	K.2.1
Showers	Sterling		DC_M3768	UCS	K.2.1
Shrestha	Chauyen Lai		DC_E0010		K.3.5
Shridan	Suzanne		DC_M2637	UCS	K.2.1
Shroder	Jennifer	David Shroder	DC_M5132	UCS	K.2.1
Shroder	Jennifer	David Shroder	DC_M7094	UCS	K.2.1
Shuecraft	Steven Wayne		DC_M0170		K.2.1
Shuffler	Holly		DC_M2033	UCS	K.2.1
Shukla	H		DC_M5861	UCS	K.2.1
Shuler	Heidi		DC_M5829	UCS	K.2.1
Shumaker	Larry		DC_M5983	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Shumate	Charlene		DC_M5266	UCS	K.2.1
Shurr	Allison		DC_M5358	UCS	K.2.1
Sia	Tiffiny		DC_M1530	UCS	K.2.1
Sibley	Kate		DC_M5660	UCS	K.2.1
Sibus	Ashley		DC_M1748	UCS	K.2.1
Sickel	Stephen		DC_M7268	UCS	K.2.1
Sidari	Samantha		DC_M7117	UCS	K.2.1
Sidell	Gregory		DC_M3899	UCS	K.2.1
Sieffert	L.		DC_M5324	UCS	K.2.1
Siegan	Bruce		DC_M7560	UCS	K.2.1
Siegel	Larry		DC_M7906		K.2.1
Siegel	Lenny		DC_E0429		K.4
Siegel	Lenny		DC_PHW0004	Center for Public Environmental Oversight	K.3.15, K.4
Siegel	Sylvia		DC_M7945		K.2.1
Sienknecht	Nancy		DC_M4484	UCS	K.2.1
Sies	Richard		DC_M3187	UCS	K.2.1
Siewert	Rae Ann		DC_M1051	UCS	K.2.1
Sigmund	Chandra		DC_M0818	UCS	K.2.1
Sillars	Rodger		DC_M3241	UCS	K.2.1
Sillins	Stacy		DC_M3864	UCS	K.2.1
Silver	Karissa		DC_M0841	UCS	K.2.1
Silver	Myra		DC_M3373	UCS	K.2.1
Silver	Sandy		DC_M0046	Women's International League for Peace and Freedom, United States Section	K.3.1, K.3.2, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Silver	Sandy		DC_PHW0008	Women's Intenational Leauge Peace and Freedom	K.3.2, K.3.5, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Silvern	Robert		DC_M5386	UCS	K.2.1
Silvers	Rodger		DC_M7847		K.2.1
Silverstein	Sasha		DC_M5571	UCS	K.2.1
Silvis	Julia		DC_M4970	UCS	K.2.1
Simeone	Bruce		DC_E0314		K.2.2
Simmonds	Kathy		DC_M5039	UCS	K.2.1
Simmons	Carole		DC_M0407		K.2.1
Simmons	Carole		DC_M3229	UCS	K.2.1
Simmons	Judy		DC_M1578	UCS	K.2.1
Simon	N.		DC_M7340	UCS	K.2.1
Simons	Bette		DC_M4625	UCS	K.2.1
Simons	Sarah		DC_M4841	UCS	K.2.1
Simons	Dave		DC_M7518	UCS	K.2.1
Simonsen	Jill		DC_M5872	UCS	K.2.1
Simonson	Shawn	Denise Simonson	DC_M7005	UCS	K.2.1
Simpson	George		DC_M2845	UCS	K.2.1
Simpson	James		DC_M7154	UCS	K.2.1
Simpson	Walter		DC_M2419	UCS	K.2.1
Sims	Kate		DC_M5867	UCS	K.2.1
Sims	Stephanie		DC_M3607	UCS	K.2.1
Simshauser	Vanessa		DC_M6158	UCS	K.2.1
Sinclair	Carol D.		DC_M6741	UCS	K.2.1
Sinclair	Clara		DC_M0213		K.3.14
Sinclair	Michele		DC_M1183	UCS	K.2.1
Sindley	Heather		DC_M6375	UCS	K.2.1
Singer	Barb		DC_M7585	UCS	K.2.1
Singer	John		DC_M3557	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Singer	R.		DC_M5531	UCS	K.2.1
Sinks	Jennifer		DC_M1518	UCS	K.2.1
Sipress	Matthew		DC_M1834	UCS	K.2.1
Sirelson	Bernie		DC_M5656	UCS	K.2.1
Sitrick, Jr.	James B.		DC_M6628	UCS	K.2.1
Sitton	Ronald		DC_M1045	UCS	K.2.1
Sivel	Richard		DC_M5380	UCS	K.2.1
Sivesind	Torunn		DC_M6233	UCS	K.2.1
Skarda	Angi		DC_M1955	UCS	K.2.1
Skelton	Julie		DC_M1308	UCS	K.2.1
Skillman	Ermalee		DC_M0592		K.2.1
Skinder	Mark		DC_M5802	UCS	K.2.1
Skinner	Charles		DC_E0077		K.3.3, K.3.13, K.3.14
Skinner	Charles		DC_M0631		K.2.1
Skinner	Jaqueline		DC_E0327		K.3.4, K.3.7, K.3.11, K.3.12, K.3.15
Skinner	Sara		DC_M5616	UCS	K.2.1
Skipper	Elizabeth		DC_M1215	UCS	K.2.1
Sklar	Zach		DC_M4600	UCS	K.2.1
Skoglund	Sheryl R.		DC_M5285	UCS	K.2.1
Skoglund	Sheryl R.		DC_M5286	UCS	K.2.1
Slack	Robert		DC_M3085	UCS	K.2.1
Slack	Stephen		DC_M7745		K.2.1
Sladek	Phyllis		DC_M5694	UCS	K.2.1
Slaven	Charmaine		DC_M5545	UCS	K.2.1
Slawson	Bob		DC_M4516	UCS	K.2.1
Sleve	Lloyd		DC_M7252	UCS	K.2.1
Sleve	Patricia		DC_M6722	UCS	K.2.1
Sloan	Matthew		DC_M6901	UCS	K.2.1
Sloan	Rita		DC_M0928	UCS	K.2.1
Sloane	Jeanne		DC_M0668		K.2.1
Sloane	Marselle		DC_M4257	UCS	K.2.1
Slocum	Jessica		DC_M4206	UCS	K.2.1
Slof	Mike		DC_M5798	UCS	K.2.1
Slomovits	Helen		DC_M3794	UCS	K.2.1
Slonim	Tracey		DC_M6207	UCS	K.2.1
Slusarski	Yvette		DC_M5754	UCS	K.2.1
Small	Jack	Joyce Small	DC_E0294		K.3.2, K.3.3, K.3.10, K.3.11, K.3.15
Small	Karen		DC_E0111		K.2.3
Small	Tom		DC_M3852	UCS	K.2.1
Smarandoiu	Andrei		DC_M3781	UCS	K.2.1
Smith	Angela		DC_M1018	UCS	K.2.1
Smith	Angele		DC_M3409	UCS	K.2.1
Smith	Ann		DC_M2817	UCS	K.2.1
Smith	Barrie		DC_M6008	UCS	K.2.1
Smith	Brett		DC_M2459	UCS	K.2.1
Smith	Brian		DC_M0743		K.2.1
Smith	Brian		DC_M1589	UCS	K.2.1
Smith	Cathy		DC_M3047	UCS	K.2.1
Smith	Cha		DC_M7734		K.2.1
Smith	Colin		DC_M5052	UCS	K.2.1
Smith	Dakota		DC_M6228	UCS	K.2.1
Smith	Deborah		DC_M5395	UCS	K.2.1
Smith	Deborah		DC_M6252	UCS	K.2.1
Smith	Diana		DC_M4208	UCS	K.2.1
Smith	Ed		DC_M1290	UCS	K.2.1
Smith	Elena		DC_M2138	UCS	K.2.1
Smith	Ellen L		DC_M2188	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Smith	Elske		DC_M2640	UCS	K.2.1
Smith	Grace		DC_M7139	UCS	K.2.1
Smith	Gretle		DC_M7477	UCS	K.2.1
Smith	Janet		DC_M6000	UCS	K.2.1
Smith	Janice		DC_M5777	UCS	K.2.1
Smith	Kandler		DC_M6706	UCS	K.2.1
Smith	Kevin		DC_M5930	UCS	K.2.1
Smith	Kim		DC_M6768	UCS	K.2.1
Smith	Leigh		DC_M4447	UCS	K.2.1
Smith	Lowell		DC_M7913		K.2.1
Smith	M.M.K		DC_E0095		K.2.1
Smith	Margaret J.		DC_M4443	UCS	K.2.1
Smith	Marion		DC_M0215		K.3.1, K.3.14
Smith	Mark		DC_M6850	UCS	K.2.1
Smith	Mark S.		DC_M5299	UCS	K.2.1
Smith	Michele		DC_M4766	UCS	K.2.1
Smith	Molly		DC_M5628	UCS	K.2.1
Smith	Morton		DC_M1650	UCS	K.2.1
Smith	Morton		DC_M7071	UCS	K.2.1
Smith	Nancy		DC_M1067	UCS	K.2.1
Smith	Nate		DC_M2965	UCS	K.2.1
Smith	Paul		DC_M0688		K.2.1
Smith	Priscilla R.		DC_M5219	UCS	K.2.1
Smith	Ron		DC_M6783	UCS	K.2.1
Smith	Rosita A		DC_M2323	UCS	K.2.1
Smith	Sandy C.		DC_M1237	UCS	K.2.1
Smith	Sharon		DC_M2413	UCS	K.2.1
Smith	Sherry		DC_M4747	UCS	K.2.1
Smith	Stacey		DC_M2853	UCS	K.2.1
Smith	Stephen		DC_M5404	UCS	K.2.1
Smith	Suzanne		DC_M2752	UCS	K.2.1
Smith	Suzanne N.		DC_M5196	UCS	K.2.1
Smith	Suzanne N.		DC_M5197	UCS	K.2.1
Smith	Teresa		DC_M6468	UCS	K.2.1
Smith	Teresa		DC_M6469	UCS	K.2.1
Smith	Theresa		DC_M1031	UCS	K.2.1
Smith	Traude		DC_M0374		K.2.1
Smith	Trenton		DC_M3212	UCS	K.2.1
Smith	Valerie		DC_M0169		K.3.4, K.3.5, K.3.6, K.3.11, K.3.12, K.3.15
Smith	Valerie		DC_M2841	UCS	K.2.1
Smith	Wayne		DC_M2129	UCS	K.2.1
Smith	William		DC_M3437	UCS	K.2.1
Smith	William	Elaine Smith	DC_M7646	UCS	K.2.1
Smith-Bates	Lorrin		DC_M7346	UCS	K.2.1
Smith-Hundley	Kathy O		DC_M2088	UCS	K.2.1
Smithson	Jill		DC_M2248	UCS	K.2.1
Smoak	Copley		DC_M0543		K.2.1
Smolinsky	Gerald		DC_M0476		K.2.1
Smucker	Anna		DC_M1975	UCS	K.2.1
Smullin	Sylvia		DC_M7246	UCS	K.2.1
Smykal	Joyce		DC_M4081	UCS	K.2.1
Snavely	Nicholas		DC_M1164	UCS	K.2.1
Snawder	John		DC_M6660	UCS	K.2.1
Snoonian	Collette Legault		DC_M4327	UCS	K.2.1
Snow	Barbara		DC_M7169	UCS	K.2.1
Snow	Patricia		DC_M6405	UCS	K.2.1
Snowden	Patricia		DC_M3753	UCS	K.2.1
Snyder	Bradley K		DC_M2295	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Snyder	Carolyn		DC_M4894	UCS	K.2.1
Snyder	Judy	Wyane Snyder	DC_M0007		K.2.2
Snyder	Larry		DC_M0536		K.2.1
Snyder	Mark		DC_M7159	UCS	K.2.1
Snyder	Stephen		DC_M2568	UCS	K.2.1
Snyder	Stephen		DC_M5814	UCS	K.2.1
Snyder	Sueanne Kelsey		DC_M4315	UCS	K.2.1
Snyder	Sueanne Kelsey		DC_M5340	UCS	K.2.1
Snyder	Wendy		DC_M3205	UCS	K.2.1
Soares	Colleen		DC_M3518	UCS	K.2.1
Sobel	Scott		DC_M0883	UCS	K.2.1
Sober	Dottie		DC_M4729	UCS	K.2.1
Sobo	Naomi		DC_M7013	UCS	K.2.1
Sockrider	Dan		DC_M4103	UCS	K.2.1
Soderlind	Johan		DC_M2546	UCS	K.2.1
Soderman	Arne		DC_E0158		K.3.5, K.3.7, K.3.11, K.3.12, K.3.15, K.4
Sodos	Michael		DC_M1295	UCS	K.2.1
Sofie	Celia		DC_M4104	UCS	K.2.1
Sohn	Jeremy		DC_M0383		K.2.1
Soiferman	Layah		DC_M3233	UCS	K.2.1
Sokal	Judith		DC_M2466	UCS	K.2.1
Sokolow	Fred		DC_M4837	UCS	K.2.1
Solano	Francisco		DC_M4728	UCS	K.2.1
Solem	Bruce		DC_M3911	UCS	K.2.1
Soler	Ana Yong		DC_M7634	UCS	K.2.1
Soles	Ellen		DC_M6990	UCS	K.2.1
Sollars	Jim		DC_M2057	UCS	K.2.1
Sollenberger	Bruce		DC_PHO0042		K.3.2, K.3.3, K.3.4, K.3.10, K.3.11, K.3.13
Solomon	Beverly		DC_M6006	UCS	K.2.1
Solomon	Bruce		DC_M7137	UCS	K.2.1
Solomon	Phyllis		DC_M0140		K.2.1
Solovay	Mitchell		DC_E0285		K.2.2
Soltesz	Steven		DC_M1312	UCS	K.2.1
Soltis	M.B.		DC_M6795	UCS	K.2.1
Somer	Natalie		DC_M5805	UCS	K.2.1
Sommer	Catherine		DC_M5957	UCS	K.2.1
Sommer	Marc		DC_M3931	UCS	K.2.1
Sommerfield	Thomas		DC_M0422		K.2.1
Sonne	Liana		DC_M2889	UCS	K.2.1
Sonneborn	David		DC_M1443	UCS	K.2.1
Sonnino	Valerie		DC_M5573	UCS	K.2.1
Sonsteng	Melanie		DC_M1506	UCS	K.2.1
Sood	Lisa		DC_M1683	UCS	K.2.1
Soos	Joyce		DC_M5985	UCS	K.2.1
Soper	Robert A.		DC_M3359	UCS	K.2.1
Soreil	B.		DC_M3789	UCS	K.2.1
Sorgen	Phoebe		DC_M3028	UCS	K.2.1
Sornsilp	Vickie		DC_M1415	UCS	K.2.1
Sosa	Hector		DC_M1178	UCS	K.2.1
Soskolne	Lise		DC_M3349	UCS	K.2.1
Soth	Carol		DC_M1904	UCS	K.2.1
Sousa	Rich		DC_M2598	UCS	K.2.1
South	Gail		DC_M3982	UCS	K.2.1
South	Mary J.		DC_M3337	UCS	K.2.1
South	Sylvia		DC_M1073	UCS	K.2.1
South	Jennifer		DC_M2207	UCS	K.2.1
Southard	Mary		DC_M2892	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Souther	Gail		DC_M0144		K.3.14
Southwick	Alan		DC_M5991	UCS	K.2.1
Sowa-Maksic	Christopher		DC_M1392	UCS	K.2.1
Sowell	Mark		DC_M0377		K.2.1
Sower	David		DC_M0583		K.2.1
Soyama	Takuji		DC_M2961	UCS	K.2.1
Spacek	Steve		DC_M7750		K.2.1
Spadola	Suzanne		DC_M5192	UCS	K.2.1
Spagnoli	Harriet		DC_M5120	UCS	K.2.1
Spalding	Kathleen		DC_M2342	UCS	K.2.1
Spall	James		DC_M6673	UCS	K.2.1
Spallina	Jann		DC_M4589	UCS	K.2.1
Sparks	Margaret		DC_M1810	UCS	K.2.1
Sparks	Melissa		DC_M1095	UCS	K.2.1
Spaulding	Kathryn		DC_M3969	UCS	K.2.1
Spaulding	Ruth		DC_M3912	UCS	K.2.1
Spaulding	Ruth		DC_M4002	UCS	K.2.1
Spearow	Jimmy		DC_E0427	PSR (member)	K.3.4, K.3.5, K.3.9, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Spearow	Jimmy		DC_E0439		K.3.4, K.3.5, K.3.9, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Spearow	Jimmy		DC_E0443		K.3.9
Spearow	Jimmy		DC_PHO0011		K.3.4, K.3.11, K.3.15, K.4
Spears	Nancy		DC_M6364	UCS	K.2.1
Spears	Priscilla		DC_M5897	UCS	K.2.1
Speck	Monica		DC_M6974	UCS	K.2.1
Speitel	Michael		DC_M6136	UCS	K.2.1
Spence	Jack		DC_M4190	UCS	K.2.1
Spencer	Dawn		DC_M3529	UCS	K.2.1
Spencer	Miriam		DC_M3452	UCS	K.2.1
Spendelow	Jeff		DC_M6819	UCS	K.2.1
Spickard	Sarah		DC_M1021	UCS	K.2.1
Spielman	Eric		DC_M4207	UCS	K.2.1
Spiert	Vincent		DC_M2186	UCS	K.2.1
Spinney	Jane		DC_M5145	UCS	K.2.1
Spinney	Jane		DC_M5165	UCS	K.2.1
Spirito	Janice C.		DC_M1274	UCS	K.2.1
Spitzer	Susan		DC_M5681	UCS	K.2.1
Spivack	Freddie		DC_M0623		K.2.1
Spivey	D.		DC_M4814	UCS	K.2.1
Spradling	Richard D.		DC_M7065	UCS	K.2.1
Sprague	Gretchen		DC_M2123	UCS	K.2.1
Sprague	Philip		DC_M3295	UCS	K.2.1
Springer	William		DC_M7860		K.2.1
Squire	Blanche P.		DC_M7077	UCS	K.2.1
Squire	S		DC_M6925	UCS	K.2.1
St Clair	Joseph		DC_M3235	UCS	K.2.1
St. Clair	Taylor		DC_M2783	UCS	K.2.1
St. Cyr	Jeanne		DC_M6528	UCS	K.2.1
St. Jean	Constance		DC_M0186		K.3.2, K.3.14
St. Louis	Marsha		DC_M5072	UCS	K.2.1
St. Pierre	Leslie		DC_M4670	UCS	K.2.1
St. Pierre	Leslie		DC_M5479	UCS	K.2.1
Staaf	Linda		DC_M5816	UCS	K.2.1
Staats	Gwen		DC_M0786	UCS	K.2.1
Stacey	McRae		DC_M3822	UCS	K.2.1
Stackkman	Marshall S		DC_M2221	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Stafford	Nathaniel		DC_M7583	UCS	K.2.1
Stafford	Venus		DC_M5267	UCS	K.2.1
Stahl	Charlotte		DC_M5576	UCS	K.2.1
Stahl	Jeffrey		DC_M4658	UCS	K.2.1
Stahl	Tashery		DC_M3488	UCS	K.2.1
Stahler	Alan		DC_PHO0005		K.3.3, K.3.11, K.3.13, K.3.15
Stahlheber	Elaine Ann		DC_M7604	UCS	K.2.1
Stair	Judith		DC_M7057	UCS	K.2.1
Stakely	Rheua S.		DC_M3947	UCS	K.2.1
Staley	Claire		DC_M1132	UCS	K.2.1
Stallworth	Carol		DC_M0942	UCS	K.2.1
Stambaugh	Susan		DC_M5091	UCS	K.2.1
Stanback	Brad		DC_M6737	UCS	K.2.1
Standi	Ilona		DC_M1166	UCS	K.2.1
Standring	Patricia		DC_M4644	UCS	K.2.1
Standring	Patricia		DC_M4660	UCS	K.2.1
Stanfield	Edwin		DC_M5931	UCS	K.2.1
Stanfield	Gary		DC_M7334	UCS	K.2.1
Stanford	George		DC_E0098		K.3.10
Stankavage	JoAnn		DC_M4256	UCS	K.2.1
Stanley	Anie		DC_M4188	UCS	K.2.1
Stanton	Lisa		DC_M2721	UCS	K.2.1
Stanton	Staci		DC_M5585	UCS	K.2.1
Stanton	Staci		DC_M5608	UCS	K.2.1
Stanzione	Dawn		DC_M1988	UCS	K.2.1
Stark	Eleanor		DC_M5718	UCS	K.2.1
Starke-Livermore	Shanna		DC_M3173	UCS	K.2.1
Starr	Frank		DC_M6122	UCS	K.2.1
Starr	Jene'		DC_M1663	UCS	K.2.1
Starr	Julie		DC_M3190	UCS	K.2.1
Starrett	Nancy		DC_M7236	UCS	K.2.1
Stask	Diana		DC_M0790	UCS	K.2.1
Stassinos	Gerry		DC_M1105	UCS	K.2.1
Stately	Amber		DC_M2866	UCS	K.2.1
Statman	Paul		DC_M6631	UCS	K.2.1
Stauber	Della		DC_M3637	UCS	K.2.1
Stauber	Della		DC_M4896	UCS	K.2.1
Stauffer	Wendie		DC_M1884	UCS	K.2.1
Stavis	Alex		DC_M7659	UCS	K.2.1
Stearns	Luke		DC_M3381	UCS	K.2.1
Stebbins	Emma		DC_M2252	UCS	K.2.1
Stebler	Timothy		DC_M1720	UCS	K.2.1
Steele	Debbie		DC_M0404		K.2.1
Steele	Joanne		DC_M1608	UCS	K.2.1
Steele	Sharon		DC_M5813	UCS	K.2.1
Steen	Kevin		DC_M5527	UCS	K.2.1
Steensma	Monica		DC_M7615	UCS	K.2.1
Stefano	Courtney		DC_M4662	UCS	K.2.1
Steffy	Susan		DC_M3125	UCS	K.2.1
Stein	Diane		DC_M5475	UCS	K.2.1
Stein	Eric		DC_M2689	UCS	K.2.1
Stein	MaryJo		DC_M1331	UCS	K.2.1
Stein	Michael		DC_M7296	UCS	K.2.1
Steinbach	Kurt D		DC_M3202	UCS	K.2.1
Steinwinder	Eric		DC_M7635	UCS	K.2.1
Steitz	Martin		DC_M0041		K.2.1
Stenflo	Jan		DC_M1173	UCS	K.2.1
Stenger	Joseph		DC_M7854		K.2.1
Stepanski	D M		DC_M6884	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Stephanopoulos	Maria		DC_M1846	UCS	K.2.1
Stephanson	Sarah		DC_M2485	UCS	K.2.1
Stephens	Don		DC_E0262		K.4
Stephens	Maria		DC_M5772	UCS	K.2.1
Stephenson	John		DC_M1169	UCS	K.2.1
Steranko	Marilyn		DC_M2589	UCS	K.2.1
Stern	Annelore		DC_M0304		K.2.1
Stern	Joe		DC_E0197		K.3.1, K.3.11
Stern	Sue		DC_M3462	UCS	K.2.1
Stern	Susan		DC_M3370	UCS	K.2.1
Sternman	William		DC_M1270	UCS	K.2.1
Steussy	Helen		DC_M7761		K.2.1
Stevens	Anne		DC_E0255		K.3.2, K.3.11, K.3.12
Stevens	Daphne T.		DC_M0660		K.2.1
Stevens	Jessica		DC_M5811	UCS	K.2.1
Stevens	Paula		DC_M5218	UCS	K.2.1
Steward	R M		DC_M5254	UCS	K.2.1
Stewart	Carrie L.		DC_M4036	UCS	K.2.1
Stewart	Glenn		DC_M3992	UCS	K.2.1
Stewart	Jeffery		DC_M5674	UCS	K.2.1
Stewart	John		DC_M7937		K.3.2, K.3.7, K.3.10, K.3.13, K.3.15
Stewart	June		DC_M4131	UCS	K.2.1
Stewart	Richard		DC_M1189	UCS	K.2.1
Stewart	Robert and Linda		DC_M1895	UCS	K.2.1
Sthokal	Randy		DC_M5830	UCS	K.2.1
Stiegleiter	Stacy		DC_M0590		K.2.1
Stiegler	Kristen		DC_M5635	UCS	K.2.1
Stienman	Michael		DC_M6811	UCS	K.2.1
Stine	William		DC_M1856	UCS	K.2.1
Stinnett	Brian		DC_M0675		K.2.1
Stinson-Hawn	Kim		DC_M0747		K.2.1
Stirba	Clifford		DC_M0185		K.3.14
Stires	Rondi		DC_M5546	UCS	K.2.1
Stock	Janalee		DC_M5630	UCS	K.2.1
Stock	Stephanie		DC_M6767	UCS	K.2.1
Stockbridge	Miriam		DC_M0295		K.3.1, K.3.2, K.3.11, K.3.12
Stocks	Jackie		DC_M5896	UCS	K.2.1
Stocks	Peter		DC_M2486	UCS	K.2.1
Stockton	Daniel		DC_M4057	UCS	K.2.1
Stoffel	Patrick		DC_M4231	UCS	K.2.1
Stoffer	Ted		DC_M1074	UCS	K.2.1
Stofiel	Mike		DC_M0446		K.2.1
Stojak	Mark		DC_M5272	UCS	K.2.1
Stoll	Colin		DC_M7480	UCS	K.2.1
Stollenwerk	Scott		DC_M5919	UCS	K.2.1
Stone	Albert		DC_M5707	UCS	K.2.1
Stone	Benjamin		DC_M6720	UCS	K.2.1
Stone	Gaynell		DC_M7249	UCS	K.2.1
Stone	George T.		DC_M0551		K.2.1
Stone	Jill M.		DC_M7038	UCS	K.2.1
Stone	Meredith		DC_M1505	UCS	K.2.1
Stonebraker	Alyson		DC_M6460	UCS	K.2.1
Stoops	Donald		DC_M3020	UCS	K.2.1
Stoor	April		DC_M1055	UCS	K.2.1
Storino	Michael		DC_M0868	UCS	K.2.1
Storm	Tessa		DC_M3489	UCS	K.2.1
Stosch	William		DC_M4594	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Stoudt	John		DC_M1797	UCS	K.2.1
Stoughton	MaryLouise		DC_M2270	UCS	K.2.1
Stout	Chuck		DC_M0596		K.2.1
Stowe	Jane		DC_M3976	UCS	K.2.1
Strachan	Don		DC_M0065		K.2.1
Strange	Linda		DC_M0762		K.2.1
Strasser	Bob		DC_M1383	UCS	K.2.1
Stratton	Jewels		DC_M1442	UCS	K.2.1
Straub	Caroline		DC_M0365		K.2.1
Straub	Caroline		DC_M1763	UCS	K.2.1
Straub	Gwen Pallante		DC_M5075	UCS	K.2.1
Strauss	Julie		DC_M6005	UCS	K.2.1
Strebeck	Robert		DC_M7404	UCS	K.2.1
Strehlow	Laura		DC_M7366	UCS	K.2.1
Strickland	Jennifer		DC_M4395	UCS	K.2.1
Strini	Thomas		DC_M3671	UCS	K.2.1
Strobel	Melissa		DC_M6625	UCS	K.2.1
Stroecker	Linda		DC_M4984	UCS	K.2.1
Strong	Ann		DC_M1632	UCS	K.2.1
Strother	Gordon		DC_M4052	UCS	K.2.1
Stroud	Sally		DC_M1090	UCS	K.2.1
Stroupe	Kerri		DC_M3213	UCS	K.2.1
Strouts	LM		DC_M7267	UCS	K.2.1
Strum	Daniel		DC_M6488	UCS	K.2.1
Struthers	Sue		DC_M3240	UCS	K.2.1
Stryker	Vic		DC_M0630		K.2.1
Stuart	Anne		DC_M1812	UCS	K.2.1
Stuart	Glenn		DC_M4483	UCS	K.2.1
Stuart	Peter	Vicky Stuart	DC_M1264	UCS	K.2.1
Stubblefield	Adrian		DC_M2336	UCS	K.2.1
Stubblefield	Kerri		DC_M4630	UCS	K.2.1
Stucke	Harriet		DC_M1172	UCS	K.2.1
Stucklen	Claire		DC_M6031	UCS	K.2.1
Studtmann	David		DC_M0636		K.2.1
Stull	Rita		DC_M2629	UCS	K.2.1
Stuphin	Madelaine		DC_M0836	UCS	K.2.1
Sturges	Laurel C.		DC_M7096	UCS	K.2.1
Sturgill	Michele		DC_M5083	UCS	K.2.1
Sturm	Lois		DC_M7251	UCS	K.2.1
Sturnick	Mark		DC_M0284		K.3.10, K.3.14
Sudbury	Heather		DC_M7914		K.2.1
Sudderth	Philip R.		DC_M6970	UCS	K.2.1
Sugar	Anne		DC_M6821	UCS	K.2.1
Suhr	Linda		DC_M3245	UCS	K.2.1
Sukolsky	Brad		DC_M3385	UCS	K.2.1
Sulak	Dustin		DC_M7082	UCS	K.2.1
Sulanke	Thom		DC_M0306		K.2.1
Sullivan	Daniel		DC_M2890	UCS	K.2.1
Sullivan	Daniel		DC_M2891	UCS	K.2.1
Sullivan	Kristin		DC_M2542	UCS	K.2.1
Sullivan	Lauren		DC_M3952	UCS	K.2.1
Sullivan	M.C.		DC_M0430		K.2.1
Sullivan	Neil		DC_M3808	UCS	K.2.1
Sulock	Dorothy		DC_M4462	UCS	K.2.1
Sulzman	Christina		DC_M6905	UCS	K.2.1
Sumii	Miya		DC_M0052		K.2.1
Summer	Rebecca		DC_M4992	UCS	K.2.1
Summers	JR		DC_M7265	UCS	K.2.1
Summers	Mary		DC_M0800	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Sumner	Noreen		DC_E0146		K.2.2
Sun	Nida		DC_M2580	UCS	K.2.1
Sundberg	Clifford		DC_M7928		K.2.3
Sunderman	Carole		DC_M0047		K.2.2
Sundquist	Eric		DC_M5558	UCS	K.2.1
Sundquist	Sunny		DC_M5495	UCS	K.2.1
Sunflame	Brigit		DC_M7749		K.2.1
Sunshine	Jane		DC_M4867	UCS	K.2.1
Supernant	Rachel		DC_M1246	UCS	K.2.1
Surette	John		DC_M2399	UCS	K.2.1
Surprenant	Rachel		DC_M0499		K.2.1
Susan	McMillan		DC_M0852	UCS	K.2.1
Susman	Millard		DC_E0096		K.3.2, K.3.4, K.3.7, K.3.10, K.3.11, K.3.13
Sutaria	Shreeraj		DC_M5998	UCS	K.2.1
Sutcliffe	Renae		DC_M5626	UCS	K.2.1
Suter	Emanuel		DC_M0329		K.2.1
Sutherland	Laura		DC_M2100	UCS	K.2.1
Sutliffe	Pat		DC_M1002	UCS	K.2.1
Sutphin	Andrew		DC_M4941	UCS	K.2.1
Sutton	Claudette		DC_M3661	UCS	K.2.1
Sutton	Ellyn		DC_M4226	UCS	K.2.1
Sutton	JoAnne		DC_M4468	UCS	K.2.1
Svoboda	Michael		DC_M6278	UCS	K.2.1
Swab	Leah		DC_M2233	UCS	K.2.1
Swan	Charles		DC_E0025		K.2.2
Swanick	Theresa		DC_M4049	UCS	K.2.1
Swank	Bonnie		DC_M7291	UCS	K.2.1
Swank	Phyllis		DC_M3851	UCS	K.2.1
Swanson	Erik		DC_M3005	UCS	K.2.1
Swanson	Michael		DC_M7709		K.2.1
Swanson	Miriam		DC_M2796	UCS	K.2.1
Swanson	Vanessa S		DC_M3137	UCS	K.2.1
Sward	Jean		DC_M0066		K.2.1
Sward	Leesa		DC_M7464	UCS	K.2.1
Swartz	Tony		DC_M5112	UCS	K.2.1
Sweeney	Ellen		DC_M7935		K.2.1
Sweeney	Katherine		DC_M5426	UCS	K.2.1
Sweet	Grace		DC_M7280	UCS	K.2.1
Sweetser	Thomas		DC_E0241		K.2.2
Swei	Andrea		DC_M7946		K.2.3
Sweitzer	Hannah		DC_M2153	UCS	K.2.1
Swenson	Gordon J.		DC_M4187	UCS	K.2.1
Swida	M		DC_M2472	UCS	K.2.1
Swida	M		DC_M2479	UCS	K.2.1
Swift	Ronna J.		DC_M7660	UCS	K.2.1
Swindlehurst	Susan		DC_M3013	UCS	K.2.1
Swoboda	Lois		DC_M5877	UCS	K.2.1
Swyers	Nancy		DC_M2213	UCS	K.2.1
Syed	Amina		DC_M1752	UCS	K.2.1
Sykes	Chris		DC_M2918	UCS	K.2.1
Sylvester	Stephen		DC_M4703	UCS	K.2.1
Syres	Matthew		DC_M7561	UCS	K.2.1
Szalay	Amy		DC_M5981	UCS	K.2.1
Szendroi	Annamaria		DC_M4552	UCS	K.2.1
Szpanelewski	Cynthia		DC_M3208	UCS	K.2.1
T	Nancy		DC_M2113	UCS	K.2.1
Tabachnick	Paul		DC_M5251	UCS	K.2.1
Tabb	Linda		DC_M1671	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Tabor	Jeremy		DC_M7895		K.2.3
Tackes	Jim	Rosemary Tackes	DC_E0210		K.2.2
Taggart	Carol J.		DC_M1582	UCS	K.2.1
Taggert	Deborah		DC_M4583	UCS	K.2.1
Taglienti	Richard		DC_M6657	UCS	K.2.1
Tait	David		DC_M6596	UCS	K.2.1
Takagi	Richard		DC_M3960	UCS	K.2.1
Takatsch	Julie		DC_M5473	UCS	K.2.1
Talbot	Ashley		DC_M3136	UCS	K.2.1
Talbot	Nancy		DC_M2156	UCS	K.2.1
Talbott	Debbie		DC_M4731	UCS	K.2.1
Tallerinio	Eugene		DC_M3818	UCS	K.2.1
Tallerino	Carole		DC_M3830	UCS	K.2.1
Tallerino	Toni		DC_M6334	UCS	K.2.1
Talley	Tamera		DC_M6298	UCS	K.2.1
Tallow	Samuel		DC_M7341	UCS	K.2.1
Talmage	Elizabeth		DC_M5638	UCS	K.2.1
Talmage	Taormina		DC_M7253	UCS	K.2.1
Tamm	Ryan		DC_M3592	UCS	K.2.1
Tamres	Marilyn		DC_M3253	UCS	K.2.1
Tan	Frances		DC_M2840	UCS	K.2.1
Tang	Amy		DC_M7732		K.2.1
Tang	Henry		DC_M7425	UCS	K.2.1
Tanke	John		DC_M4619	UCS	K.2.1
Tannenbaum	Stanley		DC_M0291		K.3.2, K.3.10, K.3.13, K.3.14
Tansy	Kelly		DC_M6146	UCS	K.2.1
Tante	Carole		DC_M4886	UCS	K.2.1
Tao	Kazuko		DC_M5528	UCS	K.2.1
Tapp	Jack		DC_M2189	UCS	K.2.1
Tarajkowski	Lila		DC_M4884	UCS	K.2.1
Tarajkowski	Lila		DC_M6801	UCS	K.2.1
Taranow	Gerda		DC_M5001	UCS	K.2.1
Tarasoff	Norine		DC_M0973	UCS	K.2.1
Tardino-Hemerlein	Jeri		DC_M3157	UCS	K.2.1
Targon	Elvira		DC_M5457	UCS	K.2.1
Targon	Leah		DC_M2420	UCS	K.2.1
Tarnowski	Lori		DC_M1832	UCS	K.2.1
Tate	Carrie		DC_M4171	UCS	K.2.1
Tatum	Jim		DC_M4762	UCS	K.2.1
Tatum	Nadine		DC_M4582	UCS	K.2.1
Taulman	Janine		DC_M6629	UCS	K.2.1
Tava	Jennifer		DC_M2753	UCS	K.2.1
Tayler-Houle	Catherine		DC_M0628		K.2.1
Tayler-Houle	Catherine		DC_M1905	UCS	K.2.1
Taylor	Aileen		DC_M5940	UCS	K.2.1
Taylor	Carolyn		DC_M3817	UCS	K.2.1
Taylor	Carolyn		DC_M7829		K.2.1
Taylor	Diane		DC_M2187	UCS	K.2.1
Taylor	Karen		DC_M3436	UCS	K.2.1
Taylor	Kristina		DC_M4217	UCS	K.2.1
Taylor	Lee		DC_M3896	UCS	K.2.1
Taylor	Linda		DC_M0947	UCS	K.2.1
Taylor	Pamela		DC_M5537	UCS	K.2.1
Taylor	Patricia		DC_M0943	UCS	K.2.1
Taylor	Quinn		DC_M6292	UCS	K.2.1
Taylor	Robyn		DC_M2115	UCS	K.2.1
Taylor	Sarah		DC_M2919	UCS	K.2.1
Taylor	Sherry Horne		DC_M1592	UCS	K.2.1
Taylor	Sherry Horne		DC_M7178	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Taylor	William		DC_M4366	UCS	K.2.1
Taylor	Willie		DC_M0275	United States Department of the Interior	K.5
Teach	Erika		DC_M4414	UCS	K.2.1
Teasley	Regi		DC_M1824	UCS	K.2.1
Teasley	William		DC_M3131	UCS	K.2.1
Teglkamp	Lone		DC_M2991	UCS	K.2.1
Temple	Rob		DC_M0353		K.2.1
Templin	Orletta		DC_M4909	UCS	K.2.1
TenBrook	Jonathan		DC_M6691	UCS	K.2.1
Tennant	Eileen		DC_M1437	UCS	K.2.1
Tennyson	Sharon		DC_M3720	UCS	K.2.1
Tepe	Z		DC_M7221	UCS	K.2.1
Terhark	Theresa		DC_M6995	UCS	K.2.1
Teri	Michele		DC_M1545	UCS	K.2.1
Terra	Aileen		DC_M6012	UCS	K.2.1
Terrell	Melanie		DC_M0905	UCS	K.2.1
Terry	Darlene		DC_M7542	UCS	K.2.1
Terry	Judith L.		DC_M7368	UCS	K.2.1
Terry	Terelle		DC_M3918	UCS	K.2.1
Teshu	Susan		DC_M0837	UCS	K.2.1
Tessnow	Heike		DC_M5103	UCS	K.2.1
Testolin	Angela		DC_M7533	UCS	K.2.1
Tettlebaum	Ben		DC_M2370	UCS	K.2.1
Teutsch	Sallie		DC_M0413		K.2.1
Thatcher	Diana L.		DC_M6562	UCS	K.2.1
Thau	Paul		DC_M2715	UCS	K.2.1
Theresa	Futroye-Micus		DC_M0013		K.3.1, K.3.11, K.3.12
Therese	Maria		DC_M5770	UCS	K.2.1
Therien	Warren		DC_M3722	UCS	K.2.1
Thibodeaux	David		DC_M0308		K.2.1
Thie	Julia		DC_M2552	UCS	K.2.1
Thiele	B.F.		DC_M4526	UCS	K.2.1
Thiesen	Lauren		DC_M4070	UCS	K.2.1
this section blank			DC_M5407	UCS	K.2.1
Thom	Arleen		DC_M1317	UCS	K.2.1
Thom	Arleen		DC_M6315	UCS	K.2.1
Thomas	Autumn		DC_M4786	UCS	K.2.1
Thomas	Betty		DC_M3799	UCS	K.2.1
Thomas	Cathy L.		DC_M0865	UCS	K.2.1
Thomas	Cynthia		DC_E0213		K.2.2
Thomas	Dennis		DC_M0259		K.3.7, K.3.14, K.3.15
Thomas	Dennis		DC_M1550	UCS	K.2.1
Thomas	Dennis		DC_M1703	UCS	K.2.1
Thomas	Donna		DC_M1967	UCS	K.2.1
Thomas	Erika J.		DC_M7624	UCS	K.2.1
Thomas	Helen		DC_M5359	UCS	K.2.1
Thomas	Helen		DC_M7351	UCS	K.2.1
Thomas	J		DC_M4932	UCS	K.2.1
Thomas	Jennifer		DC_M1728	UCS	K.2.1
Thomas	Joseph		DC_M3923	UCS	K.2.1
Thomas	Karam		DC_M4683	UCS	K.2.1
Thomas	Kathryn		DC_M3083	UCS	K.2.1
Thomas	Kevin		DC_M7283	UCS	K.2.1
Thomas	Kimberley		DC_M6426	UCS	K.2.1
Thomas	Larry		DC_M1527	UCS	K.2.1
Thomas	Pamala		DC_M5599	UCS	K.2.1
Thomas	Rebecca		DC_M0672		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Thomas	Rick		DC_PHO0033		K.3.2, K.3.3, K.3.9, K.3.10
Thomas	Robert		DC_M5477	UCS	K.2.1
Thomas	Rory		DC_M0647		K.2.1
Thomas	Susan		DC_M4871	UCS	K.2.1
Thomas	Thomas		DC_M2503	UCS	K.2.1
Thomas	Toni		DC_M5137	UCS	K.2.1
Thomas	WEG		DC_M4010	UCS	K.2.1
Thomas	Yvonne		DC_M0920	UCS	K.2.1
Thomasson	Catherine		DC_E0402	Oregon Physicians for Social Responsibility	K.3.2, K.3.3, K.3.5, K.3.10, K.3.11, K.3.15, K.4
Thompsen	Kara		DC_M7362	UCS	K.2.1
Thompson	Alexis		DC_M2810	UCS	K.2.1
Thompson	Alice		DC_M4263	UCS	K.2.1
Thompson	Brian		DC_M1685	UCS	K.2.1
Thompson	Cheryl		DC_M3251	UCS	K.2.1
Thompson	Donna		DC_M7045	UCS	K.2.1
Thompson	Elaine		DC_M0440		K.2.1
Thompson	Elaine		DC_M7185	UCS	K.2.1
Thompson	Eric		DC_M0495		K.2.1
Thompson	Heidi		DC_M0926	UCS	K.2.1
Thompson	Howard		DC_M3438	UCS	K.2.1
Thompson	Joseph		DC_M0612		K.2.1
Thompson	Karen		DC_M6642	UCS	K.2.1
Thompson	Larry		DC_M7488	UCS	K.2.1
Thompson	Leslie		DC_M4650	UCS	K.2.1
Thompson	Linda I.		DC_M5269	UCS	K.2.1
Thompson	Linda I.		DC_M7673	UCS	K.2.1
Thompson	Marianne		DC_M4898	UCS	K.2.1
Thompson	Mary		DC_M6105	UCS	K.2.1
Thompson	Mary K		DC_M3413	UCS	K.2.1
Thompson	Scott		DC_M1864	UCS	K.2.1
Thompson	Stephen		DC_M5233	UCS	K.2.1
Thompson	Wayne		DC_M2751	UCS	K.2.1
Thompson-Wilding	Ann		DC_M6710	UCS	K.2.1
Thomson	Armida		DC_M6111	UCS	K.2.1
Thomson	Scott		DC_M1909	UCS	K.2.1
Thorman	Dorothy		DC_M0271		K.3.2, K.3.14
Thorne	Eve		DC_M5077	UCS	K.2.1
Thorne	Marisa		DC_M6839	UCS	K.2.1
Thornhill	CP		DC_M5180	UCS	K.2.1
Thoron	Janeth		DC_M6860	UCS	K.2.1
Thorp	John K.		DC_M7639	UCS	K.2.1
Thorpe	Y. Sue		DC_E0430		K.2.2
Thulin	Frederick		DC_M5461	UCS	K.2.1
Thyme	Lauren		DC_M0318		K.2.1
Tibbits	Greg		DC_M4790	UCS	K.2.1
Ticktin	Estelle		DC_M0557		K.2.1
Tidd	Amy		DC_M6609	UCS	K.2.1
Tidd	Robert		DC_M2905	UCS	K.2.1
Tifford	Paul		DC_M3463	UCS	K.2.1
Tilley	Merritt E.		DC_M5715	UCS	K.2.1
Tillotson	Christina		DC_M7941		K.2.1
Timmons	James		DC_M7885		K.2.1
Tindall	Heather		DC_M7524	UCS	K.2.1
Tindall-Gibson	Rosemary		DC_M6981	UCS	K.2.1
Tipp	L. Ilona		DC_M0850	UCS	K.2.1
Tirone	Paris		DC_M6637	UCS	K.2.1
Tizard	Thomas		DC_M6425	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Tjessem	Sandra		DC_M3492	UCS	K.2.1
Toal	Christopher		DC_M0915	UCS	K.2.1
Todd	Kalita		DC_M3922	UCS	K.2.1
Todirita	Katherine		DC_M2290	UCS	K.2.1
Tognoli	Stephen		DC_M4168	UCS	K.2.1
Tokugawa	Diane		DC_M3077	UCS	K.2.1
Tokuyasu	Taku		DC_M1693	UCS	K.2.1
Tomac	Helen		DC_M5776	UCS	K.2.1
Tomaro	Daniel		DC_M3668	UCS	K.2.1
Tomczak	L		DC_M3675	UCS	K.2.1
Tomkiel	Stanley		DC_M7909		K.2.1
Tomkosky	Lisa		DC_M4764	UCS	K.2.1
Tomkosky	Lisa		DC_M4788	UCS	K.2.1
Tomlin	Patricia		DC_M6630	UCS	K.2.1
Tomlinson	Philip		DC_M7692		K.2.1
Tompkins	Amy		DC_M1742	UCS	K.2.1
Tompkins	John		DC_M0705		K.2.1
Tonningsen	Barbara	Ed Tonningsen	DC_M7435	UCS	K.2.1
Toobert	Michael		DC_M7079	UCS	K.2.1
Toot	Erin		DC_M3950	UCS	K.2.1
Topper	Gwen		DC_M0999	UCS	K.2.1
Torrance	Jerry		DC_M1723	UCS	K.2.1
Torres	Arturo		DC_M4697	UCS	K.2.1
Torres	Priscilla		DC_M6487	UCS	K.2.1
Torres	Susan		DC_M1094	UCS	K.2.1
Torres	Veronica		DC_M7208	UCS	K.2.1
Tostenson	Kim		DC_M2916	UCS	K.2.1
Tostenson	Kim		DC_M2917	UCS	K.2.1
Tostenson	Kim		DC_M5402	UCS	K.2.1
Townsend	Darlene		DC_M4376	UCS	K.2.1
Townsend	Kristine		DC_M1862	UCS	K.2.1
Townsend	Marti		DC_PHO0048		K.3.15, K.4
Townsend	Patricia A.		DC_M0991	UCS	K.2.1
Towson	Roger		DC_M0451		K.2.1
Trachsel	Gay		DC_M2758	UCS	K.2.1
Tracy	Julia		DC_M0871	UCS	K.2.1
Trail	Pepper		DC_M3165	UCS	K.2.1
Trainor	Jean		DC_M1273	UCS	K.2.1
Trammell	Ryan		DC_M0619		K.2.1
Tran	Thuha		DC_M2053	UCS	K.2.1
Trau	Candis		DC_M2004	UCS	K.2.1
Traversa	Catherine		DC_M4235	UCS	K.2.1
Traversa	Stephanie		DC_M1882	UCS	K.2.1
Travis-Morgan	Donna Mae		DC_M6373	UCS	K.2.1
Treadway	Richard		DC_M6430	UCS	K.2.1
Trehan	Indi		DC_M7367	UCS	K.2.1
Tremaine	Katie		DC_M6799	UCS	K.2.1
Tremper	Clare		DC_M7478	UCS	K.2.1
Tremper	Irene		DC_M6772	UCS	K.2.1
Trepes	Karen		DC_M6838	UCS	K.2.1
Trevino	Alicia		DC_M2269	UCS	K.2.1
Trewet	Claudia		DC_M2554	UCS	K.2.1
Tribble	Kassandra		DC_M0860	UCS	K.2.1
Trice	Richard		DC_M1594	UCS	K.2.1
Trigg	George		DC_M0324		K.2.1
Trinkala	Michael J.		DC_M5084	UCS	K.2.1
Trinkner	Clarence		DC_M6899	UCS	K.2.1
Trinkner	Clarence		DC_M6932	UCS	K.2.1
Trione	Edward		DC_M7233	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Trippe	Thomas		DC_M1698	UCS	K.2.1
Trouve	Annie		DC_M4246	UCS	K.2.1
Troyano	Paul		DC_M5920	UCS	K.2.1
Truax	Wayne		DC_M5884	UCS	K.2.1
Trufan	Hal		DC_M3857	UCS	K.2.1
Trujillo	Sharon R.		DC_M1940	UCS	K.2.1
Trull	Joe		DC_M5195	UCS	K.2.1
Trumbull	Erica		DC_M3186	UCS	K.2.1
Trumpp	Leon		DC_M2655	UCS	K.2.1
Trupp	Arthur		DC_M0695		K.2.1
Trupp	Arthur		DC_M4891	UCS	K.2.1
Trupp	Arthur		DC_M4892	UCS	K.2.1
Trupp	Arthur		DC_M6953	UCS	K.2.1
Trutna	Tiana		DC_M2351	UCS	K.2.1
Trycinski	Nancy		DC_M3222	UCS	K.2.1
Tsai	Michael		DC_M1722	UCS	K.2.1
Tsai	Micheal		DC_M3032	UCS	K.2.1
Tsang	Sauwah		DC_M6156	UCS	K.2.1
Tschersich	Hans		DC_M0731		K.2.1
Tseu	Maria E.		DC_M2835	UCS	K.2.1
Tsuchiguchi	Kahn		DC_M3405	UCS	K.2.1
Tu	Alexander		DC_M7428	UCS	K.2.1
Tucci	Harry		DC_M1885	UCS	K.2.1
Tuck	Edward		DC_M4214	UCS	K.2.1
Tucker	Emil J.		DC_M3621	UCS	K.2.1
Tucker	Judi		DC_M0803	UCS	K.2.1
Tucker	Julia		DC_M5673	UCS	K.2.1
Tucker	Robb		DC_M4182	UCS	K.2.1
Tuff	Paul David		DC_M5399	UCS	K.2.1
Tullius	Michael		DC_M5757	UCS	K.2.1
Tummler	Janis		DC_M5751	UCS	K.2.1
Tunick	Janet		DC_M0067		K.2.1
Tuori	Katri		DC_M0644		K.2.1
Turk	Ann		DC_M1945	UCS	K.2.1
Turk	Christine		DC_M3588	UCS	K.2.1
Turk	Lawrence		DC_E0009		K.2.2
Turley	Lynne		DC_M5793	UCS	K.2.1
Turner	Allan		DC_M7576	UCS	K.2.1
Turner	Dan		DC_M6167	UCS	K.2.1
Turner	Kathleen Kaeding		DC_M6713	UCS	K.2.1
Turner	Lorna		DC_M1420	UCS	K.2.1
Turner	Mary		DC_M2117	UCS	K.2.1
Turner	Michael		DC_M7378	UCS	K.2.1
Turner	Paul		DC_M6532	UCS	K.2.1
Turner	Rene		DC_M3633	UCS	K.2.1
Turner	Susan		DC_M1480	UCS	K.2.1
Turnoy	David		DC_M4396	UCS	K.2.1
Turnwald	Brian		DC_M7790		K.2.3
Tursi	Patricia		DC_M1542	UCS	K.2.1
Tursman	Susan		DC_M2505	UCS	K.2.1
Turtle	C.M.		DC_M6374	UCS	K.2.1
Tusinac	Michele		DC_M1747	UCS	K.2.1
Tutihasi	R-Laurraine		DC_M2341	UCS	K.2.1
Tuttle	Therese		DC_M0655		K.2.1
Tuttle	William		DC_M5522	UCS	K.2.1
Twaddell	Cheryl		DC_M2949	UCS	K.2.1
Twerdochlib	Orysia		DC_M0342		K.2.1
Twitchell	Terry		DC_M5298	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Twombly	Janneke		DC_M3997	UCS	K.2.1
Twombly	Martha		DC_M0812	UCS	K.2.1
Tyler	Tim		DC_M4198	UCS	K.2.1
Tylor	Ronaye		DC_M3847	UCS	K.2.1
Tynan	Kathleen		DC_M1733	UCS	K.2.1
Tyree	Kathleen		DC_M1402	UCS	K.2.1
Ude	Cherie		DC_E0398		K.3.2, K.3.3, K.3.6, K.3.7, K.3.12, K.3.15
Udin	David		DC_M7602	UCS	K.2.1
Uharriet	Sarah		DC_M3455	UCS	K.2.1
Uhrhane	Eric		DC_M6224	UCS	K.2.1
Ullrey	Virginia Booz		DC_M4211	UCS	K.2.1
Ulmer	Victor	Mrs. Victor Ulmer	DC_M5976	UCS	K.2.1
Underland-Rosow	Vicki		DC_M3796	UCS	K.2.1
Ungar	Jonathan		DC_M1134	UCS	K.2.1
Unlisted	Proflaura		DC_M3666	UCS	K.2.1
Unruh	Larry A.		DC_M5741	UCS	K.2.1
Unruh	Roy		DC_M1288	UCS	K.2.1
Upp	James		DC_M3156	UCS	K.2.1
Upper	Elizabeth		DC_M7358	UCS	K.2.1
Urb	Johann		DC_M3315	UCS	K.2.1
Urban	James		DC_M1081	UCS	K.2.1
Urionabarrenetxea	Pedro M		DC_M7064	UCS	K.2.1
Urrutia	Jack		DC_M3287	UCS	K.2.1
Uszak	Dennis		DC_M1177	UCS	K.2.1
Utley	William		DC_M2869	UCS	K.2.1
Utzig	Albert		DC_M5639	UCS	K.2.1
Uwanawich	Dorothy		DC_M5451	UCS	K.2.1
Vagi	Brian		DC_M2451	UCS	K.2.1
Vaidya	Bhavna		DC_M0727		K.2.1
Vajames	Carole		DC_M4307	UCS	K.2.1
Valdez	Samuel		DC_M3724	UCS	K.2.1
Valentine	Diana		DC_M7193	UCS	K.2.1
Valerie	Argenal		DC_M0330		K.2.1
Vallentine	Jo		DC_E0301	People for Nuclear Disarmament	K.3.1, K.3.2, K.3.3, K.3.4, K.3.5, K.3.10, K.3.11, K.3.12, K.3.13, K.3.15
Vallery	Earl		DC_M2461	UCS	K.2.1
Valles	Gene		DC_M6149	UCS	K.2.1
Valyou	Lauren		DC_M7505	UCS	K.2.1
van Beelen	Norm		DC_M7406	UCS	K.2.1
Van Dam	Julie		DC_M3970	UCS	K.2.1
van Davis	Barbara		DC_M2654	UCS	K.2.1
van Davis	Jeffrey		DC_M2650	UCS	K.2.1
Van de Werken	Paula		DC_M7385	UCS	K.2.1
Van den Pol	Gie		DC_M0288		K.3.14
Van der Horst	Mary Claire		DC_M6424	UCS	K.2.1
Van der Veen	Benjamin		DC_M5937	UCS	K.2.1
van Eyk	Diana		DC_M0862	UCS	K.2.1
Van Hart	Parker		DC_M1387	UCS	K.2.1
Van Horn	Dana		DC_M1744	UCS	K.2.1
Van Leunen	Alice		DC_M7417	UCS	K.2.1
Van Ness	Erin		DC_M0918	UCS	K.2.1
Van Schaick	Mary		DC_M6022	UCS	K.2.1
Van Schravendijk	Marie		DC_M5385	UCS	K.2.1
Van Wyck	Alison G.		DC_M4536	UCS	K.2.1
Vanasek	Melissa		DC_M2237	UCS	K.2.1
VanBrocklin	Jackie		DC_M0298		K.2.1
VanDame	Kathy		DC_M4515	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Vanderhoeven	Hetty		DC_M3473	UCS	K.2.1
Vanderleelie	Roy		DC_M4177	UCS	K.2.1
Vanderschaaf	Carol		DC_M6204	UCS	K.2.1
VanHorn-Bostwick	Erica		DC_M5744	UCS	K.2.1
VanHorne	Mark		DC_M5506	UCS	K.2.1
VanHouten	Eva		DC_M6969	UCS	K.2.1
VanTil	Evelyn		DC_M5617	UCS	K.2.1
VanTil	Evelyn		DC_M5620	UCS	K.2.1
VanValkinburgh	Liz		DC_M1269	UCS	K.2.1
Vapenik	Gene		DC_M0696		K.2.1
Varian	Linda		DC_M7375	UCS	K.2.1
Varjavand	Nahid		DC_M0642		K.2.1
Vars	Jacqueline		DC_M4228	UCS	K.2.1
Vasquez	Suzanna		DC_M4486	UCS	K.2.1
Vassilakidis	Marie Sophia		DC_M1258	UCS	K.2.1
Vassos	Angelo		DC_M3735	UCS	K.2.1
Vatcher	Dorothy		DC_M0450		K.2.1
Vaten	Sharon		DC_M1916	UCS	K.2.1
Vaughan	Karen		DC_M0755		K.2.1
Vaughn	James		DC_M0993	UCS	K.2.1
Vaughn	Keith		DC_M7376	UCS	K.2.1
Vaughn	Viki		DC_M1958	UCS	K.2.1
Vaught	Ronald		DC_M1736	UCS	K.2.1
Vayssieres	Marc		DC_M3091	UCS	K.2.1
Veach	Margaret		DC_M1768	UCS	K.2.1
Vedder	Barbara		DC_M3727	UCS	K.2.1
Vega	Selene		DC_M7476	UCS	K.2.1
Veiga	Linda		DC_M5596	UCS	K.2.1
Veirs	Scott		DC_M7707		K.2.1
Veith	Kenneth Warren		DC_M3611	UCS	K.2.1
Velev	Omourtag		DC_M0671		K.2.1
Veltfort	Leonore		DC_M0240	Women's International League for Peace and Freedom, United States Section	K.3.12, K.3.15
Veltri	Carlo		DC_M1313	UCS	K.2.1
Venema	Eve		DC_M4915	UCS	K.2.1
Venus	Pamela		DC_M7495	UCS	K.2.1
Veon	Mike		DC_M6654	UCS	K.2.1
Veras	Edward		DC_M3456	UCS	K.2.1
Verber	Jean	Judene Walsh, Rosalie Lauer	DC_E0378		K.3.2, K.3.3, K.3.7, K.3.11, K.3.12, K.3.15
Verchinski	Stephen		DC_M5771	UCS	K.2.1
Verdier	Bill		DC_M5502	UCS	K.2.1
Vergara	Julia		DC_M6293	UCS	K.2.1
Vermillion	Julianna		DC_M3653	UCS	K.2.1
Vern	Jane		DC_M6042	UCS	K.2.1
Veronelli	Vrobert		DC_M3040	UCS	K.2.1
Verrengia	A		DC_E0051		K.2.2
Verrill	Evelyn		DC_M5420	UCS	K.2.1
Vertrees	Gerald		DC_M3863	UCS	K.2.1
Vesely	Jane		DC_M7017	UCS	K.2.1
Vetter	Andrew		DC_M5568	UCS	K.2.1
Vice	Daniel		DC_M2675	UCS	K.2.1
Victor	Arisa		DC_M6407	UCS	K.2.1
Viehmann	Laura		DC_M4960	UCS	K.2.1
Vieira	David T.		DC_M6580	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Vierthaler	Cathy		DC_M4835	UCS	K.2.1
Viglia	Peter		DC_M5824	UCS	K.2.1
Viglia	Peter A.		DC_M6894	UCS	K.2.1
Viglietta	Keith		DC_M7387	UCS	K.2.1
Viken	Barbara		DC_M7157	UCS	K.2.1
Vilano	Patrick		DC_M5760	UCS	K.2.1
Villavicencio	Ricardo		DC_M1393	UCS	K.2.1
Villavicencio	Ricardo		DC_M4167	UCS	K.2.1
Villavicencio	Ricardo		DC_M6247	UCS	K.2.1
Viltoria	Kiss		DC_M2959	UCS	K.2.1
Vincent	Sarah		DC_M0889	UCS	K.2.1
Vines	Sarah		DC_M4815	UCS	K.2.1
Vinick	Martha		DC_M6666	UCS	K.2.1
Vinick	Martha Osborn		DC_E0322		K.3.2, K.3.3, K.3.4, K.3.6, K.3.11, K.3.12, K.3.13
Vining	Stewart		DC_M2286	UCS	K.2.1
Vinson	John		DC_M4272	UCS	K.2.1
Virgil	Philip		DC_M5405	UCS	K.2.1
Visakowitz	Susan		DC_M4714	UCS	K.2.1
Visci	Gina		DC_M6851	UCS	K.2.1
Visher	Elizabeth		DC_M0739		K.2.1
Vitale	Elizabeth		DC_M4621	UCS	K.2.1
Viveiros	George		DC_M3953	UCS	K.2.1
Vivian	Connolly		DC_M2518	UCS	K.2.1
Vogel	Nathan		DC_M5485	UCS	K.2.1
Vogel	Nathan		DC_M6885	UCS	K.2.1
Vogel	Suzanne		DC_M4735	UCS	K.2.1
Vogele	John		DC_M5766	UCS	K.2.1
Vogt	Rainbow		DC_M0516		K.2.1
Voight	Mary C.		DC_M6709	UCS	K.2.1
Volckhausen	David		DC_M4255	UCS	K.2.1
Volk	Karl		DC_M3201	UCS	K.2.1
Volkmer	Miriam A.		DC_M4751	UCS	K.2.1
Volling	Kathleen		DC_M3702	UCS	K.2.1
Volmensky	Vitaly		DC_M2994	UCS	K.2.1
Volodka	Algirdas		DC_M6658	UCS	K.2.1
Volpp	Kevin		DC_M6332	UCS	K.2.1
von Giebel	Robert G		DC_M2454	UCS	K.2.1
Von Lossberg	Ann		DC_M0921	UCS	K.2.1
von Platen	Brigitte		DC_M3874	UCS	K.2.1
von Schonfeld	Walter		DC_M2234	UCS	K.2.1
von Wendt	Katherine		DC_M5432	UCS	K.2.1
Vonn	Monty		DC_M5186	UCS	K.2.1
Vontilla	Steven		DC_M3153	UCS	K.2.1
Voorhies	Bill	Marilyn Voorhies	DC_M0187		K.3.14
Voorhies	Marylin	Bill Voorhies	DC_M5838	UCS	K.2.1
Voss	Barbara		DC_M7628	UCS	K.2.1
Voss	Barbara		DC_M7629	UCS	K.2.1
Voss	Betty		DC_E0263		K.2.2
Voss	Erika M.		DC_M5594	UCS	K.2.1
Vrecenak	Joanne		DC_M7026	UCS	K.2.1
Vredenburg	Vance		DC_M0817	UCS	K.2.1
Vuong	Ilene		DC_M5943	UCS	K.2.1
W	E		DC_M7814		K.2.1
W	Michelle		DC_M3471	UCS	K.2.1
W.	Rachel		DC_M0559		K.2.1
Wachowiak	Paul		DC_M3087	UCS	K.2.1
Wachsberger	Fredrica		DC_M4628	UCS	K.2.1
Waddell	Michael		DC_E0130		K.2.3

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Waddle	Lottie		DC_M7643	UCS	K.2.1
Wade	Andrea		DC_M1244	UCS	K.2.1
Wade	Jodi		DC_M7126	UCS	K.2.1
Wade	Lillian		DC_M3657	UCS	K.2.1
Wagener	Ben		DC_M1330	UCS	K.2.1
Wager	Ray		DC_M5336	UCS	K.2.1
Wager	Ray		DC_M7916		K.2.3
Wagner	Carol C.		DC_M7393	UCS	K.2.1
Wagner	Dr. GB		DC_M1932	UCS	K.2.1
Wagner	Elissa		DC_M3520	UCS	K.2.1
Wagner	James		DC_M1003	UCS	K.2.1
Wagner	John		DC_M2622	UCS	K.2.1
Wagner	Jon		DC_M7872		K.2.1
Wagner	Laurie		DC_M3811	UCS	K.2.1
Wagner	Linda		DC_M5648	UCS	K.2.1
Wagner	Lloyd		DC_M1825	UCS	K.2.1
Wagner	Melissa		DC_M1836	UCS	K.2.1
Wagner	Sandra		DC_M2378	UCS	K.2.1
Wahl	Emily		DC_M6155	UCS	K.2.1
Wahl	Jennifer		DC_M0400		K.2.1
Wahl	Richard		DC_M6387	UCS	K.2.1
Wahosi	Mare		DC_M6066	UCS	K.2.1
Waine	Linda		DC_M7508	UCS	K.2.1
Walden	Jeanette		DC_M1223	UCS	K.2.1
Walden	Jeanette		DC_M5424	UCS	K.2.1
Waldrip	William Mack		DC_M7067	UCS	K.2.1
Waldron	Laurie		DC_M4275	UCS	K.2.1
Waldron	Robert		DC_M5977	UCS	K.2.1
Wales	Christopher		DC_M7135	UCS	K.2.1
Walker	Augustus		DC_M6983	UCS	K.2.1
Walker	Birgit		DC_M1798	UCS	K.2.1
Walker	Dale		DC_M7153	UCS	K.2.1
Walker	Emily		DC_M1078	UCS	K.2.1
Walker	Graham		DC_M0081		K.2.1
Walker	John C		DC_M3095	UCS	K.2.1
Walker	Kay		DC_M6238	UCS	K.2.1
Walker	Lynn		DC_M6973	UCS	K.2.1
Walker	Matthew		DC_M0483		K.2.1
Walker	Michelle		DC_M2524	UCS	K.2.1
Walker	Raelene		DC_M3139	UCS	K.2.1
Walker	Thomas		DC_M0667		K.2.1
Walker	Todd		DC_M6021	UCS	K.2.1
Walker	Todd		DC_M6439	UCS	K.2.1
Wall	Carol S.		DC_M6573	UCS	K.2.1
Wall	Elizabeth		DC_M0687		K.2.1
Wall	Nancy		DC_M5649	UCS	K.2.1
Wall	Sheila		DC_M6759	UCS	K.2.1
Wall	Elizabeth		DC_M5873	UCS	K.2.1
Wall	Nancy		DC_M6948	UCS	K.2.1
Wallace	Gerald		DC_M1232	UCS	K.2.1
Wallace	Jenise		DC_M6937	UCS	K.2.1
Wallace	Kay		DC_M5408	UCS	K.2.1
Wallace	Nathan		DC_M4107	UCS	K.2.1
Wallander	Carl		DC_M6644	UCS	K.2.1
Waller	Carolyn		DC_M5828	UCS	K.2.1
Waller	Joan	Paul Waller	DC_M7588	UCS	K.2.1
Walrafen	Barbara		DC_M6541	UCS	K.2.1
Walsh	Ditra		DC_M2538	UCS	K.2.1
Walsh	Jane		DC_M4118	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Walsh	Terri		DC_M4061	UCS	K.2.1
Walter	Perianne		DC_M2309	UCS	K.2.1
Walter	William		DC_M0843	UCS	K.2.1
Waltermire	Virginia		DC_M5051	UCS	K.2.1
Wang	Harry		DC_E0418	PSR- Sacramento	K.3.3, K.3.4, K.3.5, K.3.11, K.3.13, K.3.15
Wang	Harry		DC_PHO0036	Physicians for Social Responsibility Sacramento, Physicians for 24 Social Responsibility	K.3.1, K.3.2, K.3.3, K.3.4, K.3.13, K.3.15
Wang	T.K.		DC_M5572	UCS	K.2.1
Wantanabe	Astrid		DC_M6829	UCS	K.2.1
Wanzer	Sidney		DC_M0141		K.3.2, K.3.14
Ward	Dennis		DC_M2870	UCS	K.2.1
Ward	Everett		DC_M2517	UCS	K.2.1
Ward	Faye		DC_M1769	UCS	K.2.1
Ward	Fred		DC_M0149		K.2.1
Ward	Greg		DC_E0180		K.3.2, K.3.13, K.3.14
Ward	Melanie		DC_M6275	UCS	K.2.1
Ward	Melanie		DC_M6277	UCS	K.2.1
Ward	Pamela		DC_M4987	UCS	K.2.1
Warden	Suzanne		DC_M3116	UCS	K.2.1
Ware	S.B.		DC_M4400	UCS	K.2.1
Waring	Robert		DC_M3030	UCS	K.2.1
Wark	Thomas E.		DC_M5419	UCS	K.2.1
Warner	Darryl		DC_E0295		K.2.3
Warner	Horace		DC_M5444	UCS	K.2.1
Warner	John		DC_M4433	UCS	K.2.1
Warner	Keith		DC_M0305		K.2.1
Warner	Peter		DC_M4012	UCS	K.2.1
Warner	Robert		DC_M7893		K.2.1
Warpehoski	Martha		DC_M4173	UCS	K.2.1
Warren	Christopher		DC_M3876	UCS	K.2.1
Warren	Ellen C.		DC_M6152	UCS	K.2.1
Warren	Jan		DC_M6784	UCS	K.2.1
Warren	John		DC_M5755	UCS	K.2.1
Warren	Lee		DC_M2830	UCS	K.2.1
Warren	Naomi		DC_M6607	UCS	K.2.1
Warren	Phyllis		DC_M2864	UCS	K.2.1
Warren	Roxanne		DC_M4982	UCS	K.2.1
Warren	Tiffany		DC_M6997	UCS	K.2.1
Warren	Viola		DC_M3334	UCS	K.2.1
Warschau	M.B.		DC_M2294	UCS	K.2.1
Wasamuth	Carol Ann	Imagene Warren, Connie Sonnen, Joan Smith, Meg Sass, Wilma Schlangen, Agnes Reichlin, Valine Kachelmier, Mildred Lustig, Bernie Ternes, A. Oakley, Cecile Uhlorn, Carm Ternes, Angela Uhlorn, Sylveria Heiand, Mercedes Martzen, Judith Brown	DC_M0069	Monastary of St. Gertrude	K.2.1
Wasfi	Dahlia		DC_E0026		K.3.12
Wasfi	Dahlia		DC_M1757	UCS	K.2.1
Wash	Thomas		DC_M0036		K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Washburn	Liz		DC_M1677	UCS	K.2.1
Washburn	Mark		DC_M2135	UCS	K.2.1
Wasser	Sarah		DC_M3622	UCS	K.2.1
Wassmuth	Carol Ann		DC_M4454	UCS	K.2.1
Waters	Patricia		DC_M3393	UCS	K.2.1
Waters	Shaun		DC_M0216		K.2.1
Watkins	Walter		DC_M2971	UCS	K.2.1
Watlington	Elton		DC_M7041	UCS	K.2.1
Watson	Angela		DC_M4267	UCS	K.2.1
Watson	Claire		DC_M6199	UCS	K.2.1
Watson	Jeff		DC_M3143	UCS	K.2.1
Watson	Sharon		DC_M0332		K.2.1
Watson	Warren		DC_M3498	UCS	K.2.1
Watt	J		DC_M4804	UCS	K.2.1
Watts	Elizabeth		DC_M0241		K.3.2, K.3.10, K.3.14
Watts	George		DC_M1717	UCS	K.2.1
Watts	Sarah		DC_M6354	UCS	K.2.1
Watts Jr	Weston A		DC_M2468	UCS	K.2.1
Waud	John		DC_M1875	UCS	K.2.1
Waugh	Marianne R.		DC_M4375	UCS	K.2.1
Waugh	Michael		DC_M0811	UCS	K.2.1
Wawrzyniak	Chad		DC_M2338	UCS	K.2.1
Wdowiak	David		DC_M5300	UCS	K.2.1
Weaver	Anne		DC_M2369	UCS	K.2.1
Weaver	Cheryl		DC_M5636	UCS	K.2.1
Weaver	Joe		DC_M2198	UCS	K.2.1
Weaver	Julene		DC_M7631	UCS	K.2.1
Webb	Gene		DC_M1379	UCS	K.2.1
Webb	H. Chandler		DC_M5667	UCS	K.2.1
Webb	John		DC_M1933	UCS	K.2.1
Webb	Mary Theresa		DC_E0116		K.3.14
Webb	Sheff		DC_M1298	UCS	K.2.1
Webber	Carroll		DC_E0007		K.3.2, K.3.4, K.3.10, K.3.11
Webber	Carroll		DC_E0221		K.3.2, K.3.11
Webber	Rita		DC_M3200	UCS	K.2.1
Weber	Kenneth		DC_M6739	UCS	K.2.1
Webster	Earlene		DC_M6346	UCS	K.2.1
Web-Walker	Tina		DC_M3171	UCS	K.2.1
Weggel	Robert		DC_M7811		K.2.1
Wehrer	Laurie		DC_M7553	UCS	K.2.1
Wehrle	Leroy S.		DC_M2048	UCS	K.2.1
Wehrli-Hemmeter	Ginny		DC_M5697	UCS	K.2.1
Weibel	Annemarie		DC_M6266	UCS	K.2.1
Weibert	Gary		DC_M3932	UCS	K.2.1
Weidner	Naomi		DC_M2329	UCS	K.2.1
Weiermann	Daniel		DC_M3844	UCS	K.2.1
Weigand	Christine		DC_M1641	UCS	K.2.1
Weigle	Elizabeth		DC_M2210	UCS	K.2.1
Weigner	Steven		DC_M0297	UCS	K.2.1
Weikal	William Byron		DC_M0198		K.2.1
Weiland	Alex		DC_M2204	UCS	K.2.1
Weiland	Sherry		DC_M4951	UCS	K.2.1
Weilenmann	Alex		DC_M3268	UCS	K.2.1
Weinberg	Louis		DC_M5023	UCS	K.2.1
Weiner	Lori		DC_M1005	UCS	K.2.1
Weininschke	Deborah		DC_M5480	UCS	K.2.1
Weinstein	David		DC_M7759		K.2.1
Weishaar	Jennifer M.		DC_M4637	UCS	K.2.1
Weiss	Ann		DC_M2307	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Weiss	Arleen		DC_M1479	UCS	K.2.1
Weiss	Benjamin L.		DC_M6758	UCS	K.2.1
Weiss	Dorthy		DC_M0023		K.3.7, K.3.11, K.3.12
Weiss	Ira		DC_M1114	UCS	K.2.1
Weiss	Judy		DC_M3476	UCS	K.2.1
Weiss	Marc		DC_M2592	UCS	K.2.1
Weisskirk	Lynne		DC_M0846	UCS	K.2.1
Weitkamp	Robert		DC_M5925	UCS	K.2.1
Weitzmann	Margaret		DC_E0300		K.3.2, K.3.3, K.3.11, K.3.12, K.3.13
Welch	Annette		DC_M7632	UCS	K.2.1
Welch	Sheila		DC_M2120	UCS	K.2.1
Welch	Tim		DC_M2631	UCS	K.2.1
Weldon	Laura		DC_M7025	UCS	K.2.1
Welford	Gabrielle		DC_M5602	UCS	K.2.1
Weller	Jacqueline		DC_M6210	UCS	K.2.1
Welles	Skip		DC_M2907	UCS	K.2.1
Wells	Jason		DC_M7191	UCS	K.2.1
Wells	Jennifer		DC_M4335	UCS	K.2.1
Wells	Jordan		DC_E0036		K.3.1, K.3.3, K.3.7, K.3.11, K.3.12
Wells	William		DC_M5375	UCS	K.2.1
Welsh	Larry		DC_M5108	UCS	K.2.1
Welter	Richard		DC_M3871	UCS	K.2.1
Wen	Frederick		DC_M4109	UCS	K.2.1
Wendel	Tara		DC_M7342	UCS	K.2.1
Wendt	Diana		DC_M1038	UCS	K.2.1
Wendt	Erin		DC_M4405	UCS	K.2.1
Wenner	Shirley L.		DC_M4088	UCS	K.2.1
Wentz	Candice		DC_E0066		K.3.1, K.2.2, K.3.3, K.3.7, K.3.11, K.3.15
Werner	Miriam		DC_M4499	UCS	K.2.1
Werner	Walter		DC_M5503	UCS	K.2.1
Wert	Dorean		DC_M6910	UCS	K.2.1
Werth	J.		DC_M4358	UCS	K.2.1
Werzinski	Joseph		DC_M2061	UCS	K.2.1
Wessbecher	Marlies		DC_M1968	UCS	K.2.1
Wessels	Rose		DC_M6360	UCS	K.2.1
Wessling	Nan		DC_M1503	UCS	K.2.1
West	John		DC_M5889	UCS	K.2.1
West	John		DC_M5891	UCS	K.2.1
West	Kathleen and Hans		DC_M3198	UCS	K.2.1
West	Mary		DC_E0230		K.3.2, K.3.3, K.3.7, K.3.11, K.3.15
West	Mary		DC_E0231		K.4
Westhafer	John		DC_M6566	UCS	K.2.1
Westman	Lisa		DC_M6440	UCS	K.2.1
Weston	Hugh		DC_M2196	UCS	K.2.1
Weston	Maria		DC_M0399		K.2.1
Westrate	Bea		DC_M2868	UCS	K.2.1
Whalen	Michael		DC_M7687		K.2.1
Whaley	Lorraine		DC_M0223		K.3.2, K.3.3, K.3.7, K.3.12, K.3.15
Wheeler	Breana		DC_M6154	UCS	K.2.1
Wheeler	Carolyn		DC_M2670	UCS	K.2.1
Wheeler	John		DC_M7864		K.2.1
Wheeler	Judith	Michael Wheeler	DC_M7444	UCS	K.2.1
Wheeler	Romona		DC_M1422	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Wheelock	Michael		DC_M5742	UCS	K.2.1
Whelan	Joseph		DC_E0209		K.3.3, K.3.12
Whipple	Wyman		DC_M6492	UCS	K.2.1
Whitacre	Donnella		DC_M4224	UCS	K.2.1
Whitbeck	Monte		DC_M2068	UCS	K.2.1
Whitcomb	Sarah-Elizabeth		DC_M1997	UCS	K.2.1
White	Cheryl		DC_M2276	UCS	K.2.1
White	Dave		DC_M4655	UCS	K.2.1
White	Eric		DC_M3509	UCS	K.2.1
White	Felice		DC_M5664	UCS	K.2.1
White	Galen		DC_E0228		K.2.2
White	Jane		DC_M2449	UCS	K.2.1
White	Jeffrey		DC_M3820	UCS	K.2.1
White	John		DC_M1615	UCS	K.2.1
White	Kathleen		DC_M0931	UCS	K.2.1
White	Lois		DC_M0448		K.2.1
White	Lois		DC_M3151	UCS	K.2.1
White	Marianne		DC_M6330	UCS	K.2.1
White	Rodney		DC_M4905	UCS	K.2.1
White	Sharlene		DC_M1595	UCS	K.2.1
White	Veda		DC_M3898	UCS	K.2.1
White	William		DC_M3279	UCS	K.2.1
White	William H.		DC_M4071	UCS	K.2.1
White	Steven		DC_M3352	UCS	K.2.1
White/Covey	Jean/George		DC_M2393	UCS	K.2.1
Whitecar	Deborah		DC_M1396	UCS	K.2.1
Whitehead	Betsy		DC_M3913	UCS	K.2.1
Whitehead	Rebecca R.		DC_M7364	UCS	K.2.1
Whitehead	Richard		DC_M4959	UCS	K.2.1
Whiteley	Emily C.		DC_M2941	UCS	K.2.1
Whitelock	Linda Lee		DC_M4309	UCS	K.2.1
Whitmont	Andrew		DC_M3345	UCS	K.2.1
Whitmore	Karen		DC_M0734		K.2.1
Whitmore	Ron		DC_M6340	UCS	K.2.1
Whitney	Diane		DC_M7241	UCS	K.2.1
Whittingham	Anne		DC_E0426		K.3.5, K.3.7, K.3.11, K.3.12, K.3.15
Whittington	Dana Thomas		DC_M2513	UCS	K.2.1
Wiatrowski	Sandra		DC_M5601	UCS	K.2.1
Wible	Karen		DC_M1466	UCS	K.2.1
Wick	Therese		DC_M5493	UCS	K.2.1
Wickersham	Laura		DC_M7127	UCS	K.2.1
Wicks	Nancy		DC_M5166	UCS	K.2.1
Wieland	A.H.		DC_M0706		K.2.1
Wieland	Molly		DC_M4388	UCS	K.2.1
Wiese	Ellen		DC_M6391	UCS	K.2.1
Wiese	Jennie		DC_M1883	UCS	K.2.1
Wiget	Francis		DC_M4672	UCS	K.2.1
Wiggers	Stewart		DC_M0663		K.2.1
Wiggers	Stewart		DC_M2786	UCS	K.2.1
Wiggins	Terry		DC_M6191	UCS	K.2.1
Wiggs	Steve		DC_M2974	UCS	K.2.1
Wight	Nelson		DC_M7353	UCS	K.2.1
Wightman	Jean		DC_M0197		K.2.1
Wilcox	Jill		DC_M6220	UCS	K.2.1
Wilcox	Linda		DC_M1802	UCS	K.2.1
Wilcox	Linda		DC_M1809	UCS	K.2.1
Wilcox	Molly		DC_E0102		K.2.2
Wilder	James P.		DC_M3647	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Wildern	Nancy		DC_M0021		K.3.12, K.3.13
Wildt	Ron		DC_M2172	UCS	K.2.1
Wiley	Michael R.		DC_M7259	UCS	K.2.1
Wilhelm	Janus		DC_M4736	UCS	K.2.1
Wilhelmi	Christy		DC_M1356	UCS	K.2.1
Wilkins	Erin		DC_M5181	UCS	K.2.1
Wilkins	Nilufer		DC_E0115		K.2.3
Wilkins	Paul		DC_M6065	UCS	K.2.1
Wilkinson	R. Allen		DC_M4517	UCS	K.2.1
Will	John		DC_M1566	UCS	K.2.1
Willams	Mark		DC_E0131		K.2.3
Willemsen	Micahel		DC_E0088	Revrend	K.2.2
Willey	Monique		DC_M2121	UCS	K.2.1
Willey	Paula		DC_M0265		K.3.2, K.3.3, K.3.15
Williams	Craig		DC_E0128		K.2.3
Williams	Cyndy		DC_M5441	UCS	K.2.1
Williams	David		DC_E0093		K.3.3, K.3.7
Williams	Diane M		DC_M2148	UCS	K.2.1
Williams	Elaine		DC_M0984	UCS	K.2.1
Williams	Elizabeth		DC_M1894	UCS	K.2.1
Williams	Garth		DC_M0363		K.2.1
Williams	Givhan		DC_M1203	UCS	K.2.1
Williams	Janet		DC_M3415	UCS	K.2.1
Williams	John		DC_M5242	UCS	K.2.1
Williams	Kelli		DC_M3002	UCS	K.2.1
Williams	Laurie		DC_M7281	UCS	K.2.1
Williams	Lora Marie		DC_M2229	UCS	K.2.1
Williams	Lynda		DC_E0394		K.2.2
Williams	Lynda		DC_M6693	UCS	K.2.1
Williams	Lynne		DC_M3053	UCS	K.2.1
Williams	Marilyn		DC_M0603		K.2.1
Williams	Mark		DC_E0377		K.2.3
Williams	Matthew		DC_M1020	UCS	K.2.1
Williams	Natasha		DC_M3800	UCS	K.2.1
Williams	P.		DC_M0188		K.3.1, K.3.2
Williams	Paul	Lynde Williams	DC_M6662	UCS	K.2.1
Williams	Sarah		DC_M1499	UCS	K.2.1
Williams	Seanna		DC_M4734	UCS	K.2.1
Williams	Stephen		DC_M3217	UCS	K.2.1
Williams	Stephen		DC_M4530	UCS	K.2.1
Williams	Terese		DC_M4709	UCS	K.2.1
Williams	Ursula		DC_M6159	UCS	K.2.1
Williams	Wayne		DC_M3515	UCS	K.2.1
Williams	Wyatt		DC_M3421	UCS	K.2.1
Williams-Chase	Jean		DC_M0651		K.2.1
Williamson	J.C.		DC_M3242	UCS	K.2.1
Williamson	Joan		DC_M0055		K.2.1
Williamson	Peter		DC_M7244	UCS	K.2.1
Williamson	Sandra		DC_M3180	UCS	K.2.1
Willing	Rick		DC_M0714		K.2.1
Willis	Christine		DC_M6697	UCS	K.2.1
Willis	Kristen		DC_M7275	UCS	K.2.1
Willis	Mary		DC_M5903	UCS	K.2.1
Willman	Rachel		DC_M1352	UCS	K.2.1
Willmott	Marian		DC_M7484	UCS	K.2.1
Willour	Judith		DC_M3718	UCS	K.2.1
Wills	Kathy		DC_M6702	UCS	K.2.1
Wills	Sherry		DC_M0024		K.2.2
Wilner	Lawrence		DC_M0194		K.3.14

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Wilson	CR		DC_M2109	UCS	K.2.1
Wilson	Eric		DC_M0452		K.2.1
Wilson	Erica		DC_M2398	UCS	K.2.1
Wilson	Faustine		DC_M6080	UCS	K.2.1
Wilson	Gaye		DC_M7028	UCS	K.2.1
Wilson	Heather		DC_M6227	UCS	K.2.1
Wilson	Jan		DC_M1326	UCS	K.2.1
Wilson	Jane		DC_M3446	UCS	K.2.1
Wilson	Jeff		DC_M6570	UCS	K.2.1
Wilson	Jerry		DC_M5303	UCS	K.2.1
Wilson	Jim		DC_M6682	UCS	K.2.1
Wilson	Kay		DC_M1063	UCS	K.2.1
Wilson	Lynn		DC_M7671	UCS	K.2.1
Wilson	Olive		DC_M0617		K.2.1
Wilson	Phillip		DC_M4825	UCS	K.2.1
Wilson	Phillip		DC_M4997	UCS	K.2.1
Wilson	Robert		DC_M6788	UCS	K.2.1
Wilson	Scott		DC_M7037	UCS	K.2.1
Wilson	Shana		DC_M7100	UCS	K.2.1
Wilson	Susan E.		DC_M5140	UCS	K.2.1
Wilson	Todd		DC_M3470	UCS	K.2.1
Wimbrow	Betsy		DC_M3475	UCS	K.2.1
Wine	Deborah		DC_M5647	UCS	K.2.1
Winer	Diana		DC_M5629	UCS	K.2.1
Wingeier	Douglas		DC_M4406	UCS	K.2.1
Winig	Guy		DC_M2395	UCS	K.2.1
Winkler	Renate		DC_M6324	UCS	K.2.1
Winnette	Julie		DC_M5890	UCS	K.2.1
Winslett	Paige		DC_M5916	UCS	K.2.1
Winter	Sandra		DC_M4495	UCS	K.2.1
Winterer	Jorg		DC_M5063	UCS	K.2.1
Wiorek	Mona		DC_M6450	UCS	K.2.1
Wischmann	Lesley		DC_M2720	UCS	K.2.1
Wise	Chad		DC_M5963	UCS	K.2.1
Wishingrad	Barbara		DC_M5727	UCS	K.2.1
Wisialowski	Bart		DC_M2932	UCS	K.2.1
Wisniewski	Gail		DC_M0468		K.2.1
Witback	Carol		DC_M5696	UCS	K.2.1
Witt	Brody		DC_M2750	UCS	K.2.1
Wittel	Lauren		DC_M5623	UCS	K.2.1
Wlodarek	Desiree		DC_M6877	UCS	K.2.1
Wodjenski	Joseph		DC_M1537	UCS	K.2.1
Woffard	William		DC_M6467	UCS	K.2.1
Wojciechowski	Stanley		DC_M2101	UCS	K.2.1
Wojkowski	Mary		DC_M7904		K.2.1
Woletz	Amanda		DC_M3575	UCS	K.2.1
Wolf	Diane		DC_E0044		K.3.1, K.3.11, K.3.12, K.3.15
Wolf	Lisa		DC_M7018	UCS	K.2.1
Wolf	Marty		DC_M5079	UCS	K.2.1
Wolf	Maxine Diane		DC_M0132		K.2.1
Wolf	Patty		DC_M1942	UCS	K.2.1
Wolf	Pauline		DC_M6297	UCS	K.2.1
Wolf	Susan		DC_M4888	UCS	K.2.1
Wolf	Sylvia	Leo Wolf	DC_M0142		K.2.1
Wolfe	Dolores		DC_M5156	UCS	K.2.1
Wolfe	John		DC_M2741	UCS	K.2.1
Wolfe	Judith		DC_M6569	UCS	K.2.1
Wolff	Daynna		DC_M5491	UCS	K.2.1
Wolff	Jean		DC_M2541	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Wolin	Jessica		DC_M7388	UCS	K.2.1
Woller	W.J.		DC_M5129	UCS	K.2.1
Woller	W.J.		DC_M5685	UCS	K.2.1
Wolters	Marilyn		DC_M7311	UCS	K.2.1
Wolters	Melvin		DC_M3887	UCS	K.2.1
Womble	Jeffrey Earl		DC_M6917	UCS	K.2.1
Wong	Teresa		DC_M6480	UCS	K.2.1
Wong	Teresa		DC_M6484	UCS	K.2.1
Woo	Howard		DC_M3815	UCS	K.2.1
Wood	Amanda		DC_M1801	UCS	K.2.1
Wood	Dayna		DC_M2228	UCS	K.2.1
Wood	Donald W.		DC_M6708	UCS	K.2.1
Wood	Jeremy		DC_M3606	UCS	K.2.1
Wood	Susan		DC_M3068	UCS	K.2.1
Woodard	Sarah F.		DC_M6750	UCS	K.2.1
Woodbury	Chad		DC_M6211	UCS	K.2.1
Woodbury	Mitchell		DC_M3249	UCS	K.2.1
Woodcock	Angela		DC_M6873	UCS	K.2.1
Woodfin	Jim		DC_M6358	UCS	K.2.1
Woodford	J.A.T.		DC_M3039	UCS	K.2.1
Woodhead	Nathaniel		DC_M5881	UCS	K.2.1
Woodruff	Cate		DC_M3688	UCS	K.2.1
Woods	Karla		DC_M7310	UCS	K.2.1
Woods	Linda L.		DC_M5600	UCS	K.2.1
Woods	Mark		DC_M1721	UCS	K.2.1
Woods	Terry		DC_M5447	UCS	K.2.1
Woods	James		DC_M4551	UCS	K.2.1
Woodside	Don		DC_E0268		K.2.2
Woodson	Kellie		DC_M3511	UCS	K.2.1
Woodson	Shaun		DC_M0492		K.2.1
Woodson	Shaun		DC_M4353	UCS	K.2.1
Woolwine	Mark		DC_M1085	UCS	K.2.1
Wooten	Sandra P		DC_M2703	UCS	K.2.1
Wootton	John		DC_M2107	UCS	K.2.1
Worden	Donna		DC_M5088	UCS	K.2.1
Worden	Jessica		DC_M0124		K.2.1
Worley	Janice		DC_M1446	UCS	K.2.1
Worthington	Lynne		DC_M2764	UCS	K.2.1
Woweries	Moni		DC_M7180	UCS	K.2.1
Wozinak	Susan		DC_M5878	UCS	K.2.1
Wozna	Robert E.		DC_M1278	UCS	K.2.1
Wright	Alan		DC_M5996	UCS	K.2.1
Wright	Christine		DC_M3639	UCS	K.2.1
Wright	David		DC_M1787	UCS	K.2.1
Wright	Eileen		DC_M7463	UCS	K.2.1
Wright	Jacob		DC_M0493		K.2.1
Wright	Janet		DC_M6060	UCS	K.2.1
Wright	Mark		DC_M7667	UCS	K.2.1
Wright	Max		DC_M5416	UCS	K.2.1
Wright	Meredith		DC_M7527	UCS	K.2.1
Wright	Michael		DC_M0049		K.2.1
Wright	Patricia		DC_M5440	UCS	K.2.1
Wright	Patti		DC_E0272		K.2.2
Wright	Ricky		DC_M7036	UCS	K.2.1
Wright	Timothy		DC_M7869		K.3.1, K.3.3, K.3.11, K.3.13
Wright-Kaiser	Carol		DC_M0912	UCS	K.2.1
Wrona	Dorothy		DC_M4464	UCS	K.2.1
Wrzesien	Sheetal		DC_M1483	UCS	K.2.1
Wrzesien	Sheetal		DC_M1484	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Wu	Sara		DC_M5843	UCS	K.2.1
Wyatt	Dorothy		DC_M4436	UCS	K.2.1
Wyatt	Margaret		DC_M3905	UCS	K.2.1
Wyatt	Margaret		DC_M3916	UCS	K.2.1
Wyatt	Maria		DC_M3333	UCS	K.2.1
Wyatt	Victoria		DC_M4448	UCS	K.2.1
Wychorski	Steven		DC_M1947	UCS	K.2.1
Wylie	Michael		DC_M1912	UCS	K.2.1
Wyness	Martin		DC_E0043		K.3.18
Wynn	Gareth		DC_M4557	UCS	K.2.1
Wynn	Jon		DC_M1587	UCS	K.2.1
Wynn	Tina		DC_M5206	UCS	K.2.1
Wyvekens	Nadja		DC_M6558	UCS	K.2.1
Wyzga	Gabriel		DC_M5066	UCS	K.2.1
Yakes	Steven		DC_M1850	UCS	K.2.1
Yakovakis	Andrea		DC_M3641	UCS	K.2.1
Yamada	Seiji		DC_PHO0043		K.3.5, K.3.6, K.3.11, K.3.12
Yamada	Seiji		DC_PHW0012		K.3.1, K.3.6, K.3.12, K.3.18
Yandle	Jo		DC_M6294	UCS	K.2.1
Yanez	Mario		DC_M2979	UCS	K.2.1
Yannell	Michael		DC_M5433	UCS	K.2.1
Yanoff	Steven		DC_M5047	UCS	K.2.1
Yarbrough	Jim		DC_M0038		K.2.2
Yarger	Andrea		DC_M5965	UCS	K.2.1
Yarger	James C.		DC_M2009	UCS	K.2.1
Yarrow	Arthur T		DC_M2137	UCS	K.2.1
Yasko	S.J.		DC_M5543	UCS	K.2.1
Yates	Nicholas		DC_M7122	UCS	K.2.1
Yeager	Will		DC_M5951	UCS	K.2.1
Yeargain	Greg		DC_M1334	UCS	K.2.1
Yearman	John		DC_E0273		K.3.1, K.3.10, K.3.13
Yeatman	Paula		DC_M3402	UCS	K.2.1
Yeo	Jeremy		DC_M0447		K.2.1
Yiannatji	Helen		DC_M1435	UCS	K.2.1
Yona NooN	Wendy		DC_M0712		K.2.1
York	Carole		DC_M3460	UCS	K.2.1
York	Linda		DC_M6523	UCS	K.2.1
York-Erwin	Nancy		DC_M1907	UCS	K.2.1
Young	Billie		DC_M0881	UCS	K.2.1
Young	Carl		DC_M2806	UCS	K.2.1
Young	Carl		DC_M4039	UCS	K.2.1
Young	Carroll		DC_M2199	UCS	K.2.1
Young	David		DC_M2430	UCS	K.2.1
Young	Ginger		DC_M5781	UCS	K.2.1
Young	Ginger		DC_M5782	UCS	K.2.1
Young	Graeme		DC_M7861		K.2.3
Young	Helen		DC_M0143		K.2.1
Young	J		DC_M5331	UCS	K.2.1
Young	Jane		DC_M5702	UCS	K.2.1
Young	Jock		DC_M1101	UCS	K.2.1
Young	Lois		DC_M5787	UCS	K.2.1
Young	Louise		DC_M4488	UCS	K.2.1
Young	Nancy		DC_M0528		K.2.1
Young	Shirley		DC_M3568	UCS	K.2.1
Young	Stephan		DC_PHO0003	Union of Concerned Scientists	K.3.4, K.3.5, K.3.11, K.3.12, K.3.13, K.3.15, K.4
Young	Steven		DC_O0001	Union of Concerned Scientists	K.3.9
Young	Andrew		DC_M7540	UCS	K.2.1

Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Younger	Lanny		DC_M4590	UCS	K.2.1
Younger	Wes		DC_M7188	UCS	K.2.1
Youngkins	George		DC_M7538	UCS	K.2.1
Youngquist	Laurie		DC_M2256	UCS	K.2.1
Youngquist	Laurie		DC_M6526	UCS	K.2.1
Young-Sklar	Rachel		DC_M5900	UCS	K.2.1
Youngson	Patricia		DC_M4617	UCS	K.2.1
Youtie	Berta		DC_M0657		K.2.1
Yudis	Jonathan		DC_M7672	UCS	K.2.1
Yudis	Jonathan		DC_M7678	UCS	K.2.1
Yuenger	Arthur		DC_M4639	UCS	K.2.1
Zabinski	James		DC_M1993	UCS	K.2.1
Zack	James		DC_M2383	UCS	K.2.1
Zahakos	James		DC_M4665	UCS	K.2.1
Zahner	Glenda		DC_M5592	UCS	K.2.1
Zai	Gabriel		DC_M2263	UCS	K.2.1
Zai	Rob		DC_M2357	UCS	K.2.1
Zaitlin	J.		DC_M3814	UCS	K.2.1
Zaleon	Janet		DC_M6043	UCS	K.2.1
Zallen	Robi	Barry Zallen	DC_M1287	UCS	K.2.1
Zamboni	Jean		DC_M7516	UCS	K.2.1
ZamEk	Jill		DC_E0172	San Luis Obispo Mothers for Peace	K.3.11
ZamEk	Jill		DC_M0227	San Luis Obispo Mothers for Peace	K.3.11
Zangrando	Frederica		DC_M7794		K.3.1, K.3.7, K.3.10
Zapalowski	Leonard		DC_M4054	UCS	K.2.1
Zappone	Mark		DC_M2682	UCS	K.2.1
Zaragosa	Alfonso		DC_M6296	UCS	K.2.1
Zarchin	Natalie		DC_M6773	UCS	K.2.1
Zarchin	Paul		DC_M4629	UCS	K.2.1
Zarember	Irving		DC_M3353	UCS	K.2.1
Zari III	Eliseo		DC_M6950	UCS	K.2.1
Zaroff	Barbara		DC_M0633		K.2.1
Zaroff	Barbara		DC_M6816	UCS	K.2.1
Zarowitz	Jay		DC_M0796	UCS	K.2.1
Zarrella	Laura		DC_M1759	UCS	K.2.1
Zarri	Jason		DC_M2759	UCS	K.2.1
Zaslavsky	Claudia		DC_M7562	UCS	K.2.1
Zaslavsky	Sam		DC_M7197	UCS	K.2.1
Zatrine	Barbara		DC_M4821	UCS	K.2.1
Zaugg	Marion		DC_M2820	UCS	K.2.1
Zavada	Rebecca		DC_M3263	UCS	K.2.1
Zavada	Rebecca		DC_M5290	UCS	K.2.1
Zebolsky	Mary Ann		DC_M6878	UCS	K.2.1
Zebolsy	Donald M		DC_M2405	UCS	K.2.1
Zebuth	Herbert		DC_M7943		K.2.1
Zechmeister	Gisela		DC_M5501	UCS	K.2.1
Zeeb-Roman	Joan		DC_M0319		K.2.1
Zeff	David		DC_M0068		K.2.1
Zeichner	Walter		DC_M2692	UCS	K.2.1
Zeidman	Jonathan		DC_M1781	UCS	K.2.1
Zeigerman	Taina		DC_M1176	UCS	K.2.1
Zeiler	Andrew		DC_M2324	UCS	K.2.1
Zeiler	Eric		DC_M0754		K.2.1
Zeinstra	Juanita		DC_M0791	UCS	K.2.1
Zelinski	Michael		DC_M1368	UCS	K.2.1
Zeller	Rudy		DC_M6648	UCS	K.2.1
Zemek	Ruth		DC_M4549	UCS	K.2.1

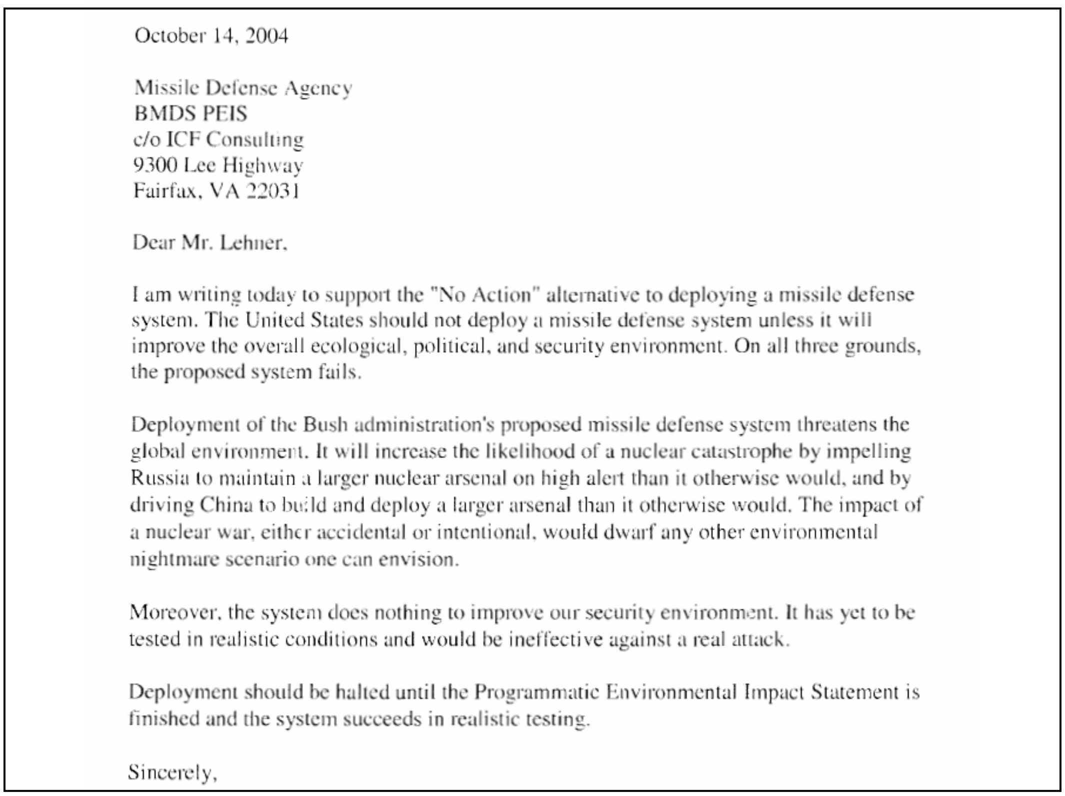
Last Name	First Name	Additional Commenters	Comment Document Number	Commenter Organization	Subsection Where Comment is Addressed
Zentura			DC_M3963	UCS	K.2.1
Zhuang	Lou Xiu		DC_M1249	UCS	K.2.1
Ziegler	Ralph		DC_M5959	UCS	K.2.1
Ziemer	John		DC_M7779		K.2.3
Ziff	Margery		DC_M0310		K.2.1
Zilkowski	David		DC_M7240	UCS	K.2.1
Zimmer	Audrey		DC_M1012	UCS	K.2.1
Zimmerle	Julie		DC_M7381	UCS	K.2.1
Zimmerlee	Cassie		DC_M5924	UCS	K.2.1
Zimmerman	Marc		DC_M4205	UCS	K.2.1
Zimmerman	Paulette		DC_M5043	UCS	K.2.1
Zimmerman	Rebecca		DC_M0890	UCS	K.2.1
Zimmerman	Sue		DC_M4592	UCS	K.2.1
Zimmermann	Muriel		DC_M2257	UCS	K.2.1
Zimnie	John		DC_M3660	UCS	K.2.1
Zink	Joseph		DC_M3889	UCS	K.2.1
Zinsser	John S.		DC_M0037		K.3.1, K.3.2, K.3.3, K.3.10
Zittrain	Jeff		DC_M6585	UCS	K.2.1
Zoblotsky	Linda		DC_E0109		K.3.1, K.3.3, K.3.5, K.3.12
Zochert	Kyle		DC_M4820	UCS	K.2.1
Zoellner	Jay		DC_M4304	UCS	K.2.1
Zographou	Nora		DC_M1286	UCS	K.2.1
Zolan	David		DC_M7084	UCS	K.2.1
Zoldak	Loretta		DC_M3290	UCS	K.2.1
Zondlo	Anne		DC_M2164	UCS	K.2.1
Zook	Pamela		DC_M0150		K.2.1
Zorn	Kathleen		DC_M3355	UCS	K.2.1
Zoulalian	Nancy		DC_M5008	UCS	K.2.1
Zschaler	William		DC_M7520	UCS	K.2.1
Zschaler	William		DC_M7521	UCS	K.2.1
Zukowski	Catherine		DC_M5031	UCS	K.2.1
Zur	R.		DC_M1027	UCS	K.2.1
Zusne	Megan		DC_M6880	UCS	K.2.1
Zyla	Alison		DC_M7365	UCS	K.2.1

K.2 Template Letters

The MDA identified four template letters that were received via e-mail, facsimile, or U.S. postal service. These template letters are categorized as Comment Template A, B, C, and D. There were some variations of these template letters; therefore, the following sections include randomly selected variations of these letters. Comment documents that were included as variations of each template included several comment themes. Although the specific wording varied slightly the comment themes were the same. All of the comment documents in this group included some or all of the comment themes. The following sections include examples of the template letters, identified comment themes and the MDA's responses to those themes.

K.2.1 Comment Template A

K.2.1.1 Examples of Template A



October 14, 2004

Missile Defense Agency
BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Mr. Lehner,

I am writing today to support the "No Action" alternative to deploying a missile defense system. The United States should not deploy a missile defense system unless it will improve the overall ecological, political, and security environment. On all three grounds, the proposed system fails.

Deployment of the Bush administration's proposed missile defense system threatens the global environment. It will increase the likelihood of a nuclear catastrophe by impelling Russia to maintain a larger nuclear arsenal on high alert than it otherwise would, and by driving China to build and deploy a larger arsenal than it otherwise would. The impact of a nuclear war, either accidental or intentional, would dwarf any other environmental nightmare scenario one can envision.

Moreover, the system does nothing to improve our security environment. It has yet to be tested in realistic conditions and would be ineffective against a real attack.

Deployment should be halted until the Programmatic Environmental Impact Statement is finished and the system succeeds in realistic testing.

Sincerely,

Oct 13, 2004

Rick Lehner
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Mr. Rick Lehner,

I am writing today to support the "No Action" alternative to deploying a missile defense system. The United States should not deploy a missile defense system unless it will improve the overall ecological, political, and security environment. On all three grounds, the proposed system fails.

Deployment of the Bush administration's proposed missile defense system threatens the global environment. It will increase the likelihood of a nuclear catastrophe by impelling Russia to maintain a larger nuclear arsenal on high alert than it otherwise would, and by driving China to build and deploy a larger arsenal than it otherwise would. The impact of a nuclear war, either accidental or intentional, would dwarf any other environmental nightmare scenario one can envision.

Moreover, the system does nothing to improve our security environment. It has yet to be tested in realistic conditions and would be ineffective against a real attack.

Deployment should be halted until the Programmatic Environmental Impact Statement is finished and the system succeeds in realistic testing.

Sincerely,

K.2.1.2 Template A Comment Themes and Responses

Comment Theme 1. The BMDS would create an arms race "…by driving China to develop and deploy a larger arsenal than it otherwise would."

Response. These types of statements are conjectural in nature and are not appropriately addressed in a NEPA environmental analysis. Therefore, comments concerning the potential effect of the BMDS on the accumulation of weapons by other nations or groups were determined to be outside the scope of the BMDS PEIS.

Comment Theme 2. "Voting" for or "supporting" the No Action Alternative presented in the BMDS PEIS or supporting consideration of a "real" No Action Alternative.

Response. The CEQ's September 2002 report titled *CEQ Task Force Review of the NEPA Process: Summary of Public Comments* stated "It is important to recognize that the consideration of public comment is not a vote-counting process in which the outcome is determined by the majority opinion. Relative depth of feeling and interest among the public can serve to provide a general context for decision-making. However, it is the appropriateness, specificity, and factual accuracy of comment content that serves to provide the basis for modifications to planning documents and decisions. Further, because respondents are self-selected, they do not constitute a random or representative public sample." The comment period for the Draft PEIS does not encompass a voting process for the alternatives. Therefore, these comments do not require a substantive response.

As noted in CEQ's "Forty Most Asked Questions", there are two interpretations of the No Action Alternative depending on the nature of the proposal being evaluated. In situations where "no action" is illustrated in instances involving Federal decisions on proposals for a project, "no action" would mean the proposed activity would not take place. In situations that involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed, "no action" may be thought of in terms of continuing with the present course of action until that action is changed. It is further noted that to construct an alternative based on no land management at all would be a useless academic exercise. For this PEIS, because the proposed action involves the integration of existing discrete missile defense systems, the no action alternative would be to continue with existing stand-alone systems; not to scrap all existing systems like the PATRIOT missile already in use in theater defense by U.S. forces.

Comment Theme 3. The BMDS has not been tested and would be ineffective in a real attack.

Response. This PEIS does not address issues related to DoD threat assessment policy or the technological feasibility of missile defense design. These comments regarding the effectiveness or ineffectiveness of the proposed system in defeating threat missiles were determined to be outside the scope of the BMDS PEIS and therefore do not require a substantive response. MDA has considered the environmental impacts of system integration flight testing in this PEIS. This testing would help MDA fine tune the various systems components of the BMDS and continue to identify additional functional capabilities needed to assure the security and efficacy of the system. However, the President made the decision to deploy a limited defensive capability to ensure the safety and security of the U.S. homeland while the system was being further developed and tested. Also, because the BMDS is a spirally developed defensive system, there may never be the ultimate deployment of a single architecture or even of a set of system architectures. Continuous improvement, technology development, and testing are critical to MDA's development of the BMDS.

Comment Theme 4. The BMDS would not improve the political environment.

Response. These types of statements are the opinion of the commenter and thus are not appropriately addressed in an environmental analysis. Therefore, comments concerning the potential effect of the BMDS on terrorism or global stability were determined to be outside the scope of the BMDS PEIS and do not require a substantive reply.

Comment Theme 5. The BMDS would not improve the security environment.

Response. These types of statements are the opinion of the commenter and thus are not appropriately addressed in an environmental analysis. Therefore, comments concerning the ability of the BMDS to defend against a realistic threat or provide safety for the U.S. were determined to be outside the scope of the BMDS PEIS and do not require a substantive reply.

Comment Theme 6. Deployment of the BMDS should be halted until the PEIS is finished and the system succeeds in realistic testing.

Response. This PEIS considers the environmental impacts from possible realistic testing scenarios that could be used to test the BMDS. However, this environmental analysis is not the appropriate venue to determine the outcome of testing or to determine when or how to deploy an integrated BMDS. Therefore, comments concerning deployment of the BMDS only after the success of realistic testing were determined to be outside of the scope of the BMDS PEIS and do not require a substantive reply.

Comment Theme 7. The BMDS would not improve the ecological environment.

Response. This comment reflects the opinion of the commenter. The PEIS analyzes the environmental impacts of the implementation of an integrated BMDS as discussed under Alternative 1 in Section 4.1.1; this includes the use of weapons, sensors, Command and Control, Battle Management, and Communications (C2BMC), and support assets for all of the resource areas described in Section 3. The environmental impacts of Test Integration under Alternative 1 are analyzed in Section 4.1.2. The impacts of activities at Locations Outside the Continental U.S. are discussed in Section 4.1.3. The cumulative impacts associated with Alternative 1 are considered in Section 4.1.4. The environmental impacts associated with Alternative 2 are addressed in Sections 4.2.1 Impacts Analysis, 4.2.2 Test Integration, and 4.2.3 Cumulative Impacts. The impacts of the No Action Alternative are addressed in Section 4.3. Thus the BMDS PEIS provides decision makers with information regarding potential environmental impacts of the proposed implementation alternatives so that effective decisions can be made about system implementation in the context of impacts to the environment.

K.2.2 Comment Template B

K.2.2.1 Examples of Template B

Sent: Monday, September 20, 2004 1:58 PM
To: mda.bmds.peis
Subject: Public Comment Re: Star Wars

To whom it May Concern:

I am writing to support the "No Action" alternative for the following reasons:

1) This new Star Wars program as outlined in the PEIS will be ***destabilizing*** thus creating new momentum to move the deadly and dangerous arms race into the heavens. This will create more global instability.

2) Testing and deployment of weapons in space will create massive amounts of new ***space debris*** making the environment of space even more contaminated and thus unavailable for future space flight.

2) This new Star Wars plan will be ***extraordinarily expensive*** requiring massive cuts in health care, education, public services, and environmental clean-up.

3) The likely use of ***nuclear power*** for eventual space-based weapons would be an environmental disaster.

4) Space-based weapons, described in the PEIS as being "defensive", could easily serve an ***offensive purpose*** as outlined in the Space Command's *Vision for 2020* that says the U.S. will "deny" other nations the use of space.

5) Toxic ***rocket exhaust pollution*** is now contaminating the Earth and punching a hole in the ozone layer. This plan would dramatically expand these polluting launches.

In light of the above and the huge cost of this plan at a time when people in our country and around the globe are suffering so greatly due to lack of basic human needs, I feel it is morally imperative to turn away from this project and work for the good of humanity on this earth.

Sincerely,

Sent: Wednesday, November 10, 2004 9:15 AM
To: mda.bmds.peis
Subject: Ballistic Missile Defense System

I understand the public is invited to comment on PEIS before Nov 17th. So here I am.
I was a high school science teacher for 24 years. So I have studied and learned about the dangers and effects of radiation.
I believe the current "no action alternative" is insuffiicient and should be rewritten for the following reasons:
1) Nuclear reactors and systems should be kept out of space because that move will only increase the arms race.
2) Even though the purpose of space-based weapons would be "defensive", they could be used for "offensive" purposes. (we don't want to start any nuclear wars. I have had a first-hand view of Hiroshima in 1945 since I was overseas with the USO entertainung the troops.)
3) We don't want to increase polluting rocket launches. (The ozone layer is already being damaged thus creating climate change.)
The money could be put to much better use for health care, education, public services, etc.

Sent: Friday, November 12, 2004 8:56 AM
To: mda.bmds.peis
Subject: pentagon star wars plan

I support the "No Action Alternative" in relation to the pentagon star wars plan because of the following reasons: (1) rocket exhuast and space debris from testing in space could pollute outer space and increase the ozone depletion already exixsting and (2) the fabulous ly expensive cost of this program. The Bush Administration has already created record debts and I don't see any hope for this problem being solved anytime soon. There are enough problems on earth without making more in space. I am not naive and realize that the Bush Administration loves giving money to the military industrial corporate complex, but aren't they already profiting enough on violence and death with Bush's invasion of Iraq? Money in defense of this country could be better spent on health care and social initiatives than on ridiculous space projects.

I firmly support the "No Action Initiative."

K.2.2.2 Template B Comment Themes and Responses

Comment Theme 1. The BMDS would be extraordinarily expensive.

Response. Budgetary policy issues including the cost of the proposed BMDS and other DoD related acquisition programs are not part of the decision to be made in this environmental analysis. Therefore, these types of issues were determined to be outside the scope of this PEIS. This PEIS considers the environmental impacts of various alternatives to develop, test, deploy, and plan for the decommissioning of an integrated BMDS.

Comment Theme 2. The cost of the BMDS will require spending cuts in other areas.

Response. Such comments on budgetary policy issues including how Federal funds should be spent provide an expression of personal or political philosophy or opinion. These types of comments do not address the environmental issues addressed in this PEIS and are outside the scope of the analysis.

Comment Theme 3. The BMDS would create an arms race.

Response. These types of statements are the opinion of the commenter and are thus not appropriately addressed in a NEPA environmental analysis. Therefore, comments concerning the potential effect of the BMDS on the accumulation of weapons by other nations or groups were determined to be outside the scope of the BMDS PEIS.

Comment Theme 4. The BMDS could be used as an offensive weapon.

Response. BMDS weapons are described as defensive system components that could be used to destroy threat missiles. Statements including those suggesting the use of these weapons for other purposes are the opinion of the commenter and are thus considered outside of the scope of the BMDS PEIS.

Comment Theme 5. "Voting" for or "supporting" the No Action Alternative presented in the BMDS PEIS or supporting consideration of a "real" No Action Alternative.

Response. The CEQ's September 2002 report titled *CEQ Task Force Review of the NEPA Process: Summary of Public Comments* stated "It is important to recognize that the consideration of public comment is not a vote-counting process in which the outcome is determined by the majority opinion. Relative depth of feeling and interest among he public can serve to provide a general context for decision-making. However, it is the appropriateness, specificity, and factual accuracy of comment content that serves to provide the basis for modifications to planning documents and decisions. Further, because respondents are self-selected, they do not constitute a random or representative public sample." The comment period for the Draft PEIS does not encompass a voting process for the alternatives. Therefore, these comments do not require a substantive response.

As noted in CEQ's "Forty Most Asked Questions," there are two interpretations of the No Action Alternative depending on the nature of the proposal being evaluated. In situations where "no action" is illustrated in instances involving federal decisions on proposals for project "no action" would mean the proposed activity would not take place. In situations that involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed, "no action" may be thought of in terms of continuing with the present course of action until that action is changed. It is further noted that to construct an alternative based on no management at all would be a useless academic exercise. For this PEIS, because the proposed action involves the integration of existing discrete missile defense systems, the no action alternative would be to continue with existing stand-alone systems; not to scrap all existing systems like the PATRIOT missile already in use in theater defense by U.S. forces.

Comment Theme 6. The BMDS will be politically destabilizing.

Response. These types of statements are the opinion of the commenter and are thus not appropriately addressed in an environmental analysis. Therefore, comments concerning the potential effect of the BMDS on terrorism or global stability were determined to be outside the scope of the BMDS PEIS and do not require a substantive reply.

Comment Theme 7. The BMDS would increase environmental damage including damage to the ozone layer from rocket launch emissions.

Response. Many generic environmental issues are considered in the PEIS. However, impacts to some resource areas including Cultural Resources, Environmental Justice, Land Use, Socioeconomics, Utilities, and Visual Resources are more appropriately considered in site-specific environmental documentation. Each of these was discussed regarding methodology and thresholds for significance to provide a “roadmap” for performing future site-specific analyses tiering from the PEIS. The following resource areas were considered in the PEIS: Air Quality, Airspace, Biological Resources, Geology and Soils, Hazardous Materials and Hazardous Waste, Health and Safety, Noise, Transportation, Water Resources, and Orbital Debris.

The PEIS analyzes the environmental impacts of the use of BMDS Components under Alternative 1 in Section 4.1.1; this includes the use of weapons, sensors, C2BMC, and support assets for all of the resource areas described above. The environmental impacts of Test Integration under Alternative 1 are analyzed in Section 4.1.2. The impacts of activities at Locations Outside the Continental U.S. are discussed in Section 4.1.3. The cumulative impacts associated with Alternative 1 are considered in Section 4.1.4. The environmental impacts associated with Alternative 2 are addressed in Sections 4.2.1 Impacts Analysis, 4.2.2 Test Integration, and 4.2.3 Cumulative Impacts. The impacts of the No Action Alternative are addressed in Section 4.3.

Specifically, damage to the ozone layer from rocket launch emissions was considered in Section 4.1.1.2 for launches of interceptors and impacts on air quality including ozone depletion in the stratosphere.

K.2.3 Comment Template C

K.2.3.1 Examples of Template C

October 20, 2004

Missile Defense Agency

MDA BMDS PEIS, c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Missile Defense Agency:

I am writing to support a real "No Action" alternative to the deployment of a missile defense system. This means no further testing, development, or deployment. Deployment of such a system threatens a new nuclear arms race, puts the global environment at risk, and does not improve the security of the United States.

Deployment of a missile defense system will increase the likelihood of a nuclear catastrophe. It impels Russia to maintain a larger nuclear arsenal on high alert than it otherwise would. Deployment also drives China to deploy a larger arsenal. The impact of a nuclear war, whether accidental or intentional, would dwarf any other environmental nightmare one can envision.

Moreover, the system does not improve our security. So far, it has yet to be tested in realistic conditions and would be ineffective against an attack. While in the future the capabilities of the system can be expanded at great expense, these developments are likely to be made useless by the newly improved weapons and countermeasures of potential adversaries.

Finally, the $10 billion a year being spent on missile defense should be spent on measures that are more effective and environmentally sound. One example is the program to secure stockpiles of nuclear weapons material in the former Soviet Union and other countries.

The testing, development, and deployment of the missile defense system should be halted, given that the system leads to environmental harm and potentially to environmental devastation and does so without improving the security of the United States.

Sincerely,

October 24, 2004

Missile Defense Agency

MDA BMDS PEIS, c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Missile Defense Agency:

I am writing to support a real "No Action" alternative to the deployment of a missile defense system. This means no further testing, development, or deployment. Deployment of such a system threatens a new nuclear arms race, puts the global environment at risk, and does not improve the security of the United States. Deployment of a missile defense system will increase the likelihood of a nuclear catastrophe. It impels Russia to maintain a larger nuclear arsenal on high alert than it otherwise would.
Deployment also drives China to deploy a larger arsenal. The impact of a nuclear war, whether accidental or intentional, would dwarf any other environmental nightmare one can envision. Moreover, the system does not improve our security. So far, it has yet to be tested in realistic conditions and would be ineffective against an attack. While in the future the capabilities of the system can be expanded at great expense, these developments are likely to be made useless by the newly improved weapons and countermeasures of potential adversaries. Finally, the $10 billion a year being spent on missile defense should be spent on measures that are more effective and environmentally sound. One example is the program to secure stockpiles of nuclear weapons material in the former Soviet Union and other countries.

The testing, development, and deployment of the missile defense system should be halted, given that the system leads to environmental harm and potentially to environmental devastation and does so without improving the security of the United States.

Sincerely,

November 16, 2004

Missile Defense Agency
MDA BMDS PEIS, c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Missile Defense Agency:

I am writing to support a real "No Action" alternative to the deployment of a missile defense system. This means no further testing, development, or deployment. Deployment of such a system threatens a new nuclear arms race, puts the global environment at risk, and does not improve the security of the United States.

Moreover, the system does not improve our security. So far, it has yet to be tested in realistic conditions and would be ineffective against an attack. While in the future the capabilities of the system can be expanded at great expense, these developments are likely to be made useless by the newly improved weapons and countermeasures of potential adversaries.

This is a waste of my hard-earned tax money. I do not feel more secure with such a system. I instead feel very insecure. Nuclear weapons are not the way to make me feel secure or defended. I think it would be better to use the monies on systems that are environmentally sound and are not potentially hazardous to me and others who are being defended.

The testing, development, and deployment of the missile defense system should be halted, given that the system leads to environmental harm and potentially to environmental devastation and does so without improving the security of the United States.

Sincerely,

K.2.3.2 Template C Comment Themes and Responses

Comment Theme 1. Monies slated for the BMDS should be spent on other programs or services.

Response. Comments on budgetary policy issues including how Federal funds should be spent provide an expression of personal or political philosophy or opinion. These types of comments do not address the environmental issues addressed in this PEIS and are outside the scope of the analysis.

Comment Theme 2. Deployment of the BMDS would create an arms race.

Response. These types of statements are the opinion of the commenter and thus are not appropriately addressed in a NEPA environmental analysis. Therefore, comments concerning the potential effect of the BMDS on the accumulation of weapons by other nations or groups were determined to be outside the scope of the BMDS PEIS.

Comment Theme 3. Supporting a "real" No Action Alternative.

Response. As noted in CEQ's "Forty Most Asked Questions," there are two interpretations of the No Action Alternative depending on the nature of the proposal being evaluated. In situations where "no action" is illustrated in instances involving Federal decisions on proposals for project, "no action" would mean the proposed activity would not take place. In situations that involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed, "no action" may be thought of in terms of continuing with the present course of action until that action is changed. It is further noted that to construct an alternative based on no management at all would be a useless academic exercise. For this PEIS, because the proposed action involves the integration of existing discrete missile defense systems, the no action alternative would be to continue with existing stand-alone systems; not to scrap all existing systems like the PATRIOT missile already in use in theater defense by U.S. forces.

Comment Theme 4. The BMDS has not been tested and would be ineffective in a real attack.

Response. This PEIS does not address issues related to DoD threat assessment policy or the technological feasibility of missile defense design. These comments regarding the technological feasibility of defeating threat missiles are the opinion of the commenter and were determined to be outside the scope of the BMDS PEIS and therefore do not require a substantive response. MDA has considered the environmental impacts of system integration flight testing in this PEIS. This testing would help MDA fine tune the various systems components of the BMDS and continue to identify additional functional capabilities needed to assure the security and efficacy of the system. However, the President made the decision to deploy a limited defensive capability to ensure the safety and security of the U.S. homeland while the system was being further developed and tested. Also, because the BMDS is a spirally developed defensive system there may never be the ultimate deployment of a single architecture or even of a set of system architectures. Continuous improvement, technology development, and testing are critical to MDA's development of the BMDS.

Comment Theme 5. Potential adversaries will develop new weapons and countermeasures to render the BMDS ineffective.

Response. These types of statements are the opinion of the commenter and are thus not appropriately addressed in an environmental analysis. Therefore, comments concerning the potential effect of the BMDS on terrorism or global stability were determined to be outside the scope of the BMDS PEIS and do not require a substantive reply.

Comment Theme 6. The BMDS will not improve the security of the U.S.

Response. These types of statements are the opinion of the commenter and are thus not appropriately addressed in an environmental analysis. Therefore, comments concerning the ability of the BMDS to defend against a realistic threat or provide safety for the U.S. were determined to be outside the scope of the BMDS PEIS and do not require a substantive reply.

Comment Theme 7. The testing, development, and deployment of the BMDS damages the environment.

Response. The PEIS analyzes the environmental impacts of the implementation of the BMDS under Alternative 1 in Section 4.1.1, this includes the use of weapons, sensors, C2BMC, and support assets for all of the resource areas described in Section 3. The environmental impacts of Test Integration under Alternative 1 are analyzed in Section 4.1.2. The impacts of activities at Locations Outside the Continental U.S. are discussed in Section 4.1.3. The cumulative impacts associated with Alternative 1 are considered in Section 4.1.4. The environmental impacts associated with Alternative 2 are addressed in Sections 4.2.1 Impacts Analysis, 4.2.2 Test Integration, and 4.2.3 Cumulative Impacts. The impacts of the No Action Alternative are addressed in Section 4.3.

K.2.4 Comment Template D

K.2.4.1 Examples of Template D

Sent: Monday, November 08, 2004 6:52 PM
To: mda.bmds.peis
Subject: Comments on New Star Wars Program

To whom it may concern re: The new Star Wars program.

I strongly oppose any and all new Star Wars programs. The current "no action alternative" is insufficient, and the PEIS must be re-written for the following reasons:

- **Spending**. Time has proven that these types of programs take on a life of their own. Much of that life is an economic existence based on technological failures; a deadline missed, an unanticipated expense - and then evolves a process fueled by a new economic dependence on the American government tax dollars to succeed. We are not able to continue to fund such programs, which by their very nature create new dependencies on an already fragile economy.
- **Ecological Factors**. As an American living and traveling abroad, I live daily with the pollution created by economies driven by borrowed and irresponsible 'second-hand ' American technology gone amuck. Over time another new American technology will, in all probability, create envy and be used in yet another irresponsible way. The present American fear of escalating international nuclear proliferation is a case in point.
- **Moral Perspectives**. Much of the just completed American Presidential election was based on a development of ideas surrounding an American moral response based on fear of aggression and terrorism. Extending that argument to the whole world, what is the meaning of a common and global morality regarding this issue? My conclusion is that this proposal ignores the voices of much of the world.
- **Initiatives Based On Fear**. Feeding the fears of people may make this initiative popular with some, but it is the fear that must be addressed and not another military "objective" based on tactics that the Big Bad Wolf may get you, so prepare a house that is unassailable. Another model is needed.
- **Who Suffers?** To name but a few, there are the poor who continue to suffer from monies directed elsewhere, those countries that do not have a voice because they sit at an uneven economic table and an uneven power table with the rest of the world.
- **Tracking the Issue.** In a world that already has a short attention span for important issues and is daily saturated in such a way that we do not track these issues, it is critical that we not give people yet another initiative that will be quickly forgotten and, therefore, we will not pay attention to over time. This issue has huge and lasting global consequences.
- **Power**. Our global situation is already precarious and filled with many questions over which United States has exerted its power. Presently, this power is often perceived of as unjust. To add yet another initiative that will add to this feeling is not a model for a just society.

For the above and many other reasons, **I believe that the current "no action alternative" is insufficient, and the PEIS must be re-written**.

To whom it may concern re: The new Star Wars program.

I strongly oppose any and all new Star Wars programs. The current "no action alternative" is insufficient, and the PEIS must be re-written for the following reasons:

Spending. Time has proven that these types of programs take on a life of their own. Much of that life is an economic existence based on technological failures; a deadline missed, an unanticipated expense - and then evolves a process fueled by a new economic dependence on the American government tax dollars to succeed. We are not able to continue to fund such programs, which by their very nature create new dependencies on an already fragile economy.
Ecological Factors. As an American living and traveling abroad, I live daily with the pollution created by economies driven by borrowed and irresponsible 'second-hand ' American technology gone amuck. Over time another new American technology will, in all probability, create envy and be used in yet another irresponsible way. The present American fear of escalating international nuclear proliferation is a case in point.
Moral Perspectives. Much of the just completed American Presidential election was based on a development of ideas surrounding an American moral response based on fear of aggression and terrorism. Extending that argument to the whole world, what is the meaning of a common and global morality regarding this issue? My conclusion is that this proposal ignores the voices of much of the world.
Initiatives Based On Fear. Feeding the fears of people may make this initiative popular with some, but it is the fear that must be addressed and not another military "objective" based on tactics that the Big
Bad Wolf may get you, so prepare a house that is unassailable. Another
model is needed.
Who Suffers? To name but a few, there are the poor who continue to suffer from monies directed elsewhere, those countries that do not have a voice because they sit at an uneven economic table and an uneven power
table with the rest of the world.
Tracking the Issue. In a world that already has a short attention span for important issues and is daily saturated in such a way that we do not track these issues, it is critical that we not give people yet another initiative that will be quickly forgotten and, therefore, we will not pay attention to over time. This issue has huge and lasting global consequences.
Power. Our global situation is already precarious and filled with many questions over which United States has exerted its power. Presently, this power is often perceived of as unjust. To add yet another initiative that will add to this feeling is not a model for a just society.

For the above and many other reasons, I believe that the current "no action alternative" is insufficient, and the PEIS must be re-written.

K.2.4.2 Template D Comment Themes and Responses

Comment Theme 1. The BMDS would depend on American government tax dollars and would stress the economy.

Response. Budgetary policy issues including the cost of the proposed BMDS and other DoD related programs are not part of the decision to be made in this environmental analysis. Therefore, these types of issues were determined to be outside the scope of this PEIS. This PEIS considers the environmental impacts of various alternatives to develop, test, deploy, and plan for the decommissioning of an integrated BMDS.

Comment Theme 2. The BMDS would cause monies to be diverted away from other services and programs.

Response. Comments on budgetary policy issues including how Federal funds should be spent provide an expression of personal or political philosophy or opinion. These types of comments do not address the environmental issues addressed in this PEIS and are considered outside the scope of the analysis.

Comment Theme 3. Supporting a "real" No Action Alternative.

Response. As noted in CEQ's "Forty Most Asked Questions," there are two interpretations of the No Action Alternative depending on the nature of the proposal being evaluated. In situations where "no action" is illustrated in instances involving Federal decisions on proposals for project, "no action" would mean the proposed activity would not take place. In situations that involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed, "no action" may be thought of in terms of continuing with the present course of action until that action is changed. It is further noted that to construct an alternative based on no management at all would be a useless academic exercise. For this PEIS, because the proposed action involves the integration of existing discrete missile defense systems, the no action alternative would be to continue with existing stand-alone systems; not to scrap all existing systems like the PATRIOT missile already in use in theater defense by U.S. forces.

Comment Theme 4. The BMDS would add to an already precarious global situation.

Response. These types of statements are the opinion of the commenter and thus are not appropriately addressed in an environmental analysis. Therefore, comments concerning the potential effect of the BMDS on terrorism or global stability were determined to be outside the scope of the BMDS PEIS and do not require a substantive reply.

Comment Theme 5. Opposition to the "Star Wars" program.

Response. Alternative 1 would not include the use of space-based weapons while Alternative 2 would include the use of weapons from space-based platforms. While this PEIS considered two implementing alternatives for the BMDS, this PEIS performed an environmental analysis, not a policy analysis of the alternatives. The comments that were collectively summarized and grouped as *"Opposed to Weapons in Space"* were comments that expressed a philosophy, value, or opposition to an action. These comments were not substantive comments on the scope of the *environmental analysis* in this PEIS regarding the use of space-based weapons but rather statements against the *policy* of using space-based weapons. These comments appear to fit within the definition provided for non-substantive comments, i.e., comments that express a philosophy, value, or support or opposition for an action; therefore, it would appear to be appropriate to include them in this grouping. These types of issues are not part of the decision to be made in this environmental analysis. Therefore, these comments were determined not to require a substantive reply.

Comment Theme 6. The BMDS technology will eventually be used in an irresponsible way leading to ecological risk.

Response. Many generic or non-specific environmental issues are considered in the PEIS. Some resource areas including Cultural Resources, Environmental Justice, Land Use, Socioeconomics, Utilities, and Visual Resources are more appropriately considered in site-specific environmental documentation. Each of these was discussed regarding methodology and thresholds for significance to provide a "roadmap" for performing future site-specific analyses tiering from the PEIS. The following resource areas were considered in the PEIS: Air Quality, Airspace, Biological Resources, Geology and Soils, Hazardous Materials and Hazardous Waste, Health and Safety, Noise, Transportation, Water Resources, and Orbital Debris.

The PEIS analyzes the environmental impacts of the use of BMDS Components under Alternative 1 in Section 4.1.1, this includes the use of weapons, sensors, C2BMC, and support assets for all of the resource areas described above. The environmental impacts of Test Integration under Alternative 1 are analyzed in Section 4.1.2. The impacts of activities at Locations Outside the Continental U.S. are discussed in Section 4.1.3. The cumulative impacts associated with Alternative 1 are considered in Section 4.1.4. The environmental impacts associated with Alternative 2 are addressed in Sections 4.2.1 Impacts Analysis, 4.2.2 Test Integration, and 4.2.3 Cumulative Impacts. The impacts of the No Action Alternative are addressed in Section 4.3.

K.3 Out of Scope Comments

After determining which comment documents had text that was the same as or similar to that provided in one of the four types of template letters, all comments were reviewed to determine if they addressed substantive or out of scope comments. Out of scope comments were grouped according to their subject matter and in accordance with 40 Code of Federal Regulations (CFR) § 1503.4 and "Forty Most-Asked Questions Concerning CEQ's National Environmental Policy Act Regulations" these comments were briefly summarized and the reasons why these comments were considered out of scope were documented.[2] Each subject matter topic and a summary of the comments received are presented in Sections K.3.1 through K.3.18. Examples of specific comments related to each topic are also provided. Following the summary and examples is an explanation of why these comments were determined to be out of scope. All comments received have been noted and will be included in the administrative record for this PEIS.

---

[2] The Council on Environmental Quality has determined that when a large volume of comments are received it is appropriate to summarize the comments rather than reproduce the comments in the NEPA document.

K.3.1 Opposed to the BMDS

Summary. Many commenters stated that they were opposed to the testing and/or development of missile defense technologies including those proposed for the BMDS.

Examples. "I say NO STAR WARS" (DC_E0017), "This Ballistic Missile Defense system has to be one of the most stupid plans ever invented to waste the resources of the people of the USA and create a new arms race based in space." (DC_E0021), "I strongly oppose any form of missle [sic.] defense system plan for space.NO! NO! NO!" (DC_E0062), "Pie in sky while overlooking bombs in our backyard - is NOT Smart and definitely dangerous. Shelve it!" (DC_E0089)

Response. As stated in Section 1.2 of the Draft BMDS PEIS, on January 2, 2002, Secretary of Defense Rumsfeld issued a directive to the DoD to establish a single development program for all the work needed to design, develop, and test elements of an integrated BMDS that would operate under a newly titled MDA. Therefore, it has been determined that a BMDS should be developed. This PEIS considers the environmental impacts of various implementing alternatives for such a system. Therefore, comments regarding opposition to the BMDS *per se* and other related policy issues were determined to be outside the scope of this environmental analysis.

K.3.2 Missile Defense Program is too Expensive, Opposed to Funding the BMDS

Summary. Many commenters expressed a belief that that missile defense development and testing is too expensive.
Examples. "I find the other two options a waste of money and a morally empty endeavor." (DC_E0029), "The precision in timing and location needed in order to intercept a missile makes this an unrealistic program, especially considering the outrageous costs of it." (DC_E0050), "Going forward with the planned BMDS appears both scientifically irrational, highly costly, and dangerous to our national security." (DC_E0074)

Response. Comments on budgetary policy issues including the cost of the proposed BMDS and other DoD related programs are not part of the decision to be made in this environmental analysis. Therefore, these types of issues were determined to be outside the scope of this PEIS. This PEIS considers the environmental impacts of various alternatives to develop, test, deploy, and plan for the decommissioning of an integrated BMDS.

K.3.3 Federal Funds should be used to Address Domestic or International Problems

Summary. Several commenters suggested that monies allocated to missile defense could be better spent to address other social domestic or international problems. Other commenters suggested that these funds should be spent decreasing the stockpile of weapons in other countries rather than developing and testing a U.S. missile defense capability.

Examples. “The perception of a nation willing to forgo the funds desperately needed for education, for health and for the development of labor intensive industries that provide jobs, is the perception of a nation locked in the illusive pursuit of security, even at the risk of inducing weapons competition that will ultimately reduce security.” (DC_E0015), “Wouldn't the money be better spent on helping those countries where poverty is at levels which make people angry and may therefore lead to violence?” (DC_E0032), “Why would we incur the wrath of the rest of the world, commit to huge costs that undermine spending on the people's needs, endanger the planet's viability by further decimating its environmental balance and endanger the lives of billions?” (DC_E0055)

Response. Comments on budgetary policy issues including how Federal funds should be spent provide an expression of personal or political philosophy or opinion. These types of comments do not address the environmental issues addressed in this PEIS and are considered outside the scope of the analysis.

K.3.4 BMDS Would Create an Arms Race

Summary. Some commenters expressed concern that the development of a missile defense system by the U.S. would be viewed as a threat by other countries that would cause them to develop weapons systems to defeat the BMDS.

Examples. “First, they will multiply offensive missiles, ratcheting up the catastrophically expensive arms race.” (DC_E0007), “Its deployment unquestionably will accelerate the arms race into space - those who disagree with that likely assumption are very weak in their denial.” (DC_E0019), “This just continues the arms race.” (DC_E0058)

Response. These types of statements are the opinion of the commenter and are thus not appropriately addressed in a NEPA environmental analysis. Therefore, comments concerning the potential effect of the BMDS on the accumulation of weapons by other nations or groups were determined to be outside the scope of the BMDS PEIS.

K.3.5 Opposed to Nuclear Weapons

Summary. A few commenters stated that they were opposed to the use of nuclear weapons as part of a missile defense system. Commenters also expressed concern that another country could use a nuclear weapon to defeat the BMDS.

Examples. “Any kind of using of Nuclear weapons in this Beautiful must be abondoned [sic.] and use such things in the proper use for providing electricity.” (DC_E0010), “The planet, the human race, all of life on this unique place called Earth cannot survive one country's global dominance from space or the use of nuclear weapons from anywhere." (DC_E0055), "We do not need any nuclear missile system." (DC_E0061)

Response. The MDA has no plans to include nuclear material as part of the BMDS; therefore the PEIS does not consider the use of nuclear material or weapons as part of the BMDS. This PEIS does not address issues related to DoD threat assessment policy or the technological feasibility of missile defense design. Therefore comments regarding opposition to use of nuclear weapons or the technological feasibility of defeating a threat nuclear warhead were determined to be outside the scope of the environmental analysis in the PEIS.

K.3.6 BMDS could be used as an Offensive Weapons System

Summary. Several commenters expressed concern that the BMDS would not be used as a defensive system but would be used as an offensive system. These commenters expressed beliefs both that the BMDS would become a first strike system and also that other countries would see the BMDS as an offensive system and a threat to their own security.

Examples. "To be truthful about the program, it is essentially an OFFENSIVE system, in every sense of the word." (DC_E0016), "Other nations are aware that the conversion of these weapons from reactive to proactive is a simple one." (DC_E0054)

Response. BMDS weapons are described as defensive system components that could be used to destroy threat missiles. Statements including those suggesting the use of BMDS weapons components for other purposes are the opinion of the commenter and thus are considered outside of the scope of the BMDS PEIS.

K.3.7 "Voting" for No Action Alternative

Summary. Many commenters stated that they were in favor of or supported the No Action Alternative identified in the Draft BMDS PEIS.

Examples. "WE FAVOR THE 'NO ACTION' ALTERNATIVE!!!!!!" (DC_E0006), "I support the "**No Action**" option--the 3rd of 3 possible options." (DC_E0033), "It is in the opinion of many with which I've conferred to submit a No Action Alternative." (DC_E0093)

Response. The CEQ's September 2002 report on Comment Received on the NEPA Task Force stated "It is important to recognize that the consideration of public comment is not a vote-counting process in which the outcome is determined by the majority opinion. Relative depth of feeling and interest among he public can serve to provide a general context for decision-making. However, it is the appropriateness, specificity, and factual accuracy of comment content that serves to provide the basis for modifications to planning documents and decisions. Further, because respondents are self-selected, they do not constitute a random or representative public sample." The comment period for the Draft PEIS does not encompass a voting process for the alternatives. Therefore, these comments do not require a substantive response.

K.3.8 "Voting" for Alternative 1

Summary. Commenter stated that they were in favor of developing the BMDS as described under Alternative 1.

Example. "please take plan 1 astrhe best fopr a stable defence system" [sic.] (DC_E0065)

Response. Please see response to K.3.7.

K.3.9 Administrative

Summary. Several commenters submitted inquiries via e-mail or phone for administrative requests. Some of these commenters requested hard copies of the Draft BMDS PEIS. Other commenters requested additional information about the location of public hearings or whether the comment period had been extended.

Examples. "Please send me a copy by air mail if you have not already done so." (DC_E0001), "I would like to have a hard copy of the 'Ballistic Missile Defense System Draft Programmatic Environmental Impact Statement' (1 September 2004) sent to me as soon as possible- by the fastest shipping method." (DC_E0002), "I would definitely be interested in going to the hearing." (DC_E0028)

Response. Requests for alternate means of reviewing the Draft BMDS PEIS were accommodated. Responses were provided to individuals requesting additional information about the location of public hearings and the scheduled closure of the public comment period. While these comments were noted for the administrative record they do not require a substantive reply in this PEIS.

K.3.10 BMDS as a Technology Will Not Work

Summary. Several commenters expressed their belief that the technologies used as part of the BMDS would not be effective against threat missiles. Some of these commenters stated that additional realistic testing should be conducted prior to making a decision to deploy the BMDS.

Examples. "With its questionable record so far in testing, MDA, which MUST work nearly perfectly all the time to not only be effective, but safe, should not go forward." (DC_E0019), "I have read about the total unfeasibility of this program. The precision in timing and location needed in order to intercept a missile makes this an unrealistic program, especially considering the outrageous costs of it.” (DC_E0050), “There will be a "phase lag" between the time the modified software can be developed and the time it can be installed and tested; the requirement for the continual upgrading of software alone makes it unlikely that the system can be considered operational any time soon.” (DC_E0076), “"A defense that does not work against a threat that does not exist"” (DC_E0077)

Response. This PEIS does not address issues related to DoD threat assessment policy or the technological feasibility of missile defense design. These comments regarding the technological feasibility of defeating threat missiles are the opinion of the commenter, were determined to be outside the scope of the BMDS PEIS and therefore do not require a substantive response. MDA has considered the environmental impacts of system integration flight testing in this PEIS. This testing would help MDA fine tune the various systems components of the BMDS and continue to identify additional functional capabilities needed to assure the security and efficacy of the system. However, the President made the decision to deploy a limited defensive capability to ensure the safety and security of the U.S. homeland while the system was being further developed and tested. Also, because the BMDS is a spirally developed defensive system there may never be the ultimate deployment of a single architecture or even of a set of system architectures. Continuous improvement, technology development, and testing are critical to MDA’s development of the BMDS.

K.3.11 BMDS Encourages Terrorism, Threatens Global Stability, and Perceived as Threat by Other Nations

Summary. Several commenters expressed that the development of a BMDS would encourage those who wish the U.S. harm to resort to terrorist activities in lieu of using missiles. Some concerns were raised that the BMDS does not address the current threat against the U.S. In addition, some commenters expressed that the BMDS would lead to global instability.

Examples. “If it works, or is suspected by potential antagonists to possibly work, their response will be twofold. First, they will multiply offensive missiles, ratcheting up the catastrophically expensive arms race. Second and more importantly, they will divert their energies to produce sub-radar cruise missiles and, worse, divert their energies to smuggle WMD across our borders, weapons with no return addresses and zero warning time.” (DC_E0007), “Star Wars will breed hostility to those nations implementing it and to those who "host" the stations needed for the program to run (e.g. Fylingdales in Yorkshire, UK) - this is not welcome when we want to encourage peace, not war” (DC_E0017), “It is an insane response to security concerns and will make things more unstable.” (DC_E0055)

Response. These types of statements the opinion of the commenter and thus are not appropriately addressed in an environmental analysis. Therefore, comments concerning the potential effect of the BMDS on terrorism or global stability were determined to be outside the scope of the BMDS PEIS and do not require a substantive reply.

K.3.12 Opposed to Weapons in Space or "Star Wars"

Summary. Several commenters expressed that they were opposed to deploying weapons in space. Some commenters encouraged space to be used only for peaceful purposes including space exploration and commercial applications.

Examples. "Space should never be militarized." (DC_E0011), "No weapons in space!" (DC_E0024), "I support the "No Action" alternative to missile defense systems, especially those that would utilize space." (DC_E0036), "Please stop the militarization of space now." (DC_E0038), "The planet, the human race, all of life on this unique place called Earth cannot survive one country's global dominance from space or the use of nuclear weapons from anywhere. I fear this is simply another scheme to make a few people rich -- the corporations who get the contracts, the corporations who benefit from mining the moon." (DC_E0055)

Response. Alternative 1 would not include the use of space-based weapons while Alternative 2 would include the use of weapons from space-based platforms. While this PEIS considered two implementing alternatives for the BMDS, this PEIS performed an environmental analysis, not a policy analysis of the alternatives. The comments that were collectively summarized and grouped as *"Opposed to Weapons in Space"* were comments that expressed a philosophy, value, or opposition to an action. These comments were not substantive comments on the scope of the *environmental analysis* in this PEIS regarding the use of space-based weapons but rather statements against the *policy* of using space-based weapons. These comments appear to fit within the definition provided for non-substantive comments, i.e., comments that express a philosophy, value, or support or opposition for an action; therefore, it would appear to be appropriate to include them in this grouping. These types of issues are not part of the decision to be made in this environmental analysis. Therefore, these comments were determined not to require a substantive reply.

Other commenters may have provided substantive comments on the use of space-based platforms either as they relate to debris production or other issues of concern. These comments will be addressed as part of Section K.4 of this Appendix.

K.3.13 BMDS Does Not Defend Against a Realistic Threat or Provide Safety for the U.S.

Summary. Several commenters expressed that the development of a BMDS would not defend against a realistic threat or provide safety for the U.S.

Examples. "The prospect of having weapons in space threatening anyone on earth will not enhance our security, but rather further destabilize our relations with other nations…" (DC_E0039), "Furthermore, the construction of such a system is liable to increase the danger to our own country by goading potential enemies to build bigger and better missile systems of their own." (DC_E0096), "The proposed system will promote a false sense of security…" (DC_PHO0027), "…[the BMDS] would not offer any protection for a more likely sea-platform launched attack." (DC_E0180), "Anyone serious about protecting the United States, not to mention other people in the world, would be making some effort to reduce the global spread of weapons, especially these weapons of mass destruction which don't even have a real world threat against which to defend." (DC_E0182)

Response. These types of statements are the opinion of the commenter and are thus not appropriately addressed in an environmental analysis. Therefore, comments concerning the ability of the BMDS to defend against a realistic threat or provide safety for the U.S. were determined to be outside the scope of the BMDS PEIS and do not require a s

K.3.14 Realistic Testing Should be Conducted Prior to BMDS Deployment

Summary. Several commenters expressed that realistic testing of BMDS components should be conducted prior to deployment of the BMDS.

Examples. "…should the decision be made to pursue the program that a more realistic testing program be developed and carried out as a part of the development program." (DC_E0156) "I urge everyone concerned to halt all missile defense system deployment until realistic testing is completed and the system is demonstrated to be very successful under realistic conditions, including likely countermeasures such as decoy targets." (DC_E0440) "The worse aspect is the rush to deployment before components have been tested fully." (DC_M0001)

Response. This PEIS considers the environmental impacts from possible realistic testing scenarios that could be used to test the BMDS. However, this environmental analysis is not the appropriate venue to determine the outcome of testing and thus to determine when or how to deploy an integrated BMDS. Therefore, comments concerning deployment of the BMDS only after successful realistic testing were determined to be outside of the scope of the BMDS PEIS and do not require a substantive reply.

K.3.15 Generic Comments on Environmental Issues

Summary. Several commenters presented general concerns about the potential environmental impacts associated with the development, testing, deployment, and decommissioning of the BMDS. Comments that were identified under this category tended to be statements of opinion and were not supported by scientific evidence or were not specific comments on the analysis presented in the PEIS.

Examples. "In considering the Environmental Impact of the proposed BMD system, the PEIS should address the full extent of possible environmental impacts on our planet and the proposed surrounding outer space intended field of operations" (DC_E0424), "Even if MD does work, the likely health and environmental consequences of the fallout from an intercepted missile (potentially with a nuclear, biological or chemical warhead) being dispersed over populated areas render the system unacceptable." (DC_F0007), "Deployment of such a system threatens a new nuclear arms race, puts the global environment at risk, and does not improve the security of the United States." (DC_E0343) "Deployment of the Bush administration's proposed missile defense system threatens the global environment." (DC_M7903)

Response. Many of these general or non-specific environmental issues are considered in the PEIS. Some resource areas including Cultural Resources, Environmental Justice, Land Use, Socioeconomics, Utilities, and Visual Resources are more appropriately considered in site-specific environmental documentation. Each of these was discussed regarding methodology and thresholds for significance to provide a "roadmap" for performing future site-specific analyses tiering from the PEIS. The following resource areas were considered in the PEIS: Air Quality, Airspace, Biological Resources, Geology and Soils, Hazardous Materials and Hazardous Waste, Health and Safety, Noise, Transportation, Water Resources, and Orbital Debris.

The PEIS analyzes the environmental impacts of the implementation of the BMDS under Alternative 1 in Section 4.1.1, this includes the use of weapons, sensors, C2BMC, and support assets for all of the resource areas described above. The environmental impacts of Test Integration under Alternative 1 are analyzed in Section 4.1.2. The impacts of activities at Locations Outside the Continental U.S. are discussed in Section 4.1.3. The cumulative impacts associated with Alternative 1 are considered in Section 4.1.4. The environmental impacts associated with Alternative 2 are addressed in Sections 4.2.1 Impacts Analysis, 4.2.2 Test Integration, and 4.2.3 Cumulative Impacts. The impacts of the No Action Alternative are addressed in Section 4.3.

K.3.16 "Voting" for Alternative 2

Summary. Commenter indicated support for Alternative 2 as presented in the BMDS PEIS.

Examples. "I would encourage our government to continue research and development of a space based weapons system or systems based on the needs of the United States as outlined by the Joint Chiefs of Staff." (DC_E0353)

Response. Please see response to K.3.7.

K.3.17 In Favor of BMDS

Summary. A few commenters stated that they were in favor of the testing and/or development of missile defense technologies including those proposed for the BMDS.

Examples. "I am writing today to support the the [sic.] deployment of the missile defense system." (DC_M7808), "I believe we should have a limited missle [sic.] defense system capable of defending the USA and our allies from a small scale missle [sic.] attack (50 or fewer missles [sic.]." (DC_M7712) "I am writing today to support the missle [sic.] defense system." (DC_M7739), "Therefore, I fully support the Bush Administration's plans for missile defense." (DC_M7843)

Response. As stated in Section 1.2 of the Draft BMDS PEIS, on January 2, 2002, Secretary of Defense Rumsfeld issued a directive to the DoD to establish a single development program for all the work needed to design, develop, and test elements of an integrated BMDS that would operate under a newly titled MDA. Therefore, it has been determined that a BMDS should be developed. This PEIS considers the environmental impacts of various implementing alternatives for such a system. Therefore, comments expressing a favorable opinion of the BMDS and other related policy issues were determined to be outside the scope of this environmental analysis.

K.3.18 Miscellaneous Issues or Topics

Summary. Several commenters provided comments that were determined to be on issues or topics that did not pertain to the BMDS. These comments were determined to be out of scope. Examples of these comments are provided below.

Examples. "Likewise destroying the population of the earth through AIDS Ebola, SARS, Anthrax, Chemtrails, lethal drugs, deadly vaccines programmes, fluoridation of water, etc should also be halted forthwith." (DE_E0198), "…We have programs now that have technology that can actually change the way that we think. We have to choose that. It's a choice we have to make. But we can actually change from a victim mentality to a very powerful mentality in taking responsible for our actions. This kind of technology is also available in Israel and practiced on a regular basis all over the world through a program called Landmark Education. There is also a program called the HeartMath that teaches thinking through the heart, as opposed to strictly through the head…." (DC_PHO0034) "…In a little joke on the refrigerator where a man is standing on stage and he's asked to play a concerto. He says, "Don't make me come down there" to the audience. I'm going to go down there. I don't know how successful I will be. But maybe if everybody who lives in Sacramento will call Mr. Mort Salisman and leave messages on his machine and ask him why nobody was here and why Channel 3 and Channel 10 didn't come either. I don't know what they're doing but I know -- I don't know. I don't think so because they checked the list…." (DC_PHO0035) "…The World's first thermonuclear device utilizing hydrogen fusion, a project code-names Mike, was detonated on Enewetak in 1952….” (DC_PHW0012)

Response. Because the subject matter of these comments did not pertain to the BMDS they were determined to be out of scope or non-substantive and are therefore not considered further.

K.4 In Scope Comment Documents

Comment documents that contained substantive comments that were determined to relate to the scope of this PEIS were identified.[3] These comment documents are reproduced in Section K.4.1. In general, comments that addressed the resource areas analyzed in the Draft BMDS PEIS, feasible alternatives, relevant laws and regulations, and specific comments relating to the impacts analysis, were considered in scope. Responses to in scope comments are provided in Section K.4.2. Section K.4.2 includes the comment document number and sequential number of the comment, the resource area addressed by the comment, the text of the comment, and MDA’s response. Where appropriate, revisions to the Final BMDS PEIS were made in response to these comments. Note that the names and addresses have been removed from the reproductions to protect the privacy of the commenters.

K.4.1 Reproductions of Comment Documents Containing In Scope Comments

[3] Note: responses to comments from Federal agencies are provided in Section K.5 of this Appendix.

DC_E0030

Johnson, Kathryn

From: Dwight Rousu
Sent: Wednesday, September 22, 2004 12:23 AM
To: mda.bmds.peis
Subject: MDA BMDS PEIS

1) The new Star Wars program as outlined in the PEIS will be destabilizing thus creating new momentum to move the deadly and dangerous arms race into the heavens. This will create more global instability and nuclear materials accumulation and contamination around the world.

2) Testing and deployment of weapons in space will create massive amounts of new space debris making the environment of space even more contaminated and thus unavailable for future space flight.

3) This new Star Wars plan will be extraordinarily expensive requiring massive cuts in environmental clean-up of other problems, with the many drastic environmental impacts that would cause.

4) The likely use of nuclear power for eventual space-based weapons would be a long term environmental disaster.

5) Space-based weapons, described in the PEIS as being "defensive", could easily serve an offensive purpose as outlined in the Space Command's Vision for 2020 that says the U.S. will "deny" other nations the use of space.

6) Toxic rocket exhaust pollution is now contaminating the Earth and punching a hole in the ozone layer. This plan would dramatically expand these polluting launches.

7) Offensive tactics such as new decoys, maneuvering warheads, concurrent high altitude nuclear bursts to disable sensors, all make the probability of complete success of the BM defense almost zero.

8) Unless the offensive missiles are sensed on launch and destroyed during boost, the dirty bomb effects will rain on the targets anyway; and the proposed system is not designed to intercept during boost.

9) Other offense delivery mechanisms like suitcases in a shipping container, were not addressed, and would probably be more effective.

DC_E0030

10) The environmental effects of the X-band radar upon people and birds have not been thoroughly studied.

11) The conservative cultist and Republican affectionado, Sun Myong Moon, has helped the North Koreans obtain submarines; so the launch points and trajectories for which the system was planned can be circumvented, yielding the system worthless.

12) Shifting alliances and politics may make Russia, China, India, Pakistan, or any of several middle east countries more of a threat than North Korea. Alternatives to world-ending war mistakes are needed, not infinite arms building around the world.

13) For all these reasons I support the "No Action Alternative."

Dwight Rousu

I would rather live with uncertainty than with answers that are wrong. (from Feynman)

DC_E0142

Johnson, Kathryn

From: michael ibison
Sent: Sunday, October 31, 2004 12:47 AM
To: mda.bmds.peis
Cc: ucs@ucsusa.org
Subject: public comments on national security utility of ballistic missile defense system

Dear Sir / Madam

I request that the following be added to the record of public comments as part of the initial assessment of the feasibility of the proposed ballistic missile defense system currently under consideration by the present (Bush) administration.

My credentials are that I have a Bachelors in Electronics and a PhD in physics. I spent 10 years in automatic image analysis, and have authored several publications and some patents in that field - in addition to papers I have authored in physics. A large part of that 10 years was spent working for a defense company, some of which on a DARPA project, developing automatic image analysis with potential applications for intelligent weapons guidance. I was awarded a research scholarship at Princeton University, and currently work for a non-profit research institute in Austin, Texas.

In the following, the term `image' applies to any time-evolving 2D array of data captured by optical, infra-red, and microwave sensors.

Very briefly, it is my perception that the state of the art in automatic image analysis is such that reliable object recognition is possible only in well-controlled environments wherein the quiescent illumination, the clutter, and preferably the orientation of the target object are under control. These environmental constraints obviously cannot be imposed on a ballistic missile defense system, and therefore one should be very skeptical of claims that enemy missiles can be reliably identified. To the extent that the proposed system depends on automatic detection of enemy missiles, it is very unlikely that it will be reliable, given the present state of the art.

No doubt more reliable methods will be developed in future. But I urge an honest evaluation of the current test data, and realistic assessment of possible future improvements, uncorrupted by commercial and political influences.

Yours Sincerely,

Dr. Michael Ibison

DC_E0158

Johnson, Kathryn

From: Arne Soderman
Sent: Thursday, November 04, 2004 6:28 PM
To: mda.bmds.peis;
Subject: Public Comment on Space based missle defense system

To whom it may concern:
My name is Arne Soderman. I'm working and living in Portland, OR. After reviewing this plan for a space-based missle defense system I have criticisms that are not remedied by any option you've given the public. Of the three choices, I am compelled to support the "No Action (#3)", as it is the least destructive to the environment.

Acquiring the necessary materials, construction, and especially deployment of these systems into space are uneqivocally harmful. Rockets emitting a plethora of chemicals, continue to punch holes in our thinning ozone layer; and that which falls to the earth poisons our groundwater and rivers (perchlorate). Intensifying this for enemies non-existant (for no good reason) would be pointless destruction.
Larger objects that return to earth, or stay in orbit present problems as deadly space litter travelling at thousands of miles per hour, or hundreds as they strike the earth. Space litter has already killed (when Mir was left to gravity) and more only increases the chances of the loss of human, animal, and plant life as objects fall where they may.

The detonation of these weapons destroys the environment in a way that makes the above concerns seem silly. Nuclear winter is the end of human kind.
When we threaten others with nuclear devices, we are responsible for the nuclear devices that they come to possess. When we detonate first, that which happens as a result is also our responsibility. This missle defense system is advancing the world towards nuclear proliferation. We should abandon all weapons nuclear, and return to the United Nations Disarmament Treaty process. I can't support anything but a True "NO ACTION".

sincerely
Arne Soderman

____

Johnson, Kathryn

From:	Michael Jones
Sent:	Friday, November 05, 2004 1:46 PM
To:	mda.bmds.peis
Subject:	comments on the draft BMDS PEIS

5 Nov. 2004

via E-mail to: mda.bmds.peis@icfconsulting.com MDA BMDS PEIS c/o ICF Consulting 9300 Lee Highway Fairfax, VA 22031

Below are my comments on the draft Programmatic EIS (PEIS) for the Ballistic Missile Defense System (BMDS). Some of the PEIS deficiencies could be fixed by changes to the draft but this document comes so late in BMDS development and testing that it is largely irrelevant. Section 1.2 shows that environmental analyses have already been done for most components; notable exceptions are Aegis BMD and space-based weapons.
Development and testing of most components are well underway and decisions about initial deployment of GBI's and Aegis BMD ships have been made. The spiral development process which, according to the PEIS (page ES-7) allows MDA to "consider deployment of a missile defense system that has no specified final architecture and no set of operational requirements,"
seems to preclude any meaningful assessment. The PEIS could make a useful contribution by analyzing how to judge the effectiveness of a system with no operational requirements.

Another major general deficiency is that the No Action alternative is not considered seriously. It is asserted on page 2-67 that it "would not meet the purpose of or need for the proposed action or the specific direction of the President and the U.S. Congress." Footnote 19 on page
1-6 quotes the part of the 1999 Missile Defense Act which declares a policy to "deploy as soon as is technologically possible an effective NMD system." It is noted on page 1-6 that Pres. Clinton decided in Sept. 2000 not to authorize deployment of an NMD system for reasons including technical uncertainties and unsuccessful flight tests. Two GAO reports in
2003 and a Union of Concerned Scientists report Technical Realities in May
2004 raise serious questions about the readiness for deployment of current NMD components. Therefore, it seems that the No Action alternative (which was essentially U.S. policy until 2002) is preferable until one can demonstrate that an "effective" NMD is "technologically possible." The most recent NMD intercept attempt failed on 11 Dec. 2002, six days before Pres. Bush announced that the U.S. would deploy an initial NMD system. The test results so far and independent analyses suggest that it is at least questionable whether an effective NMD system is possible.

Detailed comments follow.

1) The PEIS should give quantitative information on the reliabilities of the boosters to be used to launch targets for BMDS tests. I noted in my scoping comment (See first comment on page B-15 of the draft PEIS.) that I had asked for this information in my comments on the 1994 BMD draft PEIS and that the response was inadequate for any meaningful assessment of the risks from launch failures. This information is especially important to include in the PEIS because the same target boosters are used in various test programs and because the information has not been included in previous environmental analyses. I noted in my comments on the 2003 GMD ETR draft EIS that an analysis of Minuteman test launches found a rate of severe failures of 15% and that the Strategic Target System has had one serious failure
(9 Nov. 2001 launch from Kodiak) in five launches. Including my scoping comment in exhibit B-9 as a health and safety issue seems to imply that this aspect should be analyzed in the PEIS. At the 26 Oct. public meeting in Honolulu, I was assured that including booster reliability information would be considered.

2) The PEIS should examine in detail treaty compliance of various BMDS tests. The draft

PEIS has no discussion of INF Treaty restrictions on long-range air-launched and sea-launched targets or START Treaty restrictions on sea-launched targets even though I raised this issue in my scoping comments. (See fourth comment on page B-15.) The GMD ETR EIS did not consider treaty compliance despite the fact that previous analyses
(1994 TMD ETR EIS and 1998 TMD ETR Draft Supplemental EIS) did consider this issue. The 1994 TMD ETR EIS refers to the INF treaty prohibition of air-launched and sea-launched missiles with ranges between 500 and 5,500 kilometers. The 1998 TMD ETR DSEIS notes that the START treaty prohibits launches from sea-based platforms and that launches from ships are restricted to ranges less than 600 kilometers. If subsequent compliance reviews of air-launched and sea-launched targets have been done, they should be discussed in the PEIS and references to them should be cited.
I was assured at the 26 Oct. meeting in Honolulu that this would be considered.

3) The PEIS discussion of cumulative impacts in section 4.1.4 and Appendix I has no details about the location, schedule, and specific missiles to be used for the estimated 515 launches from 2004 to 2014. This is important because there are annual limits on the numbers of launches at the Pacific Missile Range Facility (PMRF), Kodiak, and Vandenberg AFB, as noted in the GMD ETR EIS. The GMD ETR EIS estimated 10 launches per year so the PEIS needs to give some details about the additional 415 launches. Some information about future launches for tests of some BMDS components is provided in Appendix D. However, there are no estimates for Aegis BMD tests and only vague estimates for GMD tests. For example, it is stated on page D-25 that, "GMD test plans include a number of missile-launches (interceptors and/or targets) from each launch facility per year." The PEIS should also include impacts of test launches of offensive missiles.
For example, tests of the Trident D5 are reported to be planned near PMRF in 2005.

4) Page D-15 of the PEIS contains misleading information about previous NEPA analyses related to Aegis BMD. It cites the 1998 PMRF Enhanced Capability EIS as a supporting NEPA analysis. In fact, this EIS explicitly excluded the Navy Theater-Wide System (now called Aegis BMD) from evaluation. No subsequent environmental analysis has been done even though Aegis-LEAP tests have been done near PMRF. The PEIS should indicate when environmental analyses of this system will be done. Press reports have indicated that 20 sea-based midcourse interceptors are scheduled for deployment in 2005. The PEIS states on page D-19 that three Aegis BMD cruisers and 15 Aegis BMD destroyers would be available for deployment at the end of Block 2004.

5) The PEIS has no discussion of the unresolved safety issues involving Strategic Target System and THAAD launches at PMRF which I noted in my scoping comments (second comment on page B-15). No detailed hazard areas have been shown for Strategic Target System launches at azimuths other than 280 degrees. Similarly, no diagrams showing the THAAD hazard area were given in the 2002 THAAD EA and no detailed analysis was cited to justify the reduction in the hazard area radius from 20,000 feet in the
1998 PMRF EIS to 10,000 feet in the THAAD EA. There can be no meaningful public evaluation of the risks of such launches without this information.

6) The PEIS contains a short discussion of future laser weapon systems (page F-7) and the Tactical High Energy Laser (page F-9). It notes that testing of a laser demonstrator began in 2000. The PEIS should review these tests and testing plans for other high-power laser weapons and other directed-energy weapons. An article in the 18 Dec. 2002 Jane's Defence Weekly indicated that a megawatt-class free-electron laser could be tested at PMRF in two to three years.

7) In addition to "hit-to-kill" interceptors and directed-energy weapons, there have been reports that interceptors armed with nuclear weapons are also being considered for missile defenses. The PEIS should indicate what research and development work is being planned for such weapons as part of the Advanced Systems in Appendix F. How would such systems be tested without violating the Limited Test Ban Treaty and the Comprehensive Test Ban Treaty?

8) In 2002 the Defense Dept. announced that it would classify details about missile defense tests that had previously been public information. How can the public and independent technical analysts assess the impacts of tests and judge the effectiveness of BMDS components if this information is unavailable? Similarly, how can one estimate the impacts of entirely secret programs?

9) There are egregious errors in Exhibit 4-11 on page 4-102. There is an addition error

in the line for HCl emissions. The more serious error is that the total emissions of 115 kilograms for the representative interceptor is too small by a factor exceeding 100. Table 4.1.1-8 of the
2003 GMD ETR Final EIS gives total stage 1 exhaust emissions of greater than 15,000 kilograms. The GBI analyzed in that EIS had a total propellant mass of 19,767 kilograms of which 15,069 was in stage 1. The PEIS notes on page D-20 that each GBI may contain up to 20,500 kilograms of solid propellant. Exhibit 4-11 should be corrected; the information for BMDS launches in Exhibits 4-13, 4-14, and 4-15 may need correction if it is based on the interceptor data in Exhibit 4-11.

10) The brief history of U.S. missile defense activities in section 1.2 excludes any mention of critical technical analyses of components and testing of them. For example, the 1998 report of the Pentagon panel headed by Gen. Welch characterized the inadequate preparation for flight tests as a "rush to failure." Two GAO reports in 2003 (GAO-03-441 and GAO-03-600 available at www.gao.gov) questioned the adequacy of testing and readiness for NMD deployment. The May 2004 report Technical Realities (available at www.ucsusa.org/global_security/missile_defense/index.cfm)
by the Union of Concerned Scientists provided a critical analysis of the NMD system being deployed. It is noted on page 1-7 that Pres. Bush's
17 Dec. 2002 decision to deploy an initial defense capability followed "continued test bed development and successful flight test activities."
It should be added that this decision followed by six days a test failure and that the test record so far is five intercepts in eight attempts.

11) The brief history of the Lightweight Exoatmospheric Projectile (LEAP) program on page D-17 states that tests in the early 1990's showed that LEAP "could be integrated into a sea-based tactical missile for ballistic missile defense." In fact there were no successful intercepts in five attempts in these tests. Two successful Aegis LEAP intercept tests in 2002 are described but there is no mention of the intercept failure on 18 June 2003.
The Aegis LEAP test record so far is four intercepts in five attempts.

12) It is stated on page D-40 that there were eleven THAAD flight tests in the 1990's and that, "Upon successful intercept, the THAAD program began planning to validate the performance capability and overall effectiveness of the THAAD element, flights tests, and intercepts of target missile launches over more realistic distances..." Of the eight intercept attempts in the 1990's tests, there were only two hits.

13) The example test scenario on page 2-13 involves use of the Cobra Dane radar. However, the August 2003 GAO report GAO-03-600 noted that there were no plans to test this radar using BMDS targets. Are such tests now planned in the next ten years?

14) The details of integrated flight test events are characterized as "only conceptual at this time" on page 2-50. Some test scenarios examined in the
2003 GMD ETR EIS had jet routes between Hawaii and the West Coast crossing the target and interceptor debris areas. What details about these tests will be made available for public evaluation?

15) Section D.2 has a brief discussion of land-based and sea-based Kinetic Energy Interceptors (KEI) for use as possible components of a boost-phase defense. It should be noted that a study of possible boost-phase defenses -- including surface-based and space-based KEI -- found that they would have limited capability against liquid-fueled ICBMs and were unlikely to be practical against solid-fueled ICBMs. This study was done by an American Physical Society study group and was released in July 2003. It is available at
www.aps.org/public_affairs/popa/reports/nmd03.cfm

Please acknowledge that you have received these comments.

Michael Jones

DC_E0179

Johnson, Kathryn

From: larry ebersole
Sent: Monday, November 08, 2004 2:46 PM
To: mda.bmds.peis
Subject: PEIS Comments Corrected Version Please Use Only This Copy

Note from Laurence H. Ebersole: This is my corrected comment. Please disregard the previous one sent today. I was misinformed about Alternative Three being a no project alternative. Rather, I want to point out that the entire project is Flawed and should be Halted (alternative three merely continues the existing programs without halting them).

Laurence H. Ebersole

November 8, 2004

Dear Consultants:

RE: Comment on Ballistic Missile Defense System.

As I understand the situation, public comments are invited to help with the review of the proposed, Ballistic Missile 'Defense' System.

I believe that halting the project is the best option.

My concerns are both substantive and technical. First my substantive concerns.

I) I think, the World Court Decision of 1996, along with customary international law, and binding treaty, all require that the United State's along with all stated nuclear powers, disarm nuclear weapons; not build more, or make technological shields against the use of nuclear weapons. Goals, and specifics for this nuclear disarmament can be resolved without further delay, since the ground work is already part of the history of arms control, and disarmament agreements.

Therefore, to implement, for instance, Article IV of the Nuclear Non Proliferation Treaty, and to completely ratify the Comprehensive Test Ban Treaty, are a best shield against nuclear weapons ever being used, or the thereat of use of these weapons. Please remind the proponents of this weapons system to uphold these international agreements. Please do not violate these agreements by constructing, planning to construct, the proposed missile 'defense' systems.

II) Technologically, the concept of a missile defense is flawed for an Anti-Missile Missile System. The system can be used as a first strike system, and be viewed this way, thus, contribute to weapons proliferation. The system will drain public funds further away from humane uses like higher education, social rehabilitation, environmental cleanup, child care, health care -- the economic, social, and cultural

DC_E0179

human rights asserted in the Universal Declaration of Human Rights (Articles 23 & 25 among others). The system is not needed and is a "pork" program for the profits of the weapons makers. The system contributes to pollution and greater atmospheric ozone destruction, at a time when the impacts of global warming are reasons to be concerned. The system involves radionuclide's and nuclear elements which are toxic, and themselves can burn and potentially causes public health problems.

Conclusion: Please implement a Halt to all further development to design, building, planning, deployment, of a first strike weapons system known as the Anti Missile Missile System (the ballistic missile 'defense' system).

Yours Sincerely

Laurence H. Ebersole
Writer & Counselor

cc: Congressman McDermott

Do you Yahoo!?
Check out the new Yahoo! Front Page. www.yahoo.com

DC_E0186

Johnson, Kathryn

From: Paige Knight,
Sent: Monday, November 08, 2004 6:40 PM
To: mda.bmds.peis
Subject: PEIS on the Balistic Missile Defense System: Public comment

Hanford Watch
November 8, 2004

I am commenting on behalf of our organization on the Alternatives being proposed by the government on continuing on with the building of the BMDS as well as choosing from among your proposed options.

We are against all of the proposed alternatives, including the No Action Alternative for the following reasons.

First, this program so far as produced few results for the incredible amount of taxpayer dollars that have been spent since Reagan's Presidency. Much of the thinking behind this pork project has been based on flawed premises and illusions of grandeur by the people who are getting rich off the scheme.

Second, this PEIS is supposed to show the impacts of this project on the environment. According to your charts the impacts will be great on our water, which is becoming a scarce resource (that is, clean water, drinkable water), on our air which is already a hazard to human health for all living creatures and in particular for the children of the planet--the future generation and on the earth in the places it is being built. There will be horrendous impacts from the debris that is left in space and will eventually affect the planet It will impact the oceans and the species that inhabit the ocean. Nuclear power will be used in this project and we to date and in the future have no way to protect ourselves from the extreme and long-lasting hazards of the waste. Yucca Mountain and WIPP will hold only a small portion of all the commercial and defense waste that exists now, not to mention all that will be created in the future by programs of the defense department. It will further degrade the land which sustains us.

Third, this project will further destabilize the globe, which seems to be part of the intent. This program will not save us from terrorists who have no need of the sophisticated weapons that this "shield" is to theoretically protect us from. This program fosters an arms race as well as weapons proliferation rather than deterring other nations or "enemies" from competing with us. . It is part of the double standard by which our government and the defense department operate, only making the world a far less safe place. The real intent of the program according to some of your own documents is to take control of the world by space, land, sea and air as the gulf widens between "the haves and the have not's"--a gamut of policies planned by a group of the administration that is in power at this time.

Finally, this project has and will continue to squander our precious resources, especially our money, our tax dollars while education systems flounder, health care becomes a luxury only for the rich (while we all have our health placed in more jeopardy by such projects. We are living under an incredible deficit which our children will not even be able to make a dent in and will continue on the road to becoming a third world country.

DC_E0186

To continue on with this project as would be the case even under the "no action alternative" is unconscionable. We believe that even if you were to re-do the PEIS, there would be no reasonable alternative other than shutting down the project and calling it the loss it already is.

Sincerely,

Paige Knight, President

DC_E0204

Johnson, Kathryn

From: Rosalie Tyler Paul
Sent: Tuesday, November 09, 2004 9:45 AM
To: mda.bmds.peis

It is my understanding that Alternative 3 means "no change" so that all programs continue as planned. This is not acceptable. The statement must be rewritten to allow for a true "no action" choice....meaning NO R&D or Production of the missile defense program, no weapons in space!

Rosalie Paul, Georgetown, Maine

The PEIS considers three options:

Alternative 1, missile defenses without space-based weapons.
Alternative 2, missile defenses with space-based weapons.

Alternative 3, no action.

DC_E0211

Johnson, Kathryn

From: wfudeman
Sent: Tuesday, November 09, 2004 4:38 PM
To: mda.bmds.peis
Subject: Missile Defense- Rewrite entire PEIS, please. stop funding Star WArs

The PEIS must be rewritten, because the "No action" alternative is insufficient. The most appropriate choice is to stop all funding of Star Wars Missile defense.

The extraordinary expense of this program is inexcusable, and should be discontinued. The entire program will do far more harm to the entire world and US security than if it were discontinued.

To develop missile defense at this level will move the arms race to space, and will destabilize an already unstable world.

The use of nuclear power to propel the missiles and the likely debris we would be releasing into space is environmentally, a disaster.

I want no more of my tax dollars to support this foolish program. Please rewrite the PEIS to allow the sanest alternative- scrapping this program entirely- to be a choice. The best choice.

Thank you.

Sincerely,

Will Fudeman

DC_E0216

Johnson, Kathryn

From: Doctress Neutopia
Sent: Tuesday, November 09, 2004 2:19 PM
To: mda.bmds.peis
Cc: Doctress Neutopia
Subject: Comments of Star Wars

To whom it may concern:

The night sky is a beautiful sight. It brings a sense of wonder and awe for a universe our species is only beginning to know. There is so much we don't know, but one thing we better learn quick is how to live in peace. Going ahead with Bush's Star Wars plan brings war and nuclear power into Outer Space. It makes other nation-states afraid of what the US might do. It could start another Cold War. Anyone with a heart and knowledge of science knows that bombs in Outer Space is a violation of the life force.

Deployment of these new weapons litters the atmosphere with space junk, just what we don't need in a world that already doesn't know how to recycle most of its rubbish. When people around the planet are starving and homeless, why spend an extraordinarily amount of money on a program that helps nobody? The flumes from the fuels only comes back to Earth and makes us sick. Isn't it time we wised up and stopped killing ourselves?

For all these reasons I believe the "No Action Alternative" is insufficient and the entire PEIS should be rewritten.

Doctress Neutopia
Libby Hubbard, EdD

DC_E0231

Johnson, Kathryn

From:
Sent: Wednesday, November 10, 2004 8:38 AM
To: mda.bmds.peis
Subject: Star Wars
Mary West

The definition of no action to me is to STOP WHAT IS NOW BEING DONE!!!

DC_E0233

Johnson, Kathryn

From: Anne Brotherton
Sent: Wednesday, November 10, 2004 9:46 AM
To: mda.bmds.peis
Subject: NOT ACCEPTABLE!

None of the three options for PEIS is acceptable! The third is the most dangerous because it is so deceptive, meaning "business as usual." Let's scrap this entire frivilous program and get on with the vital business of remediation of the mistakes of the past four years and prevention of more of the same during the second Bush administration.

Anne Brotherton

DC_E0262

Johnson, Kathryn

From: Don Stephens
Sent: Thursday, November 11, 2004 3:44 PM
To: mda.bmds.peis
Subject: MDA BMDS PEIS comments

To Whom It May Concern,
I am writing in opposition to the three options of the MDA BMDS PEIS, including the No Action option, since it is in reality not a true No Action as it includes continued development of interceptors.
I urge you to revise these options with more concern for the environmental damages that will result from these actions.
Thank you.

Don Stephens

DC_E0270

Johnson, Kathryn

From: Paul Cunningham
Sent: Thursday, November 11, 2004 8:44 PM
To: mda.bmds.peis
Subject: why no?

Stop the madness!!! We do not need weapons in space. That would only create an entirely new arms race. If selling weapons is all one cares about this is the goal. It has been agreed internationally to use the heavens for only peaceful endeavors. Common sense reveals many problems here on earth that need attending to, and with our government already overspent it makes no sense. the biggest concern is that this "defense" system is just another offensive weapon, adding to our already illegal slant toward preemtively blasting whomever we say is the criminal of the day. How do we know of this intent? because the defense missiles have failed all attempts to hit other missiles, the only answer is that someone wishes to have space-strike capability.

The"No Action Alternative" is insufficient and the entire PEIS should be rewritten.

No nukes in space!!!!!!

Paul Cunningham

Do you Yahoo!?
Check out the new Yahoo! Front Page. www.yahoo.com

DC_E0319

Johnson, Kathryn

From: cheitman
Sent: Monday, November 15, 2004 1:40 AM
To: mda.bmds.peis
Subject: Oct. 14, 2004 BMDS Draft PEIS Comments

Carolyn Heitman

October 14, 2004

Sent E-mail to: mda.bmds.peis@icfconsulting.com

Enclosed are my comments on the BMDS Draft PEIS.

The MDA did a very poor public relations job in regard to getting the word out on the availability of the Draft PEIS and on the October 2004 public hearings in what will be the affected BMDS test communities. The public cannot make comments on something they do not know exists if it is not well advertised in advance (e.g. notices in newspapers). Holding public hearings in Anchorage, Alaska when the BMDS test site is located on Kodiak Island, Alaska, and in Sacramento, California when the test site is at Vandenberg AFB near Los Angeles, showed the MDA's intent was to make it as difficult as possible for members of the public to travel to the meeting places to testify and give their comments on the Draft PEIS. The MDA put a public notice in the Kodiak Daily Mirror and sent a copy of the Draft PEIS to the Kodiak Island Borough's office only after being urged by local residents. Otherwise, local officials and community members would not have known of its existence. This repetitive MDA behavior is unacceptable.

Some of the issues I wanted to see addressed by the MDA which I listed in my June 7, 2003 comments on the Notice of Intent to Prepare a PEIS for the BMDS were:

(1) Whether or not any *low-yield nuclear material* will be used in the BMDS test systems (boosters, payloads, dummy warheads, satellites, interceptors, targets, radar systems)
(2) Whether or not any *low-yield nuclear material* will be stored at Research Development Test Sites
(3) If *depleted uranium* will be used in/on target missiles, interceptors, satellites, boosters, etc.
(4) If *depleted or spent uranium* will be stored at Research, Development Test Sites
(5) A listing of the Test Sites where target missiles will be launched to be intercepted by the Airborne Laser
(6) Include detailed information on *High-Powered Microwaves* ('Directed Energy') will be used as part of the BMDS and the environmental hazards associated with their transmission into the atmosphere and ionosphere (include human Electromagnetic Radiation (EMR) hazards)
(7) If missiles are being proposed for launch from Fort Greeley, Alaska
(8) Information on proposed BMDS launches from Poker Flats Rocket Range, Alaska

None of the above issues were clarified or answered in the Draft PEIS, so once again-- I am requesting the issues be addressed.

NOTE: Regarding Fort Greeley, Alaska-- is the MDA proposing to launch future 'interceptors' in a 'north trajectory' (or south trajectory), over Alaska native villages from that location? If so, the PEIS should list all safety drop-zones for falling booster stages and proposed trajectory launches, along with what safety steps will be taken to protect natives in their villages. Also include potential cumulative environmental damage to the tundra from falling boosters.

The MDA has never referenced or included discussion on the **INF Treaty MOU** in any previous Ea or EIS in regard to missile defense testing, nor is it discussed in the BMDS Draft PEIS. *Why not? Why is the MDA avoiding*

DC_E0319

this issue? Nor has the MDA referred to or listed the Research and Development test site locations in Alaska on the INF Treaty MOU list (e.g. Kodiak Launch Complex, Alaska and Poker Flats Rocket Range, Alaska). The MDA's avoidance of discussion on these test launch sites, leaves open the question as to whether or not *nuclear material* can and *will* be launched from these test-site locations on future targets, interceptors, boosters, dummy warheads or used in laser systems. The PEIS *should* include information on the INF Treaty, the INF Treaty MOU test locations, plus any proposed future plans to use nuclear material as part of ground-based or space-based BMDS testing. The MDA is projecting test plans up to the year 2014, so it already knows if nuclear material is part of the BMDS test system (power for space-based platforms, lasers, etc).

There has not been an environmental assessment since 2001 (that the public is aware of) regarding the reliability of the STARS missile to justify the continuation of this launch vehicle. The November 2001 STARS launch from the Kodiak Launch Complex resulted in failure (the missile 'exploded' 7 miles off Kodiak's shores after launch and the MDA attempted to cover up the accident). No public reports were released on this launch failure. The STARS missile has not been improved since the early 1990's launch failures from Kwajalein Atoll. This program should be discontinued due to its unreliability, safety hazards, and pollution to air and water.

The BMDS Draft PEIS discusses ground testing of 'portable' lasers, but does not list all the potential test sites. A September 2004 ABC news report stated a Delta Airlines pilot received an eye injury when a laser beam came through the cockpit window on his approach to the Salt Lake City, Utah airport. There have been no further reports regarding where the laser beam originated; However, it leaves open the possibility of whether some ground-based or air-based laser tests were going on at the High Energy Laser Systems Test Facility located at the White Sands Missile Range in New Mexico and the Delta Airlines pilot happened to get caught in the laser's crossfire. Utah and New Mexico are within close proximity in air miles. As stated in the Draft PEIS (Volume 1, page 4-21 thru 4-34), environmental and human health hazards would result from testing air based and ground based 'portable' lasers, which is: cancer causing chemical releases into the air and waters, potential skin burns and retina damage from laser beams and/or laser 'scatter', hazards to commercial and other aircraft, birds, plants and wildlife. "Hydrochloric acid produced as a result of the interaction between laser emissions and moisture in the air has the potential to produce impacts on biological resources, including plants and aquatic animals, and water quality" (Draft PEIS Volume 1, page 4-23). "Exhaust emissions from laser activation have the potential to harm human health." "Laser beams can cause serious health problems if they contact the skin or eyes" (Volume 1, page 4-34). The PEIS should include all proposed laser test sites including the BOA, and, what experiments will take place at each site, and the total amount of acreage needed as a safety zone. For example, will the Airborne Laser 'test fire' at targets or interceptors launched from Vandenberg AFB, Kwajalein, Kodiak Island, Fort Greeley, or Poker Flats Rocket Range, Alaska?

The Alaska Aerospace Development Corporation (a.k.a. Missile Defense Agency) has requested jurisdiction over an additional 14,000 acres of Narrow Cape '*public*' land on Kodiak Island, Alaska, over and above the 3,800 acres it already has jurisdiction over. The PEIS should include what type of BMDS testing/activity is being proposed for the Kodiak Launch Complex that would require almost 18,000 acres of public land. Since the request was made *after* the release of the July 2003 Ground-Based Midcourse Defense (GMD)-Extended Test Range FEIS, the reason for the request should have been included in the BMDS Draft PEIS.

The Draft PEIS did not give enough detail on the variations of BMDS 'Directed Energy' weapon systems in Appendix F--'Advanced Systems' (e.g. high-powered microwaves), or proposed ground-based test locations. All proposed plans should be included in the PEIS for directed energy weapons. A high-power 'electromagnetic' phased array radar network is located on Kodiak Island, Alaska, but the MDA has refused to acknowledge its existence or purpose in all previous Kodiak Launch Complex Environmental Assessments since 1999 (when the microwave system started operating). The microwave's 1.9 Mega Watts (MW) of power has the potential to be used as a BMDS weapon by turning on its high power and directing it at a target or missile, thereby disabling the target's electronics and/or 'heating' up the target and causing it to explode in flight. The U.S. Air Force has received funding for several years for its 'Directed Energy' or 'Electromagnetic Warfare' program (which includes high-powered microwave systems). It is time for the MDA to 'declassify' the program and acknowledge the Kodiak microwave and explain how it will be used in BMDS testing and the human health hazards to Kodiak Island residents from the electromagnetic radiation (EMR) when the microwave is operating.

Draft PEIS Volume 2, pages D-25, D-26 (Exhibit D-6) states Ground-Based 'Interceptors' will be launched from the Kodiak Launch Complex (KLC), Alaska. In the Fall of 2003, a press release by the MDA stated only target missiles, not interceptors would be launched from the KLC. No previously released EAs or EISs have included plans for launching interceptors from Kodiak Island.

Kodiak Launch Complex and Kodiak Island issues that should have been discussed in detail in the BMDS Draft

DC_E0319

PEIS are:

(1) Island-wide areas that will be evacuated for exposure for BMDS activity
(2) Health and Safety procedures for exposure to launch debris- especially for potentially affected populated native villages such as Old Harbor and Akhiok
(3) Doing a site-specific operating document (referred to in Volume 2, page H-13)
(4) The potential electromagnetic explosive devices, ionizing and non-ionizing radiation hazards
(5) Hazards and trajectories of interceptors
(6) Special Use Airspace and Domestic Warning Areas

'Generally, sites where activities for the proposed BMDS activities may occur are located far from towns and population centers and are surrounded by open space' (PEIS Volume 2, page H-14).
This does not apply to the Kodiak Launch Complex. The test site is located only a few miles from a populated and State of Alaska recreational area. Cabins, homes, bed and breakfast accommodations are located near the Pasagshak River, which is highly frequented by fishermen and tourist during summer months, and hunters and recreational users during the winter months. Cabins and homes are in year-around use in the winter unless the roads are impassable due to snow coverage. However, this is not expected to be a problem since the road to the launch site has to be accessible to workers (especially in preparation for an upcoming launch). The PEIS needs to discuss proposed BMDS activity on Kodiak Island in detail.

BMDS Draft PEIS Volume 2, Page D-27—Deployment; MDA proposed plans for 2004-2005 include as many as 16 interceptors (GBI) at Fort Greeley, Alaska and 4 interceptors at Vandenberg AFB, California; However, no mention is made regarding the number of interceptors at the KLC. *Why not?* Are missile silos being proposed for Kodiak Island? If so, how many? If not, state the launch method. The safety hazards of launching interceptors from the KLC should have been discussed in the Draft PEIS, considering the high winds which occur on Kodiak Island throughout the year-- peak gusts up to 35 miles per hour in June and 83 miles per hour in December (PEIS Volume 2, Page H-18, Section H.2.1—Air Quality). As Kodiak residents have previously pointed out to the MDA in other EA comments (which the MDA has ignored), launching missile targets, and now possibly *interceptors* in a southwest trajectory down the East side of Kodiak Island would be extremely risky and potentially hazardous should a launch accident occur, because of populated native villages (e.g. Old Harbor and Akhiok) which are within the 'explosive safety hazard zone'.

Include in the PEIS the projected *cumulative impacts* from 'radiation fallout' for all space-based weapon systems (lasers, interceptors, warheads, e.g.).

Page 4-112, Section 4.1.4--Cumulative Impacts, does not give any useful or detailed information regarding the 515 projected BMDS launches during 2004-2014. The PEIS needs to include a breakdown of the 515 proposed launches and where each launch will take place (ground-based, sea-based, and space-based test locations). Where did the MDA come up with the 'magic' number of 515? A total of only 10 launches per year have been proposed from the KLC in previous EA documents (Air Force, Army). The MDA needs to validate and justify the need for 515 launches, considering the fact that 'Emissions from activities for the proposed BMDS include carbon monoxide, sulfur oxides, nitrogen oxides, volatile organic compounds, hazardous air pollutants, and particulate matter'. 'Most sites where activities for the proposed BMDS may occur would be classified as a major emissions source' (BMDS Draft PEIS Volume 2, pages H-18- H-19—Existing Emission Sources)

The Arctic Council comprising government representatives from Canada, Denmark, Finland, Iceland, Norway, Russia, Sweden and the United States, recently completed a report (October 21, 2004, Cambridge University Press), 'Impacts of a Warming Arctic: Arctic Climate Impact Assessment' (ACIA), which stated the Arctic is warming at an alarming rate. Scientists have not determined how much of the warming is due to human influence and how much is due to natural climate cycles, but whatever the cause, it is currently affecting indigenous Arctic people (hunters falling through the melting ice, declining reindeer herds and difficulty traveling in road less regions with no snow for sleds). U.S. Senators John McCain and Joe Lieberman said: "dire consequences of global warming in the Arctic underscores the need for their proposal to require U.S. cuts in emissions of carbon dioxide and other heat-trapping greenhouse gases (Associated Press, November 9, 2004).

The MDA's own admission in the Draft PEIS confirms the fact that: "Launches can contribute to cumulative impacts including ozone completion, global warming, and orbital debris, which could affect global warming and depletion of the stratospheric ozone layer (Volume 2, page I-2—Cumulative Impacts).

DC_E0319

The MDA must discontinue all future BMDS test plans which will contribute to further global warming or contamination in the affected Biomes listed in the PEIS; especially the Arctic Tundra Biome and the Sub-Arctic Taiga Biome-which includes areas of the Aleutian Chain where various radars or sensors are activated or will be activated as part of the proposed BMDS (e.g. Adak Island where the Sea-Based X-Band Radar will be home-ported, Shemya Island where the COBRA DANE is located, and the BOA in the Gulf of Alaska).

The 1990 Clean Air Act Amendments identified 188 chemical pollutants which cause or contribute to cancer, birth defects, genetic damage, and other adverse health effects. "The PEIS has not identified any environmental health and safety risks that may disproportionately affect children, in compliance with Executive Order (EO) 13045 as amended by EO 13229" (PEIS page 4-134, Section 4.7).
Executive Order 13045 of April 1997, states that each Federal agency, including the Department of Defense (as defined in 5 U.S.C.102)

(a) shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children, and
(b) shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.

Executive Order 13229 (October 9, 2001) does not change the requirements of EO 13045 (April 21, 1997), it only amends section 3-306 of that order "for a period of 4 years from the first meeting" and inserting in lieu thereof "for 6 years from the date of this order". The PEIS cannot identify environmental health and safety risks if the Department of Defense (MDA) has not requested any studies on the issue.

The PEIS should include any environmental health hazard studies the Department of Defense(DOD) has done since 1997 on children living in communities near rocket/missile launch sites and/or U.S. military training bases world-wide. An excerpt from an October 1, 2004 DOD news release titled: 'DOD, California Perchlorate Sampling Prioritization Protocol Reached', stated: "Currently, no drinking water standard for perchlorate has been adopted". According to the news article, the DOD apparently is finally agreeing to involve itself with environmental studies, along with the state of California, to research the findings of large quantities of perchlorates in the state's drinking water. Since perchlorate is a rocket and missile propellant, and there have been no previous drinking water standards for the chemical, the PEIS cannot state without conclusive studies that there has been no health and safety risks to children (or the general public) who live near test launch sites.

Executive Order 13045, Section 1. Policy 1-101 states: "A growing body of scientific knowledge demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because: children's neurological, immunological, digestive, and other bodily systems are still developing; children eat more food, drink more fluids, and breathe more air in proportion to their body weight than adults". Section 2-203, "Environmental health risks and safety risks means risks to health or safety that are attributable to products or substances that the child is likely to come into contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)". Once again, refer to Draft PEIS Volume 2, pages H-18, H-19—Existing Emission Sources; "Most sites where activities for the proposed BMDS may occur would be classified as a major emissions source". It is the *major emission sources* related to MDA activities, which has the people living near launch test sites concerned. The PEIS should include *ALL* test sites locations that will be affected by future BMDS activity.

Another area of concern that is mentioned in the Draft PEIS, is the MDA's current testing of Israel's 'Arrow Weapon System' in the United States. The October 24, 2003 'Arrow System Improvement Program (ASIP) Environmental Assessment' (EA), discusses the MDA testing of the system over a 4 year period, with "targets being launched from either the Mobile Launch Platform in the Point Mugu Sea Range or Vandenberg AFB". According to the Arrow System EA, the Arrow interceptor would intercept a "liquid-fueled target system (LFTS) that uses a main liquid fuel, an oxidizer, and an initiator fuel for vehicle motor ignition and propulsion". The EA further states: "the Arrow interceptor missile is a two-stage vehicle launched from a six-pack mobile launcher. The missile contains approximately 1,670 kilograms (3,600 pounds) of solid rocket propellant in the booster. The interceptor with the propellant has a hazard classification of 1.3 and consists of hydroxyl terminated polybutadiene (HTPB), ammonium perchlorate, and aluminum powder. The interceptor also contains an optical (infrared) seeker and a radar sensor. The payload includes a focused blast-fragmentation warhead, with a hazard classification of 1.1D. Combined, the Arrow interceptor missile with its payload has a hazard classification of 1.1."

Considering the Arrow interceptor missile has a Hazard class of 1.3 ('mass fire') and the payload's warhead a Hazard class of 1.1 ('mass explosion'), the PEIS should include information on all potential ground-based hazards (and locations) and space-based hazards from the Arrow 'interceptor' and exploding 'warhead' that will release

DC_E0319

chemicals and add to further air and land contamination if there is a launch accident (or even if there is not an accident). Also, list the name of the warhead in the PEIS. It should have been listed in the Draft.

In fiscal year 2004, the ASIP "Caravan 2 would consist of two flight tests of the enhanced Arrow Weapon System at a U.S. test range (to be determined) against a threat-representative target at approximately full range" (BMDS Draft PEIS, Volume 2, page D-46).

The October 24, 2003 'Arrow Weapon System Improvement Program EA'—Alternatives to the Proposed Action—Alternatives Not Carried Forward, states: "A number of candidate test ranges were examined, in addition to the Point Mugu Sea Range. All of the candidate test ranges were analyzed for various operational and technical considerations including safety, range availability, instrumentation, operational cost, and logistical support. At the conclusion of the evaluation, only the Point Mugu Sea Range met the ASIP test program requirements".
This is contradictory with the statement in the Draft PEIS (Volume 2, page D-46), which states a U.S. test range '"would be determined" for the Caravan 2 flight tests.

Since the release of the ASIP EA in 2003, the BMDS PEIS should include all updated plans to launch the Arrow interceptor missile from other test launch sites/locations (e.g. Reagan Test Site, Kwajalein Atoll, Aleutian Chain, Gulf of Alaska, Poker Flats Rocket Range, Fort Greeley, or the Kodiak Launch Complex).

The fact that Israel does not have land available for 'interceptor' missile testing, does not justify the MDA's decision to bring and test another country's 'experimental' war weapons into the U.S, which will contribute to the pollution of U.S. oceans, drinking waters, air and land. Nor should the MDA be helping Israel by testing weapons that will then be shipped back to Israel to be used against its enemies in its 'religious' war, in order to further the 'Israeli Terminal Missile Defense' program. The United States should be doing what it can to negotiate peace rather than promoting war via another country.

The wording is not much different in the excuse the MDA gives for testing the Arrow interceptor in U.S. territory-"Commitments to Israel would not be fulfilled, and the United States would not realize any benefits to its own Terminal Missile Defense test program from participation in the ASIP" (Arrow System Improvement Program EA, October 24, 2004). Regarding the BMDS Draft PEIS and No Action Alternative, the MDA comments: "This alternative would not meet the purpose of or need for the proposed action or the specific direction of the President and the U.S. Congress to defend the U.S. against ballistic missile attack". Perhaps the PEIS could explain exactly what the President and Congress have proposed for the BMDS, because the MDA evidently does not know 'the specifics of the final architecture or operational requirements' otherwise, the information would have been included in the Draft PEIS, so the public would have an Alternative 3 option to comment on that did not include 'exploding' missiles in space or firing space-based lasers at ground targets, which eventually will lead to the U.S. Department of Defense's control of space by the year 2020 (U.S. Air Force, Vision 2020).

The PEIS needs to explain how the method of launching and exploding missile targets and interceptors in space is going to protect the U.S. borders and coastlines and deter 'terrorists' threats or attacks. Unless the MDA plans on tracking terrorists by infrared satellites, firing an Israeli 'Arrow' interceptor or space-based laser weapon at them before they cross over U.S. borders, the BMDS will prove to be useless in protecting the United States.

Since no Alternative 3 is listed, the BMDS Draft PEIS is also 'useless' and a waste of the public's time to comment, because the MDA really does not care to hear what the public has to say, and most likely, Volume 1 of the BMDS PEIS has already been printed and the MDA is waiting to receive and include public comments before releasing it and publicly announcing to the news media that the BMDS is 'deployed'.

Please send an e-mail acknowledgement that my comments have been received. Thank you.

Carolyn Heitman

DC_E0320

Johnson, Kathryn

From: Lauren Ayers
Sent: Monday, November 15, 2004 3:14 AM
To: mda.bmds.peis
Subject: Comments on the BMDS PEIS

To Whom It May Concern,

I've been alerted to the problems of BMDS and am submitting these comments on the PEIS.

My major concerns have no place in the narrow confines of the comment process but I add them at the end anyway because the unintended consequences of many seemingly benign endeavors have come back to haunt humanity.

To directly address the impacts of BMDS, I have these comments:

1. It is too expensive for what we get. The opportunity cost of that money going to BMDS could bankrupt us the way the USSR exhausted itself with its military budget. We would be better off with a more educated population who have decent jobs, and a cleaner environment, which we won't be able to afford.

2. The hydrogen chloride injected into the atmosphere with each launch has incredible potential to neutralize ozone, enlarging the famous hole which now requires Australian school children to be outside only with hats and long-sleeved shirts.

For the larger picture:

As a teenager, I was proud that my father worked for the Arms Control & Disarmament Agency. Besides the huge tax savings that resulted from the test ban treaties, we have no idea of what sort of nuclear catastrophe we avoided.

Much later, when President Reagan brought up his Star Wars notion, the feasibility reports made it clear what a ridiculous idea this was, like trying to stop a bullet with a bullet. Nevertheless, by preying on Americans' fears, Star Wars was moving ahead. Luckily, the collapse of the Soviet Union ended the foolishness.

By building Star Wars, we set a terrible example to other nations that we intend to be invulnerable, and therefore we become a threat to all other nations. They have no reason to trust us not to initiate war.

We now live in a world of terrorist threat. We need to learn that resentment of imperious America fuels more violence than we can ever head off, and that threats to our security will be as low tech as having religious fundamentalists give up their lives to pilot planes into office buildings. Fairness, respect, and cooperation are key in defusing

True, there are other nuclear nations that could launch against us. However, it would be far wiser to give every North Korean, Pakistani and Indian a share of what it would cost to build Star Wars so they can buy land, build houses, start businesses, and educate their children. Peace comes from contented people in prosperous nations.

Americans don't pay much attention to complex technological and scientific issues. But when they find out the monetary and social costs of following the wrong experts' advice, they get very angry.

Citizens rose up to stop above ground atomic bomb testing and supported the test ban treaty. We insisted on the Clean Air and Clean Water Acts. We buy more organic food every year because that is safer to eat and better for the environment.

Why not do the right thing now, instead of trying to clean up the mess later? An ounce of prevention is worth a pound of cure.

DC_E0320

Lauren Ayers

DC_E0326

Johnson, Kathryn

From: peter cohen
Sent: Monday, November 15, 2004 1:42 PM
To: mda.bmds.peis
Subject: BMDS PEIS

Peter G. Cohen

November 15 2004

BMDS PEIS

PURPOSE: As all of the nations capable of deploying intercontinental ballistic missiles are either allies or friendly, the need for this system has not been established.

The real danger of hostile nuclear weapons being delivered to the United States or allies by rogue nations is not addressed by this program. The real danger being the sale or theft of nuclear materials by hostile nations or groups from existing stocks. It is well known that these stocks are not properly guarded or disposed of and that insufficient moneys are being deployed by the U.S. to accomplish this defensive measure promptly and completely.

Thus, the real danger is not addressed by the proposed action, while its extreme technical difficulties and great cost further delay the prompt securing of radioactive materials worldwide.

Furthermore, this Maginot Line in the sky will stimulate other nations to develop the means to penetrate this defense before it is even completed. For example, our own new high speed drone could deliver a weapon at such speed as to make interception impossible.

PROPOSED ACTION: The definition of the proposed action includes preparations and deployment, but does not mention use of the proposed integrated system. If it is deployed and used against missiles carrying nuclear weapons, the detonation of these weapons in flight will cause radioactive materials to be widely dispersed in the atmosphere around the world. Recent studies by the CDC /NCI conclude that thousands of Americans have contracted cancers and died from U.S. testing of nuclear weapons 1950-61. Recent studies in the Chernobyl area have shown that genetic defects caused by radiation are passed down from generation to generation. In other words, there is a very real danger that the use of this system would further degrade the human gene pool. The effects upon the continuation of ocean life are unknown.

The testing of the system at Vandenberg AFB has inevitably had the effect of polluting the surrounding area with perchlorates. We do not know the extent of birth defects and growth retardation caused by rocket fuel in this area because no studies among this population have been done. The testing and deployment of the BMDS should be halted until the effects on the human population are known.

METHODOLOGY: Most scientists agree that the process of ³incrementally develop and deploy² being used in this system is the most expensive and least feasible method of developing a working system. As you are well aware, many of the necessary systems have not been tested and no tests have come close to battlefield conditions. It is against Pentagon rules for procurement to go forward on an unproved system.

CONCLUSION: As the environmental impacts of testing and operating this system are dangerous to an unknown degree, and as the benefits to be derived are highly questionable and alternative protections in universal nuclear disarmament are both pledged by the U.S. and possible, no further funds should be

DC_E0326

appropriated and testing and deployment should cease immediately.

DC_E0332

Johnson, Kathryn

From: TOHaig
Sent: Monday, November 15, 2004 5:17 PM
To: mda.bmds.peis
Subject: Star Wars PIES

1. The three alternatives being considered are insufficient and deceptive. "No Action" is an endorsement of the current ABM program which is badly flawed and which should be terminated. The PIES as it is being conducted does not meet congressional requirements and must be started over with real alternatives.

2. Placing weapons in space is inherently destabilizing -- upsetting international relationships, forcing response in kind, creating dangerous confrontations, accidents, and errors. If weapons are placed in space they will be used in space resulting in disasterous pollution by debris, and most probably, by radiation.

3. We already know from previous tests that nuclear weapon detonations in or near space cause long-term radiation pollution and serious disturbance of the Van Allen belts, damage and destruction of satellites over vast expanses of space, as well as interruption of power grids and communication nets on the ground. Once weaponization of space starts the use of nuclear weapons will be unavoidable, and of terrible consequence to the US.

4. There is no such thing as a purely "defensive" weapon. Once a weapon is created and deployed it can, and will, be used offensively. The Star Wars objective, "To project the power of the US globally so as to dominate the world" (a quote from the AFMSC presentation) is that of apocalyptic visionaries and has no place in rational considerations of US best interests. The Star Wars concept does not advance or protect the interests of the US, it destroys and defeats our true and traditional interests. It is not a defensive system, it is offensive in every meaning of the word.

5.. I have spent a lifetime working with missles and satelites. I know just how reliable they and the people who operate them are. I find it easy to foresee the disasters that will occur with a new collection of weapons on earth or in orbit designed for instant activation, instantanious response. We shot down an innocent commercial airplane over the Mediterranean using "conventional" weapons. Just think of the accidents we will cause with Star Wars !!

6. There is no actual threat to the US that can possibly justify Star Wars. There is no conceivable threat that Star Wars weapons could address that could not be met more effectively by other means already available. There is no reason for Star Wars -- just the irrational ambition of some to dominate the world. And the cost!!! We have already poured 100 billion dollars down the ABM rathole -- and into the aerospace industry for a useless, untested "system" that won't work, deployed against no threat. We must not continue this enormous waste while our infrastructure, our schools, our health programs suffer for lack of funds. We are a nation of idiots!

Thomas O. Haig
Col. USAF (retired)

DC_E0343

Johnson, Kathryn

From: anne Kelly
Sent: Tuesday, November 16, 2004 12:45 AM
To: mda.bmds.peis
Subject: final eis comment

anne Kelly

November 16, 2004

Missile Defense Agency
MDA BMDS PEIS, c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Missile Defense Agency:

I am writing to support a real "No Action" alternative to the deployment of a missile defense system. This means no further testing, development, or deployment. Deployment of such a system threatens a new nuclear arms race, puts the global environment at risk, and does not improve the security of the United States.

Sincerely,

anne kelly

DC_E0347

WOMEMWITH HILL WOMEN'S PEACE CAMP(AIGN)
C/o 8 Somerville Terrace, East Busk Lane, Otley, West Yorkshire, UK

Submission for the attention of

MISSILE DEFENSE AGENCY
DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT
Mda.peis@cfconsulting.com

[Further details and supporting evidence for all statements made in this submission are available on application to Anne Lee, only if required for the purposes of the public consultation relating to US Missile Defense Agency's Programmatic Environmental Impact Statement]

Introduction

WoMenwith Hill Women's Peace Camp(aign) is a non-violent direct action campaign focused in opposition to Menwith Hill Station and in addition calling for the closure of US Bases in Britain and around the world. We are also affiliated to the Global Network Against Weapons and Nuclear Power in Space, the Yorkshire Campaign for Nuclear Disarmament and the Menwith Hill Forum (a locally-based group set up to examine issues of public concern resulting from the presence of the US Bases at Menwith Hill and Fylingdales).

The WoMenwith Hill Women's Peace Campaign is aware of, and supports all objections to, the degradation of the earth and space environments, which are and would result from implementation of the United States' Missile Defence programme. It is with this overall detrimental impact in mind that we submit our representation, specific to the programme's environmental impact at the ground stations and more specifically at Royal Air Force Menwith Hill and Royal Air Force Fylingdales Stations in the British Isles.

Crucial to the US Missile Defence programme is the stationing of 'forward surveillance' facilities located outside the continental USA at US Bases on land it is permitted to use by host nations. The political structure of such nations may be very different from the Federal Government (e.g. Britain is a Monarchy: q.v. 'Crown Defence Land'). The legislation regulating environmental controls in other countries may be very different, possibly more stringent, than that which obtains within the USA. It is incumbent on the Missile Defense Agency to apprise itself of, and publish an undertaking to comply with, mandatory statutory requirements wherever on the Earth it proposes to site Missile Defence facilities.

We submit that the following observations, although relating mainly to our personal experiences of the position at the US Bases at RAF Menwith Hill and RAF Fylingdales, both in North Yorkshire, England, have wider relevance. The Missile Defense Agency's Programmatic Environmental Impact Statement must acknowledge and include Environmental Impact Assessments for each and every US Missile Defence Base proposed to be sited on land in nations with British or British Commonwealth status, and also in other independent sovereign nations (e.g. Denmark's sovereignty over Thule).

The global ground stations operate as:

- Downlink and relay stations for a global surveillance network, principally deploying signals' intelligence and photo-reconnaissance satellites to assess *inter alia* preparations to launch intercontinental ballistic missiles (ICBMs).

- Downlink and relay stations for a satellite infrared tracking system to provide early warning of and tracking, after launch, of ICBMs targeted on the continental USA.

- Early Warning Radar Stations positioned around the Arctic Circle to identify a launch of ICBMs targeted on the continental USA and continue to track them in flight.

- Proposed launch sites for interceptor missiles to attack ICBMs.

Global Surveillance Network

The long-established US satellite-surveillance downlink and relay Bases, such as Menwith Hill and Pine Gap, positioned around the world for the purpose of intelligence gathering, are necessary components of the US Missile Defense System, as they would be used to monitor in advance, the preparations for the launch of a rocket. These facilities comprise part of the US Missile Defence system package and exclusion from the US Missile Defence Agency's Programmatic Environmental Impact Statement deliberations cannot be justified.

Britain and the British Commonwealth conveniently provide the USA with land for its surveillance stations around the world. Because of the 'special relationship' binding Britain, the USA considers that ground stations located on British or British Commonwealth soil to be particularly secure. Thus the USA has surveillance facilities located in the British Isles, Canada, Australia, New Zealand, Ascension Island and Diego Garcia or co-located with British surveillance facilities (e.g. Cyprus).

The British Government has been compliant in acceding to the wishes and interests of the USA, even going so far as to evict the population of the Chagos Islands to permit the construction of the US Base on the island of Diego Garcia.

US Missile Defence at Bases in Britain: Recent History

Specific to the US Bases in England, the British Government has already granted permission for the USA to upgrade the Early Warning Radar at Fylingdales and agreed that, if necessary it may be used for US Missile Defense. Further formal requests for the Missile Defense use of Menwith Hill, as a satellite downlink and relay for infrared tracking systems; construction of an X-Band Radar, and the stationing of the interceptor missiles in Britain, are anticipated.

RAF Fylingdales

The formal request for the use of RAF Fylingdales for US Missile Defence purposes was announced by the Rt Hon Geoff Hoon, Secretary of State for Defence, in the House of Commons on 15 December 2002. His decision to grant permission was deferred to allow a public consultation exercise to be carried out. This was curtailed by the imposition of a deadline of 15 January 2003 (the Christmas Recess of Parliament intervened) for representations to be submitted to the House of Commons Defence Committee and 31 January 2003 for the public announcement of his decision.

In January 2003, we contributed submissions to the deliberations of the House of Commons Defence Committee. The public consultation period was a totally inadequate farce of democratic procedure. The Committee was extremely worried that the Secretary of State for Defence had rushed through the procedure with unseemly haste and even publicly announced his decision prior to issuance of the Committee's conclusions.

On 29 January 2003, the House of Commons Defence Committee published its conclusions. (*MISSILE DEFENCE Report of Session 2002 – 03, HC 290 – 1*). It contained a strongly worded criticism accusing the Secretary of State for Defence of stifling the debate:

'Despite the Secretary of State's unequivocal statement that he wanted the decision to be informed by public and parliamentary discussion, he has acted in a way that has effectively curtailed such discussions…

'…we deplore the manner in which the public debate on the issue of the upgrade has been handled by the Ministry of Defence. It has shown no respect for either the views of those affected locally by the decision or for the arguments of those opposed to the upgrade in principle.'

The Committee demanded further information about the nature of the Early Warning Radar upgrade, its operations and the impact on the environment. They stated that:

- The upgrade will not simply be replacement of old computer systems. It will be a change of use.
- In addition to the radar identification and tracking capabilities the upgrade will incorporate *'support* [for] *the capability of the interceptor missiles'*.
- The existing agreements, which allow the USA's operations at Fylingdales and Menwith Hill, do not permit the use of these Bases for US Missile Defence.
- The possible hazard of the radio frequency radiation emissions from the radar had not been properly investigated and there was considerable public concern.

Nevertheless the House of Commons Defence Committee did conclude that it was permissible to allow this limited upgrade Fylingdales Early Warning Radar and its use '*in missile defence mode*' for US Missile Defense purposes.

Their conclusion is wrong.

The installation and operation of components of the USA's Missile Defense System on Britain's Crown Defence Land is unlawful and would require a new Act of Parliament.

The Defence Committee's demand for further information was acknowledged on 16 June 2003 by the UK Ministry of Defence's publication of a Report: *'Upgrade to RAF Fylingdales Early Warning Radar – Environment and Land Use Report'*. This may be found at http://www.mod.uk/publications/raf_fylingdales_upgrade/

The MoD's Report did not address the Committee's concerns

- About the implications of the change of use.
- Whether the existing agreements legally permit the development.
- It dealt inadequately with the concerns about the effects of the radar emissions.

The MoD's Report is also inaccurate in several identifiable areas.

The MoD's Report is not an impartial assessment conducted by an independent inspector. Its purpose is a propaganda exercise, to reassure Parliament, the public and especially the North York Moors National Park Authority, the local Council responsible for the upkeep of the National Park, which includes the Fylingdales area. The MoD's Report asserts that no Planning Application for the radar upgrade would be necessary, because the environmental impact would be *de minimus*.

A Planning Application, which would necessitate consultation with the Council's Planning Committee, would have allowed the public the opportunity to make comments and objections at a public Council Meeting reported by the media. Objectors to the development were thus denied the opportunity of a platform to state their arguments and make demands for an impartial Environmental Impact Assessment, Archaeological Survey and Public Inquiry.

A '*Response*', to the MoD's Report, submitted on behalf of WoMenwith Hill Women's Peace Camp(aign), was delivered to the North York Moors National Park Authority, in advance of its full Council Meeting on 29 September 2003. At this meeting the decision relating to the requirement for a Planning Application for the Fylingdales' upgrade was to be determined.

Six days in advance of the supposed democratic, decision-making meeting, the media published a statement from the Council that no Planning Application was required. The Chief Planning Officer's decision, was based on the assurance in the MoD's Report that, because there would be no alteration to the physical appearance of the site and no increase in Radio Frequency power radiating from the pyramid, there could be no grounds requiring submission of a Planning Application.

'Change of use' of premises (e.g. a shop to offices) normally requires a Planning Application and would have justified such for the Fylingdales upgrade.

The WoMenwith '*Response*' was circulated to the UK Ministry of Defence Estates' Organisation in September 2003. To date no reply has been received. We believe this may be because the Ministry of Defence is avoiding addressing the assertion that their Fylingdales' Upgrade Report contains inaccuracies.

The Defence Secretary's decision, in December 2002, to defer consideration of the associated X-Band Radar (which would be a major construction and would require a Planning Application and probably Public Inquiry) may be a reaction to the strength of public opinion. In 2002, the media reported widespread public concern about the abrogation of the Anti-Ballistic Missile Treaty; the implications of Britain's involvement with 'Star Wars' and fears that the upgrade of Fylingdales represented the 'thin end of the wedge'. Many people suspect that by deferring consideration of X-band Radar plans to a future date, the Secretary of State for Defence was deploying a tactic to try to defuse objections by introducing the US Missile Defence programme's components in piecemeal instalments.

Although the Fylingdales' radar upgrade was stated not to justify a Planning Application, this would not be true of either X-Band Radar installations or missile interceptor launch sites. Proposals to construct such would generate mass opposition. There would be objections from the peace movement and environmentalists internationally in addition to local concern for the consequential environmental degradation to the locality. US Missile Defence developments would be challenged through Parliament and the normal channels for presentation of arguments at Public Inquiries.

Some of the opposition to further developments would involve an escalation of non-violent direct action, similar to that at Greenham Common in the 1980's.

On 13 April 2004, BBC TV carried the news that work had started on the Fylingdales 'revamp'.

On 17 October 2004, the media carried the 'leak' that a secret, top-level agreement had been reached to permit siting of missile interceptors in Britain.

On 14 November, *The Observer* published a letter from the Secretary of State for Defence denying that missile interceptors would be placed at Fylingdales or that any secret discussions had taken place.

Menwith Hill

It is not generally acknowledged that the whole of Menwith Hill's Operations plays a role in US Missile Defense.

The long-established signals' intelligence systems have the capability to detect the advance preparations prior to a missile launch, and convey that information via the US National Security Agency's Defense Special Missile and Aeronautics Center at Fort Meade.

Two radomes and operations buildings for a space-based infrared tracking system have already been installed and the Station's organisation restructured, in advance of any permission for its use for US Missile Defense. The satellite infrared capability can track ICBMs at and after launch.

During the past two years or more there has been a steady stream of Planning Applications to the Harrogate Borough Council for infrastructure expansion at Menwith Hill. Indications are that the Base operations are due to expand c. 50% (e.g. a recent Planning Application is for 50% increase in the electricity generated for use by the satellite downlink and computer operations).

As at Fylingdales, there are suspicions that dribbling through the Planning Applications may well be a deliberate policy to defuse objections. Gradual introduction of these plans means that each is considered individually and not in the overall context of the as the total package. Public opposition, therefore, has been virtually non-existent

Because of regulations relating to developments on Crown Land (q.v. 'Crown Defence Land: Ownership, Occupation and Use') prior to the introduction of new legislation in May, the Harrogate Borough Council had no statutory powers of enforcement should it have objected to any of these proposals for expansion at Menwith Hill. In practice the law has never been tested, because the Council almost unanimously supports the presence of the US Base. It is one of the biggest employers in the district and is said to benefit the local economy by $62M annually. A statutory Public Inquiry, which would provide a well-publicised platform for objections to be heard, can happen only by the Council's application. It may thus appear to be unrealistic in the prevailing circumstances to expect that the Harrogate Borough Council would ever request it.

There have however been two recent changes in legislation governing developments considered to have significant environmental impact. These are the provisions of the Aarhus Convention, allowing the public to have greater participation in decisions impacting on the environment and the European Parliament's removal of the Crown Land exemption from the Environmental Impact Assessment, which must accompany any substantial development proposals (q.v. 'Crown Defence Land: Developments: Environmental Impact').

An argued case calling for Environmental Impact Assessment, Archaeological Survey and a Public Inquiry was submitted by WoMenwith Hill Women's Peace Camp(aign) to the Harrogate Borough Council's Planning Department, and the Ministry of Defence Estates' Organisation, in response to a recent Planning Application to enclose the whole of Menwith Hill, including the areas of pasture, inside a razor-wire topped security fence bristling with CCTV cameras.

The case was submitted in January 2004, prior to the changes in the relevant legislation in May.

On 26 February, under the 'delegated legislation' arrangements, a non-elected Civil Servant (a Planning Officer) approved the plans.

Neither these plans, nor any others in the past two years, have been put on the Agenda for deliberation by the elected members of the Council's Planning Committee Meeting.

Crown Defence Land: Ownership, Occupation and Use: the Law

Ownership of Crown Land

Defence Land is designated 'Crown Land'. The three categories of Crown Land are:

- 'Crown Estate' is land owned by the monarch, the revenue from which accrues to the State in exchange for an income, apportioned by Parliament, for the royal family (the Civil List).
- Duchy of Lancaster and Duchy of Cornwall Lands are in the private possession of the monarch and the heir to the throne.
- Land owned by the State and administered by Her Majesty's Government, such as the Ministry of Defence. During the term of his Office, the Secretary of State for Defence is deemed for legal purposes to be the owner of the Crown Defence Lands, held in his trust on behalf of the nation.

The size of the Crown Defence Estate in the UK is 240,000 hectares (593, 052 acres). This includes considerable areas in North Yorkshire, England, most of which was appropriated during World War 11 and is surplus to any current requirement for military purposes.

Menwith Hill Station and Fylingdales Station are both located on Crown Defence Land in North Yorkshire.

Acquisition and Use of Land by the Secretary of State for Defence: the Law

The appropriation and management of land for the purposes of the defence interests of the British Isles is regulated by the Defence Act 1842 and the Military Lands Acts 1892 to 1903 plus subsequent amendments (e.g. to incorporate the Royal Air Force).

Defence Act 1842

Title: '*Acquisition and Use of Land'*

'Citation: to consolidate and amend the Laws relating to the Services of the Ordnance Department, and the vesting and Purchase of Lands and Hereditaments for those Services, and for the Defence and Security of the Realm'.

The 1842 Act, therefore, states specifically the purpose for which land in Britain may be appropriated and its use for '*the defence and Security of the Realm*'.

The Defence Act 1842 is the legislation passed by Queen Victoria, which established 'Her Majesty's Surveyors of Ordnance'. The Ordnance Survey, instituted for military purposes, eventually became the UK statutory civilian authority for mapmaking. Unless Parliament were to pass new legislation re-establishing Her Majesty's Ordnance Survey Department, the 1842 Act cannot be repealed.

The 1842 Act empowers the Secretary of State for War (now Defence) to purchase land either by agreement with the landowner or by compulsory purchase. The Act permits surveyors to enter onto privately owned land in order to survey it for the possibility of acquiring it for military purposes.

The Military Lands Act 1892

'PART 1

Powers to purchase land. – (1) A Secretary of State may purchase land in the United Kingdom under this Act, for the military purposes of any portion of Her Majesty's military forces'.

The 1892 Act is an attempt to form a single body of legislation incorporating and/or repealing the previous different Acts passed throughout Queen Victoria's reign.

The 1892 Act defines the extent of, but also the limitations on, the Secretary of State's management of Crown Defence Lands: *'…for the military purposes of any portion of Her Majesty's military forces'.*

Occupation of Crown Defence Land by a Foreign Power: the Law

The occupation of Crown Defence Lands by the visiting forces of a foreign sovereign power is governed by the provisions of the North Atlantic Treaty Organisation's Status of Forces Agreement (NATO SOFA), which was signed in London on 19 June 1951, later ratified by the UK Parliament as the Visiting Forces Act, 1952.

Article 1X (s.3) of the Visiting Forces Act states:

'…the authorities of the receiving State shall assume sole responsibility for making suitable arrangements to make available to a force or civilian component the buildings and grounds which it requires…'

The 1951 NATO SOFA was agreed

'…appropriate to the relationship which exists between the United Kingdom and the United States for the purpose of our common defence' (Jeremy Hanley, Minister of State for the Armed Forces, in reply to the late Bob Cryer MP, 25 March 1994. *Hansard*)

The stipulation '*arrangements for common defence'* is stated by the NATO SOFA, the Visiting Forces Act and repeated in the updated International Headquarters and Defence Organisations Act 1964.

In 1999 the legislation was amended by Order in Council to take account of recent changes in legislation (e.g. the Town and Country Planning Act 1990). The amendment to the existing legislation is the Visiting Forces and International Headquarters (Application of Law) Order 1999 (Statutory Instrument 1736).

Significantly, in light of the USA's request for its unilateral use of lands allocated for NATO purposes, the 1999 Statutory Instrument omits to repeat '*arrangements for common defence'*. Nevertheless, as the originating Acts have not been repealed, the condition stating *'arrangements for common defence'* remains applicable.

The Law is specific, the Secretary of State is granted statutory powers to acquire and manage land for the purpose of the defence of the realm - and not for the purpose of the exclusive defence of a foreign power, whatever the relationship between Britain and that nation.

The Law does not empower the Secretary of State to grant the USA, or any other foreign power, military use of the Crown Defence Lands in his care, unless it is specifically used for the defence of the British Isles. Thus the Law would disallow the USA's use of UK Defence Lands for the USA's Missile Defence system, which is not designed to protect the British Isles from an attack by Intercontinental Ballistic Missiles. US Missile Defence is exclusively for the protection of the continental USA.

The Law allows foreign power member of NATO to conduct military activities on Crown Defence Land in support of NATO. For example, to comply with the Law, the interception of communications by the US National Security Agency at Menwith Hill Station must be for military purposes only - and on behalf of NATO. The collection of intelligence exclusively for US national interests or any other purpose (e.g. political, diplomatic or commercial, such as the collection and distribution by the ECHELON global network) is an illegal misuse of Crown Defence Land.

This begs the question of whether the NATO SOFA '*arrangement*' for the USA's occupation and use of Menwith Hill and Fylingdales is legitimate and whether the Secretary of State for Defence knowingly colludes with the conduct of illegal activities (q.v. 'Collusion: Environmental Impact'). The Law is clear - the entire function, not just part, of the operations at Menwith Hill Station and Fylingdales must be for British and NATO military activities conducted in defence of the UK.

The High Court of the Royal Courts of Justice has examined in what circumstances the US Bases' authorities are exempt from compliance with the law and the jurisdiction of the Courts (Menwith Hill US Base Commander, Colonel G Dickson Gribble v Helen John, 31 July 1997).

The Office of Secretary of State, whether of Defence or of any other UK Government Ministry, does not confer on its holder a statutory authority to negotiate disposal of national assets, such as Crown Defence Land, to a foreign power.

It would appear that the Secretary of State for Defence, the Rt Hon Geoff Hoon MP, has exceeded and abused the powers granted to his office.

We believe his action is in Law *ultra vires* and *mala fides* and therefore Treason.

Crown Defence Lands: Developments: Environmental Impact

Since the Fylingdales and Menwith Hill submissions, there has been a significant step towards implementation of the Aarhus Convention, which gives the public greater participation in the decision-making process related to developments having impact on the environment.

In January 2004, the European Commission considered taking legal action against the UK over failure to comply with European Union's legislation requiring that Environmental Impact Assessments be carried out prior to certain developments. The European Commission took the first step in the legal procedure, when it issued a final warning to the UK Government, stating that its legislation was inadequate to cover developments on land owned by the State (i.e. Crown Land).

Crown Land was excluded from statutory planning enforcement and exempt from the various UK regulations transposing the EU's Environmental Impact Assessment Directive (85/337/EEC as amended by 97/11/EC) into UK Law.

The UK Government maintained that administrative procedures already existed under the Town and Country Planning Act 1984 (Department of the Environment Circular 18/84) to ensure public consultation on Crown Land developments. However, the European Commission considered that legislative measures incorporating statutory powers were needed. The UK Government accepted this as necessary and the relevant legislation removing 'Crown Immunity', the Planning and Compulsory Purchase Act, received Royal Assent on 22 May 2004.

Possibly it is significant that the raft of measures for the expansion of Menwith Hill's infrastructure was submitted in the two years prior to 22 May 2004.

Proposed developments on Crown Land are subject now to the normal statutory planning controls. This will include a statutory requirement to conduct Public Inquiry to consider evidence of the implications of major development proposals and to conduct a full Environmental Impact Assessment and Archaeological Survey.

It remains to be seen whether the UK Ministry of Defence will successfully argue that future developments relate to UK 'national security' and whether they can be exempted from Environmental Impact Assessment under the new legislation. Presumably the Secretary of State for Defence would have to justify such a position and produce evidence for exemption – and prove that US Missile Defense functions for the 'national security' of the British Isles.

The proposal to construct X-Band Radar or locate missile interceptors at launch sites in the British Isles would be classified as a development requiring statutory Public Inquiry conducted by an impartial Planning Inspector. This would be conducted similar to a Court of Law to hear evidence from all interested parties including members of the public. The UK Ministry of Defence would not be permitted to issue its own Environmental Report, such as that for the Fylingdales' Upgrade, arguing a one-sided case, to which the public made no contribution.

The conduct of non-statutory Public Inquiry, under the previous Circular 18/84 procedure, was carried out to examine the environmental impact consequent on the Ministry of Defence's plans for developments at the Otterburn Ranges on Crown Defence Land in the Northumberland National Park. The Public Inquiries ran for five years. In October 2001, in consequence of 9/11,the Planning Inspectors' recommendations were overridden. The UK Secretary of State for Defence ordered the developments to proceed. He then had the power to do this if it was perceived to be in the interests of the defence of the realm.

The recent changes in legislation under the Planning and Compulsory Purchase Act, 2004, remain to be tested.

US Bases on Crown Defence Land: Pollution of the Environment

The former Royal Air Force Base at Greenham Common serves as an example of the contamination resulting from its occupation by the US Airforce.

The information publicly available describing the restoration and regeneration of Greenham and Crookham Commons is published on the West Berkshire District Council website **http://www.westberks.gov.uk**. The website presents only a fraction of the overall pollution picture. In practice only the surface environment has had remedial treatment. The prohibitive cost of investigating the underground contamination means that the total detrimental impact will never be assessed.

It is not possible to assess a figure for the costs incurred in the limited restoration of the surface of the land. The West Berkshire Council's figure of c. £1.5 million does not take account of the considerable unpaid work of volunteers.

The US Government has no statutory responsibility for, and makes no contribution towards, the cost of the clean up.

Fylingdales and Menwith Hill: Environmental Concerns

The following illustrative examples comprise only some of the environmental issues about which we have made representations to the relevant authorities in recent years. This list is by no means exhaustive.

- **The Environmental Impact of Fylingdales' Solid State Phased Array Radar: Radio Frequency Emissions**

There is widespread public concern about the detrimental environmental impact created by the Fylingdales' radar pyramid.

The foremost concern is the possible harmful biological effects of the non-ionising radio frequency emissions from the radar.

For example, the local village of Goathland is a major tourist attraction because it is featured in the Heartbeat TV 'soap opera' and its antique steam railway. Goathland is in direct line-of-sight from the Fylingdales radar pyramid and is therefore a recipient of RF emissions from the 'sidelobes' of the radar.

Although the UK Ministry of Defence assures the local population that the radar is entirely safe, it sets off car alarms and disables ignition systems as far away as Goathland. The Base authorities publish a health and safety guide for employees and visitors warning of these effects and the possible danger of creating a spark by induction if attempting to fill a petrol tank using a metal container.

There is no adequate official scientific study of the biological effects on plant, animal and the human body resulting from Fylingdales' radar emissions.

Professor Dave Webb, Chair of Yorkshire Campaign for Nuclear Disarmament, has published a paper, '*Is it Safe?*' which can be read at **http://cndyorks.gn.apc.org/fdales/**. Professor Webb maintains that the safety standards are inadequate and presents the evidence to substantiate his arguments. The reassuring conclusions published in the UK Ministry of Defence's '*Upgrade to RAF Fylingdales Early Warning Radar - Environment and Land Use Report*' are based on the inadequate safety guidelines . We endorse Prof. Webb's position and submit that his paper be considered by the US Missile Defense Agency as a contribution to public responses to the Programmatic Environmental Impact Statement.

- **The Environmental Impact on the Landscape: Visual Degradation**

Both Fylingdales and Menwith Hill occupy elevated positions in rural areas of high-quality landscape – in areas economically heavily dependent on tourism. The incongruous 'sci-fi' structures, Menwith Hill's 30 giant white 'golf balls' and Fylingdales huge truncated pyramid silhouetted against the sky, are visible for miles, especially from the surrounding hills.

Fylingdales is in the North York Moors National Park.

Menwith Hill overlooks Nidderdale. The boundary of the Nidderdale Area of Outstanding Natural Beauty (eventually to be incorporated into the Yorkshire Dales National Park) was tightly drawn around Menwith Hill's perimeter to exclude the Base on grounds that it is ugly.

The National Parks are areas of the British Isles, where a strictly enforced statutory conservation policy applies to preserve the rural amenity in perpetuity as a national heritage.

Only considerations of acute emergency national security would permit developments such as Menwith Hill and Fylingdales.

- **The Impact on Britain's Archaeological Heritage**

Both Fylingdales and Menwith Hill are sites of prehistoric importance known to date from the Neolithic period or earlier. Conservation of the archaeological heritage is a prime consideration in Britain and must be considered in the deliberations for the US Missile Defense Agency's Programmatic Environmental Impact Statement. The damage to these sites so far is incalculable. Herewith two examples:

Menwith Hill:
The Base is located on Forest Moor, an area of significance to archaeologists for its Neolithic settlement, testified by the wealth of flint microliths.

The site is adjacent to an Iron-Age Brigantian Fort. The Roman Road joining the fort at Ilkley (Olicana) to the city of York (Eboracum) borders the southern boundary of the Base.

The US occupants in c.1990 removed an ancient megalith known as 'Tibby Bilton', possibly the last standing remnant of a prehistoric group or circle of standing stones.

Fylingdales (or more properly, Snod Hill):
The presence of a tumulus, a group of (fallen) megaliths and petroglyphs is evidence that Snod Hill is a prehistoric funerary site.

Snod Hill is crossed by prehistoric trackways, ancient rights of way dating from the Bronze Age or earlier, for over two thousand years in use as a 'Salt Road' from the coastal settlements. The Salt Road is notorious in later history as a route for smugglers.

The Salt Road was closed peremptorily and permanently to permit the construction of the Early Warning Radar facilities.

- **The Environmental Impact on the Land: Flora and Fauna**

The location of Fylingdales Station gives rise to concern because of its proximity to Sites of Special Scientific Interest. Special conservation measures statutorily apply to such sites. In the case of Fylingdales it is because of endangered plant species and breeding sites for rare moorland birds. No construction work is permitted at Fylingdales during the birds' breeding season – April to August inclusive.

Herewith two recent examples out of the many complaints made to the Bases' authorities:

Fylingdales:

In January 2002 the unauthorised construction of a limestone internal perimeter patrol road, part of the security upgrade in advance of its US Missile Defence role, gave rise to fears that the effect would be to raise pH levels in the surrounding acid bogs. Construction work had to be halted to allow an Environmental Impact Assessment to be conducted. This was not an impartial assessment by an independent inspector, but a mitigation exercise carried out by the UK Ministry of Defence. In the event it was concluded that to remove the road and reconstruct it in a less alkaline material would cause greater damage than to permit it to remain.

Menwith Hill:
The discovery of a colony of rare feral orchids, in natural wetland on the north-west of the Base, led to an investigation by Professor Bateman, Keeper of Botany at the Natural History Museum, the country's top orchid expert. As a result of his research in 1999, the proposed high security fence was relocated to skirt the orchid site instead of cutting through it and the Menwith Hill authorities agreed to conserve the orchids' site as a reserve. Further complaints are ongoing because of their failure to implement Prof. Bateman's management recommendations.

- **The Impact on the Water Environment**

The UK Environment Agency is the statutory body responsible for monitoring and maintaining the quality of the water environment including the public water supply. It has no access or authority to investigate the Crown Defence Land inside the Bases, but it does monitor the emergent water outflows, including the sewage and can authorise remedial action.

Herewith two examples of recent complaints:

Fylingdales:
During the heavy flooding of 31 July 2002 the Fylingdales sewage works overflowed and raw sewage ran down the hillside and entered Eller Beck at Ellerbeck Bridge east of the Base. Eller beck flows through the village of Goathland. The Goathland Parish Council was informed and discussed the issue at its August Parish Council Meeting.

Menwith Hill:
The site causes concern because of its position on the gathering ground for the city of Leeds water supply. The surface water run-off from the Base enters Swinsty Reservoir via Spinksburn Beck.

The Menwith Hill Forum made enquiries recently about the history of environmental contamination resulting from the presence of Menwith Hill. The Environment Agency responded to the request and from its enquiries it emerged that a major spill of diesel fuel (the Station generates its own electricity from diesel generators) had occurred in the mid-90's, but that all the documentary evidence had been destroyed. The only surviving evidence is the memories of those personnel who were engaged on the remedial clean-up.

The fact that there was no public announcement at the time of this incident is one example that serves to indicate that it is not possible for statutory public authorities to assess the level of contamination created to the land and the water inside these Bases.

If such evidence cannot be presented to the Missile Defence Programme Environmental Impact Survey, how can it be taken into consideration?

Within the UK no official body with oversight responsibilities to monitor development abuses on the US Bases exists.

- **Unlawful Unauthorised Developments: the Environmental Impact**

There have been a number of instances where we have brought abuses of planning process to the attention of the relevant local government authorities and the UK Ministry of Defence. These include for example:

Fylingdales:
The security fence (and unauthorised internal perimeter police patrol road) on the southwest side of the Base unlawfully encroached outside the boundary of the Base onto land held by the Forestry Commission.

The Under Secretary of State for Defence was obliged to remedy the position by a transfer of land.

Menwith Hill:
The security fence in the Main Gate area unlawfully encroached onto the highways' verge outside the boundary. The fence had to be removed and reconstructed.

It is unacceptable that the UK authorities turn a blind eye towards unauthorised developments and it it incumbent on members of the public to have to complain.

- **Maintaining the Security: the Environmental Impact**

The Bases are acknowledged to be targets for 'terrorists'. The security of the Bases is totally ineffective and costs the USA and UK a considerable sum to maintain. Menwith Hill and Fylingdales bristle with razor-wire-topped high security fences, CCTV cameras, intruder alarm systems, and are constantly patrolled by armed police and guard dogs.

The UK Ministry of Defence Police Officers are ostensibly the defenders of the Bases. It is impossible for these Police Officers to secure the Bases, even were their numbers to be increased. Their main function is for propaganda purposes, to convey the impression that they are guarding UK facilities, which impression is reinforced in the Courts when they prosecute peace activists. The UK Government has admitted that at Menwith Hill they are actually paid for by USA, which not only reimburses the UK Government for personnel salaries and expenses, but also purchases and maintains their patrol vehicles and buildings.

The occupation of Menwith Hill by over 100 Greenpeace protesters in July 2001 revealed just how inadequate was the security. The response was to upgrade the security by installing more of the failed systems and increasing the police numbers.

The following public concerns have been reported in the local media:

- Councillors fear the consequences to the local community of an attack on Menwith Hill, particularly the consequences of a 'dirty bomb' on the environment and human populations.
- The Emergency Services would be unable to cope with a 'terrorist attack'.
- In November 2001 a hoax Anthrax scare at the Harrogate Postal Distribution Office was dealt with by the Emergency Services and disrupted postal deliveries. The hoax demonstrated how vulnerable the supplies and services to the Bases are to 'terrorist attack'.
- The consequences to the locality from a shower of missile debris produced by collision between ICBM and an interceptor missile.
- The cost to the local taxpayers of providing additional, civilian North Yorkshire police to patrol the Bases.

- The crime-wave in cities such as York attributed to the deployment of the civilian police to patrol the Bases.
- The recreational amenities, Yorkshire Dales' and North York Moors' tourist attractions, are patrolled by armed police.
- Protest actions will be stepped up with consequences for the local community, e.g. blockading traffic.
- Human rights and civil liberties are infringed by application of the Terrorist Act 2000, for a radius of ten miles surrounding Fylingdales and five miles around Menwith Hill, (e.g. s. 44 gives the police the right to stop and search any person without cause for suspicion) and by clandestine closed circuit television monitoring of the roads and surrounding countryside.

- **Logistics: the Environmental Impact**

The Bases are dependent on the support of the host nation. Their operations could not function without the logistics infrastructure, e.g. transport of supplies of water, food, electricity and disposal of sewage and garbage and a local workforce to service the Bases. All these impact on the environment external to the Bases. All are vulnerable to disruption (e.g. Some of the local workers are members of Trades Unions. The British Trades Union Congress of 2002 passed an anti-'Star Wars' resolution, condemning US Missile Defence).

Peace protesters have blockaded, and can be expected to continue to blockade, access roads to Menwith Hill, which obstruct movement of personnel and supplies into and out of the Base. Blockades have generated TV coverage allowing a platform for presentation of the arguments of the protesters.

In order to ensure that the essential services continue to be provided, it is politic for the Station authorities to maintain good relations with the host national government and the local community. Public relations' propaganda 'sells' a benign and positive image and conceals any information, which might reflect adversely on the Bases and their personnel.

Currently the UK national and local authorities collaborate in the practice of a deception to keep the public ignorant, complacent and co-operative (e.g. describing Menwith Hill as a 'Royal Air Force' Station is a blatant propaganda hypocrisy, intended to persuade people to believe that it is British and thus playing an essential role in the defence of the realm). Thus the UK State is complicit with the illegal operations at Menwith Hill.

- **The UK State's Collusion with US Bases: the Environmental Impact**

In a democracy the people elect their representatives and expect them to make decisions and appoint public servants to manage the State in the best interests of the electorate. If financial and other resources are expended on support for the US Bases, it follows that those resources are not available for investment in the environment (e.g. the North Yorkshire Highways' Authority must provide and maintain roads to and from the Bases, which are not necessarily of benefit to the wider community).

The collusion is not confined only to the legislative and executive arms of the State, described herein, but is also supported by the judiciary.

The Judiciary's support for the UK Government:
One example serves to illustrate that, not only is the UK Government aware of the illegalities perpetrated, it is prepared to condone them and its actions are supported by Her Majesty's Judiciary.

Appeal: Helen John and Anne Lee: York Crown Court, 2 – 5 September 1997

The Court was obliged to examine the appellants' defence accusation that the Secretary of State for Defence acted in 'bad faith' to protect and support illegal activities at Menwith Hill (the UK Ministry of Defence was the prosecutor not the defendant).
The judge rejected the argument on the grounds that the appellants were denied the right to question the Defence Secretary in the Courts about his actions. He is protected by 'Parliamentary Privilege'. The appellants won the case not on the 'bad faith' argument, but on the fact that the Defence Secretary acted ultra vires - beyond the statutory powers of his office.

In his Judgment issued on 5 September 1997: the late Judge Jonathan Crabtree stated:

"It is said that wholesale breaches of the Interception of Communications Act 1985 and of the European Convention on Human Rights must be going on [at Menwith Hill]…on the face of it, it rather looks as though Mrs Baird [Barrister] may be right in this contention…as a matter of law, the fact that some sort of illegality may be going on at a military base is not our concern. An illegality of some kind is doubtless going on...'

Under the cover of 'national security' the UK Government may impose a Public Interest Immunity Certificate to block disclosure of any prima facie evidence likely to be produced in Court, exposing the operations of the US Bases. Judge Crabtree attempted to prevent the presentation in Court of a statement by British Telecom – only to acknowledge that his efforts had been pre-empted by disclosure on the Internet.

The trial was a flagrant breach of Magna Carta: '*To no one will we sell, to no one deny or delay right or justice'*. King John, Runnymede, 1215.

The Local Government Authorities: abuse of Judicial Process:
The collusion between the US Bases and the local Council authorities is illustrated by the following example:

North Yorkshire County Council v WoMenwith Hill Women's Peace Camp women:
Eviction Hearings: Divisional Court: November 1997 – July 1999:

February 5th 1999:
It emerged during cross-examination of the North Yorkshire County Council 's Chief Highways Maintenance Engineer, who was under oath, that all documentary evidence relating to the local authorities' collusion with Menwith Hill had been deliberately withheld from the Court and the peacewomen respondents.

The judge, Hooper J, immediately adjourned the trial and ordered 'discovery', within one week, of all such correspondence. The Council 'discovered' 61 (sixty-one) relevant documents, which was still a limited disclosure. The correspondence revealed that the instigators of the eviction proceedings were the Menwith Hill Station authorities and that the Council Officers had discussed the possibility Menwith Hill making a financial contribution to the costs. (As there were five hearings in the High Court over a period of 20 months, the costs amounted to a substantial sum, believed to be in excess of £30,000).

The peacewomen submitted further affidavit arguments asserting that the national and local governments are fully aware of the illegal operations at Menwith Hill. The North Yorkshire County Council was thus guilty of bringing a case 'with unclean hands', by their covert unlawful collusion with the US National Security Agency in command of Menwith Hill.

This argument did not affect the Judgment.

Although the High Court had also to examine the peacewomen's right to protest, as enshrined in the Human Rights' Act 1998, the right to live outside Menwith Hill was not upheld and the Peace Camp was evicted on 19 August 1999.

In defiance of the High Court Injunction ordering peacewomen not to reside outside Menwith Hill, Helen John re-established the Women's Peace Camp on 24 May 2004.

- **Maintaining the Secrecy: the Environmental Impact**

Considerable finances and resources are diverted from investment in the UK environment and expended to maintain the secrecy of the US Bases' operations. It is not possible for members of the public to calculate the UK Government's contribution to the support for the US Bases provided by the Security Services and the Government Communications Headquarters. It is assumed to amount to hundreds of millions of pounds.

Some indication of Britain's commitment has been revealed by major exposures, over the past 20 years stripping away the layers of secrecy. They include:

- *The Unsinkable Aircraft Carrier*, Duncan Campbell, 1984
  (The definitive research into the US Bases).

- *The Hill*, TV programme produced by Duncan Campbell, 1993
  (Based partly on information amassed from perusing Menwith Hill's garbage).

- *Uncle Sam's Eavesdroppers*, TV programme produced by Richard Saddler, 1998
  (Duncan Campbell exposed that US Missile Defence components were being installed in Menwith Hill)

- *Interception Capabilities 2000*
  (Report presented by Duncan Campbell to the European Parliament's Committee of Inquiry into the implications for Europe of the US controlled ECHELON interception network).

- *Report of the European Parliament*, 5 Sept 2001
  (The EP made recommendations that the British and German Governments implement oversight and monitoring of the USA's communications' interception activities).

- Lots of articles published in the press – too numerous to mention.

- **Extra-Parliamentary Protest Activity: the Environmental Impact**

The effectiveness of 'single-issue' pressure groups' political activity, especially when it succeeds in changing attitudes, and thus policy decisions, at national and local government level should be a prime consideration for the Missile Defense Agency. For example, the Greenham Common Women's Peace Camps were instrumental in the decision to cancel the land-based, nuclear-armed Cruise Missile programme – as a consequence of which the US Base closed and environmental restoration work is underway.

The Yorkshire CND website http://cndyorks.gn.apc.org carries a comprehensive overview of the many different campaigning strategies deployed in opposition to the US Bases. All of them, including the non-violent civil disobedience actions, such as blockades, have an immediate impact on, and by influencing policy, the potential to change the environment.

The influence for change these opposition campaigns have achieved is difficult, if not impossible to assess, yet it is evident that changes in attitude have occurred and that they directly result from the presentation of an alternative viewpoint (e.g. the media now routinely describes Menwith Hill as 'US Spy Base').

One example will serve to illustrate:
In early 2001 approximately 200 people sent representations to the Harrogate Planning Department objecting to a development on the grounds that it was intended for US Missile Defence.

Because the Planning Application did not go before the elected Councillors, the first they knew of the plans and the objections was when it was reported in the Press that campaigners had approached a local Member of Parliament, who had then raised it with the Secretary of State for Defence.

In consequence Harrogate Council's Chief Executive, on behalf of the Council, wrote to the Prime Minister to insist that the Council be kept fully informed of the implications of such developments. The Council demanded further information about the implications of Menwith Hill's US Missile Defense role for the local community. In October 2001, Councillors and Executive Officers from Harrogate Borough and North Yorkshire County Councils were invited to attend a meeting with top Civil Servants at the Ministry of Defence in Whitehall, London.

The Council representatives were given blatant propaganda assurances that Menwith Hill is considered to be of the highest importance for the UK's national defence. The Minister of State for the Armed Forces repeated verbatim parliamentary and public statements his predecessors have issued. These assured the local authorities that Her Majesty's Government is aware of all activities taking place at the Bases: that UK personnel are integrated at the highest level and that the Bases are not engaged in anything inimical to British interests.

Tony Benn, a former Cabinet Minister, as Secretary of State for Energy at the highest level of responsibility for the nuclear power programme, stated that government Ministers are the 'elected ignorant' – so little 'sensitive' information was divulged to him when in Office.

US Missile Defence: an unpopular programme

British public opinion has changed radically as a result of the publicity generated by the anti-'Star Wars' campaigns. An opinion poll conducted in the summer of 2001 revealed that nearly 70% of the British people opposed 'Star Wars'. At the same time 278 Members of Parliament signed an Early day Motion calling for a full debate in the House of Commons.

Recent polling indications suggest that the opposition is growing.

DC_E0355

Johnson, Kathryn

From: Filson Glanz
Sent: Tuesday, November 16, 2004 10:59 AM
To: mda.bmds.peis
Subject: Comment on MDA Draft Programmatic Environmental Impact

Dear Sir/Madam:

This is a letter for the record in comment on the MDA PEIS.

It is my opinion that there is absolutely no way that we can accept "Alternative 2, missile defenses with space-based weapons." This is just too dangerous and a major risk to our democracy and the stability of the world.

We are also not very happy with "Alternative 1, missile defenses without space-based weapons." This alternative also will destabilize world weapons systems manufacture and deployment and lead to dangerous systems that can get into hands of empire builders or madmen bent on ruining the earth for us all.

Alternative 3, "No Action," which might seem like a logical out for those wanting to suppress this race to destruction, seems to leave things as they are - i.e. would allow continuation of the present
programs which we are against! So the PEIS should be rewritten to
allow another alternative: Discontinue all work on such systems, and work on getting cooperation throughout the world on disarmament.

Space based systems will most likely require nuclear energy in space and that would lead eventually to environmental disaster. or at least more widespread nuclear material throughout the earth biosystems.
This is not a good prospect for the survival of life on earth.
Furthermore, defensive space based systems can easily be used for offense; this is equally dangerous. It could also lead to control of space and the world by one country or controlling interest. And although it is evident that the Pentagon has for many decades wanted to do just that, and probably has a secret such goal, it is not what the people of the USA should allow their government to do in the interest of life on earth.

Furthermore, the cost of researching and building these systems is extremely high, and the money should be used to prepare for the coming resource depletion: fossil fuels, water, soil, air, and other resources we need to survive. That preparation will necessarily include bringing up the level of living standard of others on earth so that they will want to reduce their number of offspring and thereby stabilize the earth's population. That is on top of all the other things that need to be done: find new energy sources/systems, replacement for dwindling mineral resources, cleaning up of pollution in our air, water, soil, and organic systems.

All in all, although I realize and understand the logic of wanting impenetrable defenses, the survival of life does not depend on those; instead it depends on all countries and peoples of the earth cooperating on bringing our use of earth's resources under control so all can live a comfortable and safe life on earth. For too long the people of this country and of the world have allowed the military mentality - a kind of mocho growing up mentality - to dominate the
agendas of the earth. Of course some military is necessary as a
safeguard, but it has been way overdone. We must slowly and carefully
get back to a rational approach to living at peace on the earth. And to start we must not continue to expand these MDA programs.

Thank you for including these comment in the record. I wish more people would think about the direction we are headed in these programs.

Sincerely, Filson H. Glanz

DC_E035

DC_E0363

Johnson, Kathryn

From: Sue Koger
Sent: Tuesday, November 16, 2004 3:50 PM
To: mda.bmds.peis
Subject: Pentagon Star Wars Plan

As a physiological psychologist, I am deeply concerned about the environmental and public health impacts of the Ballistic Missile Defense System, and wish to comment on the Draft Programmatic Environmental Impact Statement (PEIS).

<!--[if !supportEmptyParas]-->

In particular, I am concerned about the hazardous waste associated with the system. For example, perchlorate from rocket fuel has already contaminated rivers and ground water, and can find its way into milk supplies (e.g., as has occurred in Texas). Like other toxins that act as endocrine disruptors, perchlorate can interfere with thyroid hormones and disrupt pre- and post-natal brain development, resulting in reductions of IQ and attention, mental retardation, hearing loss, and defects in speech and coordination. Seventeen percent of children suffer from developmental and learning disabilities, and as many as 25% of those disabilities are due to the effects of environmental toxins either acting alone or in combination with genetic and other environmental factors.

<!--[if !supportEmptyParas]-->

Certainly, those individuals (often consisting of minority ethnic groups) and non-human species who live on or near test sites are at particular risk, and this issue is not sufficiently addressed in the PEIS. Finally, it would be environmentally catastrophic if these weapons were ever actually used in war. The hazards of use, including high altitude nuclear explosions, are not discussed in the PEIS but should be addressed. .

Weaponry escalation only serves to undermine security by creating new enemies and furthering fear and distrust. I thus urge you to oppose continuation of this development plan. Thank you for your time.

<>Susan Koger, Ph.D.

DC_E0366

Johnson, Kathryn

From: Dale Nesbitt
Sent: Tuesday, November 16, 2004 4:51 PM
To: mda.bmds.peis
Subject: COMMENTS ON PEIS FOR BMDS

Subject: Comments on the PEIS for the BMDS

From: East Bay Peace Action

to. MDA BMDS PEIS, c/o ICF Consulting

(1) The most fundamental flaw in the logic behind this program as outlined in the PEIS is that rather than enhancing our security it is highly likely to decrease it. Recent events really should make this obvious even to the neocons. Why is North Korea working so hard to build more nuclear weapons? Why does Iran appear to be working toward the capability of building nuclear weapons? Why are a number of countries developing rockets with longer ranges and to carry heavier loads? Why does China appear to planning to modernize their missiles (now liquid fueled?). We have no doubt that the most basic reason is for DEFENSE against this extremely provocative planned Ballistic Missile Defense System. Unless convincing rebuttals can be made to the above this entire program should be stopped.

(2) Beyond the question of the BMDS making us less secure it will also either bankrupt this country completely or at least divert badly needed monitory AND TECHNICAL resources from pressing human needs.

(3) In addition the BMDS program can not avoid causing serious environmental harm to an environment that is already badly stressed.

Of particular concern is with the spaced based proposals, they obviously need large amounts of power and we are well aware of the development work already going on to develop fission nuclear power plants for use in space. This is fundamentally a crazy idea. We dare anyone to prove otherwise!

(4) Calling this system a 'defensive' system in Orwelling double speak, it is and can only potentially be effective as an offensive system. Why not be honest and tout it as such. Some publications, such at the Space Command's Vision for 2020 clearly states that a space based system would be used to"deny other nations the use of space" IS THAT DEFENSIVE OR OFFENSIVE ? Why wouldn't other countries see it as offensive and a further attempt by the U.S. to dominate the rest of the world.

(5) For all of the above, and many more, we believe that the only acceptable alternative is for NO BALLISTIC MISSILE SYSTEM AS OUTLINED IN THIS PEIS. Note that does not mean the 'no action alternative' IT MEANS NO PROGRAM.

(6) The positive alternative would be a very vigorous effort to lead the entire world into international cooperation to eliminate all weapons of mass destruction and to forever to prohibit any weaponization of space.

Submitted via email by Dale Nesbitt for East Bay Peace action. This statement approved by the EBPA board on 11-11-04.

EBPA, B. Brown, Chairperson

DC_E0373

Johnson, Kathryn

From: Anita MASON
Sent: Tuesday, November 16, 2004 7:26 PM
To: mda.bmds.peis
Subject: "Star Wars"

The proposals for missile defence are dangerous and misleading. To describe such a system as "defensive" is disingenuous: it is a shield, and the use of a shield is to protect the wielder of a sword. Whether or not this is the real purpose of the missile defence system is irrelevant: it will be seen as such by other nations who have reason to fear the might of the USA, and will respond by developing their own weaponry in such a way as to get round the shield. There will be an arms race, in other words. In a world already thoroughly stocked with nuclear weapons, nothing is more calculated to provoke a disaster.

The idea of the domination of the earth from space, of which "Star Wars" is a component, is morally quite unjustifiable and in fact monstrous. It offends one of the most profound human feelings, the association of the sky with spirit. I do not imagine, however, that such considerations weigh with military planners.

I do not want to live in a world in which missile so-called defence is a reality, and I do not want my country, in which there are quite enough American military bases already, to host missiles, radars
and communications systems for it. I do not believe that having them here will contribute to our security one whit, rather the reverse, and I repudiate my government's endorsement of the scheme. I believe that most British people would agree with me if they were in possession of the facts, but great care is taken to ensure that they are not. This vital issue has never been debated in Parliament.

Since it appears that "no action" in this context means "carry on with the plan", the three alternatives being considered by PEIS are all unacceptable. "Star Wars" in any form is destabilising, will eat up huge amounts of money that are needed for education, health care and the alleviation of poverty, will further distort the budget not only of the USA but of many other nations in favour of military spending and thus will make more likely a preference for military as opposed to peaceful solutions, and will only worsen the pollution and destruction of the planet by military-related industry and the cluttering up of space with bits of debris. No-one can have had a worse idea than this for many years.

Anita Mason

DC_E0376

Johnson, Kathryn

From: Bob Howd
Sent: Tuesday, November 16, 2004 8:02 PM
To: mda.bmds.peis
Subject: MDA PEIS Form Responses

name=Robert Howd
org=Office of Environmental Health Hazard Assessment
address1=1515 Clay St., 16th floor
address2=Oakland, CA 94612
comments=In the draft Programmatic Environmental Impact Statement for the Missile Defense System (1 September 2004), I would like to point out incomplete and misleading statements about perchlorate toxicity and standards in the bottom paragraph on Vol. 1, p. 4-56. This discussion provides the viewpoint of the DoD and the Perchlorate Study Group, an Industry Workgroup, on perchlorate toxicity, but ignores all risk assessments conducted by actual risk assessment agencies. The U.S. EPA has been evaluating perchlorate toxicity for years, in association with several defense agencies (as stated), and has released a draft risk assessment which proposes a drinking water equivalent level of 1 ppb.
The State of California Office of Environmental Health Hazard Assessment has published our risk assessment which estimates a health-protective level of perchlorate in drinking water of 6 ppb. The State of Massachusetts has recently released their evaluation with a recommended drinking water level of 1 ppb to protect pregnant women and fetuses (or other sensitive sub-populations), and 18 ppb for healthy adults. The U.S. EPA guidance applicable to water contaminant plumes emanating from industrial and DoD sites has used a standard of 4-18 ppb for several years.

To not consider and apply these relevant and applicable standards to the evaluation of potential environmental impact of the deployed missile systems seems to me to be putting both the DoD and the public at risk, both from legal liability and potential chemical hazards. I recommend that this section of the report, and any financial and toxicological calculations based on it, be revised to include the viewpoints expressed by the regulatory agencies whose job it is to regulate the public and environmental exposure to perchlorate. Acknowledging these opinions need not wait for the finalization of the U.S. EPA's current draft risk assessment for perchlorate, currently under review by the National Academy of Sciences, nor the promulgation of the California Maximum Contaminant Level for perchlorate in drinking water, scheduled for 2005.

Thank you for consideration of these comments.

Robert A. Howd, Ph.D.

The above comments represent my personal opinions, and have not been reviewed or approved by OEHHA prior to submission.

DC_E0380

Johnson, Kathryn

From: Darien De Lu
Sent: Tuesday, November 16, 2004 11:46 PM
To: mda.bmds.peis
Subject: Comments on the BMDS PEIS

Here are additional comments on the BMDS PEIS

1) In category after category, case after case, the PEIS repeatedly discounts the impacts of toxic substances resulting from and involved in activities at every level - manufacture, launching, use, etc. - by contending that the toxic substances will have no impact because they will be handled in accordance with existing law and guidelines. Such a blanket contention flies in the face of current experience with toxic substances. Many factors result in the legal guidelines failing to insure public and environmental safety when toxic substances are involved.
The report fails to entertain the possibility of accidental spills and discharges, whether in the transportation stage or as a consequence of mishaps at other stages. Additionally, the report ignore our experiences in which we have repeatedly experienced toxic consequences from currently legal uses of chemicals. The claim that there will be no toxic impacts by merely following existing handling rules is implausible.
Moreover, new discoveries about the minute amounts of substances that can still have a deleterious effect are continually forcing us to readjust safety standards. To initiate the massive undertakings proposed within the BMDS without making any attempt to mitigate the impacts - readily imaginable based on the evolving nature of toxin safety understandings - is unrealistic.

2) The PEIS completely ignores the well known environmental impacts of radiation. It does so by maintaining the transparent fiction that an effective BMDS can be implemented without resorting to the use of nuclear war heads.
Current research with BMDS prototypes provides scant basis for the belief that lasar or kinetic weapons will serve to eliminate target warheads. A realistic PEIS for BMDS must include a full and detailed consideration of the environmental impacts of nuclear weaponry. Such an assessment must address the entire nuclear cycle - production and manufacture as well as decommissioning and waste storage.

Submitted by Ms. Darien De Lu, .

DC_E0387

Johnson, Kathryn

From: Neil Kingsnorth
Sent: Wednesday, November 17, 2004 6:39 AM
To: mda.bmds.peis
Subject: Yorkshire Campaign for Nuclear Disarmament comments on the Draft Programmatic Environmental Impact Statement for the Ballistic Missile Defence System

Dear Sir/Madam,
Please find attached the Yorkshire Campaign for Nuclear Disarmament's comments on the Draft Programmatic Environmental Impact Statement for the Ballistic Missile Defence System. I would appreciate ackowledgement of receipt of this paper.

Best wishes,

Neil Kingsnorth

Yorkshire Campaign for Nuclear Disarmament
22 Edmund Street, Bradford, BD8 7AY, UK
tel. +44 (0)1274 730795 / email info@yorkshirecnd.org.uk
Web: www.yorkshirecnd.org.uk

Yorkshire Campaign for Nuclear Disarmament comments on the Draft Programmatic Environmental Impact Statement for the Ballistic Missile Defence System

Introduction
The Yorkshire Campaign for Nuclear Disarmament is a regional wing of British CND and it specialises in Missile Defence issues. It is one the leading UK Non-Governmental Organisations campaigning on Missile Defence, with particular emphasis placed on the two Missile Defence bases in Yorkshire – Fylingdales and Menwith Hill (the latter is yet to be officially confirmed as a Missile Defence facility).

Given our considerable interest in Missile Defence and its implications for global and UK security and stability, Yorkshire CND welcomes the opportunity to present our comments on the Draft Programmatic Environmental Impact Statement.

We are disappointed however that the PEIS will only be undertaken for component bases in the United States and not for overseas bases integral to the system, such as Fylingdales. From our experience of talking to the residents close to the Fylingdales base, we are aware of a constant concern about its role in the "Son of Star Wars" program and a desire for more information and accountability from the developers of the system. The local population in the vicinity of this base has both environmental and security concerns regarding the base's role in Missile Defence that ought to be addressed in such a study. The same also applies for Menwith Hill – considered highly likely to play a key role as the Ground Based Relay Station for the Space Based Infra Red System - and these concerns will grow if the United States is granted permission to use the base for Missile Defence by the UK Government.

Furthermore, there exists a large, informed section of society, not necessarily within the vicinity of these particular bases, that is also legitimately concerned as to the potential impact on UK and global security as a result of the Missile Defence system. Despite the UK's involvement in the system this group too will not be represented by this study.

Yorkshire CND, along with many concerned UK groups, did present submissions to the UK Parliament Defence Committee in late January 2003 as part of their investigation in to the potential use of Fylingdales for US Missile Defence, especially as the Ministry of Defence has repeatedly stated that it does not consider that the UK was under threat from a missile attack. However, since the public consultation period declared by the Secretary of State for Defence at the time (one month over the Christmas holidays and parliamentary recess) was completely inadequate, it gave no real opportunity for local residents or the general population of the UK to voice their concerns on this important issue. We hope therefore that the PEIS will give due attention to the views and concerns of residents affected by Missile defence beyond the shores of the US mainland.

Despite the fact that the PEIS has currently declared that it will only consider component bases of Missile Defence based in the US, we will refer to the Yorkshire bases both in the hope that the PEIS will recognise the importance of expanding its remit to cover Missile Defence bases beyond the USA mainland, and partly because the concerns that surround these bases can be equally applied to their US-based equivalents.

UK position
The UK Government has already granted permission for the USA to upgrade the Early Warning Radar at Fylingdales so that it may play a role in the Missile Defence system. Concerned observers of Missile Defence developments expect a similar request for use of Menwith Hill to come from the US in the future. The base has purpose-built downlink and relay elements for the Space-Based Infra-Red System (SBIRS), which will be integral to the US Missile defence system if and when the SBIRS satellite network

is complete. It is also possible that the UK may host an X-Band Radar and/or Missile Defence interceptor missiles in the future.

Fylingdales
Fylingdales, and radars like it, present environmental concerns to the local population as a result of the possible harmful biological effects of the non-ionising radio frequency emissions from the radar. Whilst the radar beam itself projects 3° above the horizon, the beam releases leakage in the form of sidelobes. These sidelobes of pulsed low frequency radiation are the source of considerable anxiety to local residents. Such concerns are exacerbated by the obvious effects of the radar in the local area (such as car alarms being set off regularly for no apparent reason, car automatic locking systems being triggered and interference with radio and tape players in cars passing the base) and the knowledge that the similar Cape Cod radar base in the United States has seemingly significant cancer clusters in its vicinity (that has resulted a USAF supported study of the radar effects on health). In 2003 the then base commander of RAF Fylingdales confirmed to Yorkshire CND that the radar has "issues with leakage."

The paper "Is it Safe?" by Professor Dave Webb - Convenor of Yorkshire Campaign for Nuclear Disarmament – explains in more detail the environmental concerns over the radar radiation and it is attached as Appendix 1 to this paper.

Furthermore we would point out that the Fylingdales radar base is in the North York Moors National Park – a loved and protected area of the UK. It is already seen by many as an unsightly abomination cutting across the horizon of otherwise ancient and unspoilt moorland. An increased role for the base in a new, highly controversial global military network presents the potential for increased activity, expansion and increased policing, all of which will lead to environmental degradation of the moorland on which the base is situated and the surrounding countryside.

Menwith Hill
Menwith Hill overlooks but is excluded from the Nidderdale Area of Outstanding Natural Beauty. As with Fylingdales, it interferes with a region that has been specifically ~~pinpointed~~ as an area of special importance that deserves protection. The land the base is on would no doubt have been included in the area if it had not been already spoilt by the considerable military presence. Menwith Hill is again visible for miles around and is an inexcusable blot on an otherwise precious landscape. The base's continual expansion and glaring nightlights only further interfere with this area.

Deleted: pinponted

Despite the base's contention that it is an RAF base, the base is in all reality run by the US military and it is famously unaccountable to the UK people. Thus, its environmental impacts are less controllable and have become considerable. As an example, although the base does present planning applications to the local council, that council has no power to disapprove them and the base can build whatever it desires, where it desires, with the local community only being able to express its concern and hope that the base commanders will take some notice. This situation has led to fervent expansion with little or no consideration for the impact on the local community or environment.

The discovery of a colony of rare feral orchids in natural wetland on the north-west of the Base by Anne Lee of the WoMenwith Hill Women's Peace Camp(aign), led to an investigation by one of the country's top orchid experts. This research did lead to the re-routing of a proposed high security fence and an agreement to conserve the orchids' site as a reserve. Such protection would not have been achieved if it were not for the discovery of a concerned citizen, since the base itself makes little effort to consider the environmental impact of its proposed developments.

Space
Missile Defence plans extend to the possible deployment of space-based weaponry and space-based weapons systems. It is crucial that the PEIS consider seriously the likely impact of space weapons deployment. The use of space weapons, for whatever reason, to attack or destroy objects outside of the atmosphere would produce space debris, changing the near Earth environment and would become a serious hazard to future space missions, even possibly preventing them from leaving Earth. At the speeds required to escape the Earth's gravitational pull, the impact of just a tiny object on a space rocket could be disastrous. Space-based conflict of any sort could add to this problem enormously and it is an issue that deserves serious attention.

Further to this, plans for weapons such as the space-based laser may eventually incorporate the use of nuclear power. The deployment of nuclear powered satellites could be environmentally disastrous with considerable risk of high-level pollution at the point of initial launch, when in orbit (from attack or accident) and (if and when the orbit decays) during re-entry into the Earth's ~~atmosphere.~~

Deleted: atmosphere .

The deployment of space-based weapons will also present the problem of increased global instability and a degradation of arms control efforts. Such deployments are likely to provoke other states to respond in kind with their own developments and deployments. With no sufficient legal system controlling the non-WMD weaponisation of Outer Space, weapons deployment and the threat of opponents interfering with vulnerable ~~systems,~~ could provoke a highly destabilising and dangerous space arms race. On top of this, space weapons deployment could provoke both horizontal and nuclear proliferation amongst states that are not capable of entering such a space weapons race but wish to respond to the threat.

Deleted: systems ,

Despite the PEIS's claims, various weapons components deployed under Missile Defence will have offensive capabilities, taking war-fighting to a whole new level, quite literally. Such statements are justified by statements from official US sources, such as the US Space Command's "Vision for 2020", their "Strategic Master Plan FY06 and Beyond" and the USAF Doctrine Document 2-2.1 "Counterspace Operations".

Nuclear proliferation and a space arms race would have considerable, long-lasting effects on arms reduction efforts and international stability and, from the perspective of the PEIS, present a genuine threat to the Earth's environment through the production of nuclear weapons, the creation of space debris and the possible use of nuclear weapons.

Other issues
The exhaust plumes of missile like the Missile Defence interceptor create considerable toxic pollution which is having an under-rated and very important long-term effect on the Earth's Ozone Layer. Such effects are to be seen increasingly over the coming years and could have a massive environmental and social impact in the near future. Missile Defence developments will expand the amount of rockets being sent into space and exacerbate this problem.

Yorkshire CND considers it worth emphasising too that the Missile Defence system is currently costing the US taxpayer something in the region of $9 billion every year and that this is likely to rise as deployment of more and more complicated, high-tech systems takes place, alongside maintenance of the current set-up. This amount of money could be diverted so that further cuts in health care, education and public services budgets would not be necessary. The money could be used too for broader, longer-term, more realistic, sustainable security efforts such as the cancellation of third world debt or the provision of food, water, shelter and education to some of the world's poorest people.

Yorkshire CND asks that our concerns be taken seriously and considered properly. The PEIS has offered itself three options, none of which is sufficient. As we understand it, the "no action" option simply allows for no change in current developments and the continuation of the project. If this is to be the ultimate step that the MDA is prepared to take then it implies a bias towards the outcome of this PEIS study by not allowing for the possibility that the Missile Defence system is too environmentally destructive to continue with.

The Missile Defence system is indeed a hugely expensive, dangerous and, on many levels, environmentally destructive system that is absorbing funds that could be put to better use in the challenge of global security. On these grounds, it should be halted.

Yorkshire CND would appreciate notice of receipt of this paper and to be kept up to date with developments relating to the PEIS.

APPENDIX 1

Fylingdales - Is the Radar Safe?
By Prof. Dave Webb – www.cndyorks.gn.apc.org/fdales

An Information and Safety Booklet given to contractors, new personnel and visitors to the Phased Array Radar (PAR) at RAF Fylingdales in North Yorkshire tells them to keep their mobile phones switched off to protect them from damage from RF power. The booklet also warns that there is a risk of induced RF power causing a spark between car and metal petrol cans and that remote car locking devices may not function. However, it doesn't mention much about the risk to health of visitors or local residents.

RAF Fylingdales is in the North Yorkshire Moors National Park and has been the home of a US Ballistic Missile Early Warning System (BMEWS) since the Cold War days of the 1960s. The base is run for the US by the RAF and is one of the 3 stations in a chain linked across the North Atlantic. The other stations are Thule in Greenland and Clear in Alaska and the 3 stations provide (in conjunction with the Defense Support early warning satellites) a Tactical Warning/Attack Assessment directly to the US Joint Chiefs of Staff.

The 40-meter high truncated pyramid that forms the PAR has 3 faces each containing an array of 2,560 aerials, transmitting at 420-450 MHz with a total mean power output of 2.5 Megawatts a range of around 3000 miles and is able to operate over a full 360°. The main radar beam is directed to be at least 3° above the horizontal, however side lobes can reach the ground.
At the time of the PAR upgrade to the system (previously it consisted of three mechanically steerable dishes housed in radomes) in 1993, an ElectroMagnetic Radiation (EMR) Survey of the area surrounding Fylingdales was commissioned by the Nuclear Free Local Authorities [1] . The survey was an extension of an earlier report produced in the summer of 1991 and used 23 measurement sites, including moorland paths and tracks, roadside locations and habitations. The survey found maximum field values of about $10Vm^{-1}$ which were in fact quite close to the currently accepted international standards developed by the International Commission on Non-Ionizing Radiation Protection (ICNIRP) reference levels of $28\text{-}29Vm^{-1}$ for the Fylingdales frequency range [2] . The MoD says that "UK safety thresholds are based on NRPB guidelines and not those of ICNIRP" [3] . However, the European Council Recommendation 1999/519/EC requires member states to implement ICNIRP and their power levels are more than ten times lower than NRPB in this frequency range [4] .

Also, there is some question as to the characteristics of the radar beam generated by the thousands of antennae on the PAR. Beams generated by conventional radar are in the form of simple waves, whereas the PAR beam is generated by many overlapping pulses that can strike a person thousands of times in a fraction of a second.

Some investigation into the accepted international standards is required in order to put these results into some kind of context. A recent report on the Physiological and Environmental Effects of Non-ionising Electromagnetic Radiation for the European Parliament [5] states:

"What distinguishes technologically produced electromagnetic fields from (the majority of) those of natural origin is their much higher degree of coherence. This means that their frequencies are particularly well-defined, a feature that facilitates the discernment of such fields by living organisms, including ourselves. This greatly increases their biological potency, and 'opens the door' to the possibility of frequency-specific, non-thermal influences of various kinds, against which existing Safety Guidelines – such as those issued by the International Commission for Non-ionising Radiation Protection (ICNIRP) - afford no protection. For these Guidelines are based solely on consideration of the ability of radio frequency (RF) and microwave radiation to heat tissue, and of extremely low frequency (ELF) magnetic fields to induce circulating electric currents in the interior of the body, both of which are known to be deleterious to health, if excessive."

The report points out that the frequency-specific sensitivity of living organisms to ultra-low intensity microwave radiation was discovered over 30 years ago in Russia and there the exposure guidelines are approximately 100 times more stringent that those of ICNIRP. It also notes that some symptoms have been reported in epidemiological studies involving humans, animals and plant life connected with a radar operating at 154-162MHz, with a pulse repetition frequency of 24.4Hz - at a location where the intensity of the emitted radiation is comparable to that typically found at 150m from a base-station. Additional effects include [6] :

- Depressed nocturnal melatonin levels in cattle [7] .

- Less developed memory and attention span (as well as decreased endurance of their neuromuscular apparatus) of children living within a 20 km radius of the radar, subject to a maximum exposure of 0.00039 W m^{-2}.
- A six-fold increase in chromosome damage in cows exposed to a likely maximum intensity of 0.001 W m^{-2}.

(The cited field intensities are estimated from information on the electric field intensity as a function of distance from the radar installation [8]).

The Fylingdales radar operates by emitting a series of pulses and additional, perhaps more serious, problems may arise at frequencies around 17 Hz. As mentioned in the STOA report, this lies in the range of beta brain-wave activity and is close the frequency of a flashing visible light that can provoke seizures in people with photosensitive epilepsy. It is also the modulation frequency at which *"there is a maximum in the expression of calcium ions from brain cells when they are irradiated with amplitude modulated, low intensity RF radiation over a wide range of carrier frequencies"* and *"any interference … could well undermine the integrity of the whole nervous system, although the extent to which this actually occurs is, at present uncertain, owing to a lack of the necessary research."* The pulse repetition frequency of the radar is thought to be 27 pulses per second (at least, this was the documented frequency of the previous system [9]) and it is not known whether there are any similar effects at or around this frequency that need to be examined closely.

Concerns about the effects of the electromagnetic radiation effects due to the radar were expressed by Yorkshire CND in its submission to the House of Commons Defence Committee on the upgrading of Fylingdales for the US Missile Defense Program (*See First Report of Session 2002-3 Volumes I & II, HC 290-I and HC 290-II, published 29 & 30 January 2003*). In response the MoD published for the first time results of emr levels measured around the base from 1991. These records show typical recorded levels of around 0.230 mW/cm^2 which is comparable with the reference level suggested by the ICNIRP of 0.225 mW/cm^2 for 450 MHz radar signals.

Radar power levels can be quoted as field strengths (V/m) or as power densities (mW/cm2). It is general practice amongst those who want to show how low their emissions are to quote in power density since this is proportional to the square of field strength, and therefore levels that are, say, ten times lower than the limit in volts per metre will be 100 times lower if expressed in mW/cm^2.

The maximum recorded levels are around 0.869 mW/cm^2 (location 26, Top of outside perimeter fence). This is 33% of the NRPB power density level or 58% of the NRPB electric field level. However, it is 4.3 times the ICNIRP power density level or more than twice the ICNIRP voltage level.
In the report the MoD state:

(para 4 on p. Ev60) "It should be borne in mind that UK safety thresholds are based on NRPB guidelines and not those of ICNIRP..."

In fact the UK has failed to implement legislation based on the European Council Recommendation 1999/519/EC, which requires member states to implement ICNIRP safety thresholds (which are ten times lower than NRPB in the frequency range relevant to Fylingdales).

Cape Cod
In April 2001 the US Air Force agreed to conduct "time-domain measurements" on a similar radar installation (known as PAVE PAWS – Phased Array Warning System) at Cape Cod in the US. Local residents there are concerned about the radar because the area has some of the highest rates of cancer in the state. From 1993 to 1997, nine of the Cape's 15 towns had breast cancer rates at least 15 percent higher than the rest of the state. [10]

Richard Albanese, an Air Force scientist for more than 31 years, and others (including Professor Kurt Oughstun) are worried that the radar's phased wave fronts affect human tissue in ways that aren't yet understood. Albanese is reported as suggesting that the radar station should be shut down or moved and that *"I have to go with the concepts of the medical profession, which say that humans shouldn't be exposed to physical or chemical environments that have not been tested"* . in the worst case the PAVE PAWS station could be causing a 21 percent increase in 'malignant disease' rates, a risk that would appear to warrant more study. *"In my experience working with military personnel ... misconceptions and*

errors tend to become entrenched in the organizational setting and do damage to medical practice" he wrote. [11]

In a presentation given in February 2002 at the start of a series of experiments to measure the PAVE PAWS radar, Albanese said he has conducted animal testing that has shown animals suffering harm when exposed to phased array radar at levels 1,000 times below the current electrical health standards. [12] The question remains "why has the Air Force classified much of Albanese's work?"

X-Band Radar
There may be additional problems. The UK government has already agreed that Fylingdales can be upgraded for use in the US missile defense ("Son of Star Wars") system and it is still possible that a new high resolution phased-array X-band radar (XBRs) using high frequencies (5.2-8.5 GHz) and advanced radar signal processing technology may eventually be employed at Fylingdales to improve target resolution [13] . These systems emit a series of electromagnetic pulses over a 50° field of view in azimuth and elevation, and can be rotated to track targets from any direction. When fully operational each system will include a radar mounted on pedestal, will need approximately 30 to 60 personnel to operate and will encompass an area of approximately 7 hectares (17.46 acres) for the radar alone and would need to be surrounded by a 150 m (500-foot) controlled area. [14]

XBRs have an average power of 170 kW and an antenna area of 123 m^2, which means a power-aperture product of about 20 million, but they usually incorporate a "thinned" array of only 1/5 of the total possible number of aerial elements (around 81,000) decreases the gain by a factor of 5. In this case more energy goes into the radar beam sidelobes but does produce a narrower beam and provides greater tracking accuracy.

Questions have been raised regarding the possible danger to the health of people living close to these installations. The BMDO insists that the microwave leakage from these high power radars is safe – but independent investigations into possible health hazards need to be made.

The XBR BMDO fact sheet [14] states that "The exposure limits established by [the US standard] ANSI/IEEE C95.1 1999 are used to ensure that public health will not be impacted by EMR emitted from the XBR".
Two major exposure environments are defined: inside and outside a controlled area of radius 150m. Security personnel would control the area to prevent any unauthorized access. It is claimed that outside the controlled area the EMR will be no higher than the power density levels specified in ANSI/IEEE C95.1 1999. The US Missile Defense Agency state that:
"There is a possibility that EMR may effect television reception out to a distance of 4 kilometers (about 2.5 miles) from the XBR and that occasional static may occur in some radios out to 7 kilometers (about 4.3 miles) from the XBR."

Concluding remarks
The radar at RAF Fylingdales in North Yorkshire gives rise to a number of concerns:

- The effects on health from the electromagnetic radiation need further investigation – a fresh EMR survey of the site is needed to update and re-examine the data collected 8 years ago – especially as the accepted international standards are being challenged in the US and by those concerned about the health effects of mobile phone masts etc.;
- The Ministry of Defence needs to explain why it insists on referring to NRPB guidelines rather than those of the ICNIRP (recommended by the European Union). Could it be because the Fylingdales radar fails the ICNIRP standards but not those of the NRPB ?
- More studies are needed on the extent and effects due to the low frequencies around the pulse repetition rate (27 Hz) as these may be particularly harmful to biological organisms;
- The introduction of a proposed X-band radar would mean an increase in EMR levels possibly resulting in an increased danger to local inhabitants and wildlife.

Much more research is required into the extent of EMR pollution at Fylingdales, the effects of these EM fields at the frequencies encountered and a much more in depth study of the health effects of the proposed X-band radar system.
See also: reports on BBC program - "Health Fears Over RAF Radar"

Notes:

[1] "RAF Fylingdales EMR survey: second phase" by Tim Williams, Elmac Services, August 2, 1993
[2] See "Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic and Electromagnetic Fields (up to 300 GHz)" from ICNIRP at http://www.icnirp.de/documents/emfgdl.pdf
[3] See the House of Commons Defence Select Committee Missile Defence report (Vol.2), Feb 2003
[4] Council Recommendation of 12 July 1999 on the limitation of exposure f the general public to electromagnetic fields (0 Hz to 300 GHz) (1999/519/EC)
[5] "The Physiological and Environmental Effects of Non-ionising Electromagnetic Radiation", by G.J. Hyland, Private Treaty No. EP/IV/A/STOA/2000/07/03.
[6] Science of the Total Environment; Issue No 180, 1996.

[7] "Study of Health Effects of Short-wave Transmitter Station at Schwarzenburg", by E.S. Altpeter et al., University of Berne, Inst. for Social & Preventative Medicine, August, 1995.
[8] "Measurement of the intensity of electromagnetic radiation from the Skrunda radio location station, Latvia", by T. Kalnins et al, Science of the Total Environment 1996, 180:51-56
[9] Jane's Radar and Electronic Warfare Systems, Second Edition, page 62, 1990-1.
[10] "Radar tower plan rekindles fears" by Richard Higgins, The Boston Globe, 5 March 2001
[11] "Making (Radar) Waves" by Ross Kerber, The Boston Globe, 2 July 2001
[12] "Measured Response" by Kevin Dennehy, Cape Cod Times, 28 February 2002
[13] The original plans for US Missile Defense did include a ground based XBR system at Fylingdales, but General Kadish of the US Missile Defense Agency has recently suggested that future XBRs might be based at sea rather than on land.
[14] "X band radar Fact Sheet" from the BMDO - was originally at www.acq.osd.mil/bmdo/bmdolink/pdf/jn0019.pdf but now removed - a copy can be found at www.cndyorks.gn.apc.org/bases/xbandradar.pdf

Johnson, Kathryn

From: Jonathan Parfrey
Sent: Wednesday, November 17, 2004 12:35 PM
To: mda.bmds.peis
Subject: comments from concerned California residents

November 16, 2004

MDA BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031
(sent via web-page)

Attention: Public Participation Officer

Dear Sir or Madam,

This letter is to transmit comments on the draft Ballistic Missile Defense System Programmatic Environmental Impact Statement, dated September 1, 2004.

I write on behalf of the Los Angeles chapter of Physicians for Social Responsibility, the American recipient of the 1985 Nobel Peace Prize. Founded in 1980, the organization has approximately 5,000 members in Southern California. The two main principles of our organization are to prevent the use of weapons of mass destruction and preserve the environment. It is out of concern for these two tenets that we write.

CROSS-CUTTING ISSUES

With respect to what the overall BMDS actually could entail, the PEIS is so broad and generalized that it is not possible to know what is covered by the overall BMDS PEIS and what isn't. For example, nuclear-tipped interceptors have been discussed by MDA officials but are not addressed in this PEIS. The extent and limitations of this PEIS should be clearly stated.

Communities most impacted by BMDS have been largely excluded from the environmental review process. For example, communities near Vandenberg AFB will disproportionately bear the burden of the proposed 515 launches over the next ten years. And, the PEIS has not sufficiently dealt with the effect of cumulative effects in Southern California, as many of the region's contractors are working on the weapon system. Simply, there needs to be additional hearings in potentially impacted areas of the nation.

The timeline to release the Final PEIS – cited on the MDA web-site and announced at the October 19, 2004 public meeting – a mere two to six weeks after the comment period deadline portends that MDA will not fully consider and respond to public testimony. PSR-LA emphatically suggests that MDA take the time to consider and respond in full to all comments and critiques.

NO ACTION ALTERNATIVE

DC_E0395

What is called the "No Action Alternative" is not adequate under NEPA and does not describe a scenario where no action is taken. Rather it describes a situation where the Missile Defense Agency would continue existing development and deployment of missile defense systems unabated. Under the "No Action Alternative" individual systems would continue to be tested and deployed except for integrated system-wide tests. This is hardly no action and would permit an indeterminate missile defense program, especially since, as explained in the draft, "There are currently no final or fixed architectures and set of requirements for the proposed BMDS." Even if MDA agreed to the "No Action Alternative," it would not find its actions constrained for the foreseeable future. The MDA needs to develop new alternatives which meet the intent of NEPA.

Most crucially, the "No Action Alternative" strangely links world events, policy objectives with environmental considerations; unprecedented in an environmental document which is supposed to be grounded in the science of risk assessment. The PEIS reads:

> "The decision not to deploy a fully integrated BMDS could result in the inability to respond to a ballistic missile attack on the U.S. or its deployed forces, allies, or friends in a timely and successful manner. Further, this alternative would not meet the purpose of or need for the proposed action or the specific direction of the President and the U.S. Congress."

Through the MDA's own volition, the document goes beyond environmental considerations and opens a Pandora's Box of analyzing the state of American security, the potential for missile attack, and the appropriate policy responses. Therefore, it is now MDA's responsibility to respond to all public comment on threat and policy, even those challenging the rationale for missile defenses.

Now that the Pandora's Box is open on policy, the Missile Defense Agency should, for example, make the case that nuclear deterrents no longer suffice, and MDA should substantiate why BMDS is the preferable security strategy over other Alternatives by which America might be kept safe, such as through United Nations IAEA inspections, international controls on missile sales and missile technology, or diplomacy.

If the agency choices to maintain the current "No Action Alterative" – which we do not support – the final PEIS would need to offer a realistic analysis (and timeline) of missile threats against the American homeland, nor fudge the distinction between theater and strategic threats.

Further, the "No Action Alternative" would eliminate systems integration testing, the very testing that would be needed to demonstrate that a layered missile defense system, as ordered by the President, can work. Elsewhere in this PEIS the President's direction is cited as a reason why no further change in the plan is being considered, but in the "No Action Alternative," the President's direction is clearly negotiable.

Historically, missile defenses have been divided between battlefield-theater defense and strategic defense. All previous administrations kept these two aspects of missile defenses segregated. A fourth alternative could be to develop and integrate theater defenses while postponing defenses to strategic attack.

TESTING AND DEPLOYMENT

In the statement read by Mr. Marty Duke at the Public Hearing held in Sacramento on October 19, 2004, Mr. Duke said that if testing failed to show that the system worked, the system would not go forward. However, as you know, the system is already being deployed even though it has no demonstrated capability to work under realistic conditions. Accordingly, the environmental process described in this

DC_E0395

PEIS is not believable since the statement made by Mr. Duke on October 19 has already been nullified by the Missile Defense Agency.

SPACE-BASED INTERCEPTORS AND SATELLITES

With respect to space-based interceptors, the PEIS is silent about the fact that missile defense would for the first time weaponize space. While space is certainly militarized, it is not yet weaponized, that is, by deploying attack weapons in space, with the consequences of a new arms race in space. The PEIS does not adequately address the environmental impacts of the consequences of placing strike weapons in space. Also, the relationship between NFIRE and space-based missile defenses, alluded to in the PEIS, should be clarified.

The use of radioactive sources on missile defense satellites, either for surveillance, target tracking and target discrimination, or on space-based missile defense interceptors is not discussed.

The PEIS states that space-based interceptors could be placed in geosynchronous orbit: 35,786 kilometers above the Earth's surface. To actually get a weapon from geosynchronous orbit to low-Earth orbit or even a lower trajectory of a missile within 20 minutes or half hour and do so accurately is physically impossible. Therefore the PEIS has mischaracterized this space weapon. Simply, any weapon placed in geosynchronous orbit could not be an anti-missile weapon. However such a deployment could be an anti-satellite weapon, an ASAT. The agency should then go through the process of trying the field this ASAT weapon on its own merits.

AIR-BORNE LASER

With respect to the Airborne Laser, the PEIS says that, "the ABL is currently the only proposed BMDS element with a weapon using an air platform." This is not correct. The PEIS should also address another proposed BMDS element using air platforms, namely, interceptors fired from aircraft.

The PEIS does not present the total quantities of specific hazardous chemicals that would be carried aboard an ABL aircraft nor does it describe the total quantities of specific hazardous chemicals that would be stored on the ground at various test and training locations. In addition, the PEIS does not address the environmental impacts should those chemicals be spread over the land from an accident or aircraft crash, or jettisoned at low altitude in an emergency.

AEGIS BMD

Except for the largely historical discussion in Section D.3, the PEIS does not adequately describe AEGIS BMD operations, the large number of missiles involved, nor the locations where testing or training with those ships and missiles will be conducted, nor the environmental impacts of operational deployment with those ships or missiles.

KILL VEHICLE

The environmental impacts of the development, testing, training, and deployment of the proposed new, high-speed, Kinetic Energy Interceptors are not adequately addressed. In particular, the number and size of these large interceptors is not described nor are the types of propellants and chemicals involved.

GROUND-BASED INTERCEPTOR

A third interceptor site is mentioned in the PEIS but it's location is not stated or described. More

DC_E0395

importantly, the environmental impact of BMDS operations at that third site are not addressed either. MDA officials have said that this third site could hold up to 20 ground-based interceptors and be bigger than the site at Fort Greely, Alaska. The environmental impacts of such as large operation should be addressed.

Thank you. We look forward to a response.

Sincerely,

Jonathan Parfrey
Executive Director

DC_E0401

Johnson, Kathryn

From: Victoria Samson
Sent: Wednesday, November 17, 2004 3:29 PM
To: mda.bmds.peis
Subject: Comment on draft BMDS PEIS

To whom it may concern,

I would like to raise the issue of the 3rd ground-based interceptor site, something which I believe has been completely overlooked in the draft Ballistic Missile Defense System Programmatic Environmental Impact Statement. There is no hard and fast information in this document which indicates where the 3rd interceptor site may be located. However, news stories this fall claim that the United States has been discussing with the United Kingdom the possibility of basing our interceptors on their territory. Alternatively, there are reports that Poland may be the host of the third site. Be that as it may, the draft PEIS gives no indication of where the third site will be, nor of the extent of its size. Presumably, if this document is to lay the groundwork for the missile defense network in its entirety, at least several of these alternatives would have to be examined.

Victoria Samson

Victoria A. Samson, Research Analyst

DC_E0402

Johnson, Kathryn

From: Catherine Thomasson
Sent: Wednesday, November 17, 2004 3:29 PM
To: mda.bmds.peis
Subject: Comments on behalf of over 800 members of Oregon Physicians for Social Responsibility
Importance: High

I am very pleased to be able to comment on the Ballistic Missile Defense System Programmatic Environmental Impact Statement (BMDS PEIS) on behalf of over 800 members of Oregon through the Physicians for Social Responsibility. I am delighted that a sense of system and control and oversight required by NEPA can be applied to this program as it does to other aspects of governmental plans.

I think the most important issue is that the BMDS PEIS does not contain a real No Action Alternative. Your No Action alternative which many people think is a good option really only states that the entire plan be implemented as already underway with only the exclusion of the new layered additions. A real No Action alternative, stops the implementation of the nuclear missile defense system.

This was the choice of President Clinton when he decided in September 2000 not to move forward with deployment because of technical uncertainties and unsuccessful flight tests. In 2003 the General Accounting Office in 2 separate reports raised serious questions about the ability to prove the system was functional. A separate non-governmental report by the Union of Concerned Scientists supported that position in 2004. Their report indicates that operational testing has not even started and that test conditions are not close to being realistic. None of the X-band radars that are central to the system are built hence we are exposing ourselves and the world with a system that has no hope of working.

Even if the technology worked perfectly, the systems being deployed are vulnerable to countermeasures that are easier to build than the long-range missile on which they would be placed. The UCS-MIT report *Countermeasures* was instrumental in calling attention to this problem and contributed to President Clinton's 2000 decision not to deploy the system the Bush administration is now fielding.

Therefore, given the potential severe environmental damage from both testing and deployment of this program, a true no action policy is preferable.

Beyond the lack of proven functionality there are other very important environmental reasons to choose a real no action item.

Whereas, there is no true threat of an intercontinental nuclear attack either on the basis of weak positions of our current allies such as China, Russia and that other states who are considering the development of nuclear weapons such as Iran and North Korea don't have the capability without detection;

Whereas, the implementation of NMDS will require us to withdraw in a more substantive way from the AntiBallistic Missile Treaty, which sends a message that the United States scoffs at international treaties that have up until now protected us and provides a very good and important mechanism for inspections;

We must conclude that the option for maintaining and improving on a prevention strategy based

DC_E0402

on international cooperation, inspection and enforcement of international treaties that are agreed to by all parties is the most effective option.

The impact environmentally and socially of the incredible amount of money to be spent has also not been addressed. The Pentagon's missile defense and space budgets together stand at over $23 billion, which does not include highly classified "black budget" spending this year alone. However, this year's allocations represent only a small portion of the Defense Department's anticipated investment on the system. In five years the Bush Administration estimates ballistic missile defenses will cost some $53 billion per annum. The full cost of deploying and maintaining BMDS is estimated to be between $800 billion and $1200 billion over the next 15 years. This represents an incredible amount of money will have been circumvented from true protection of public and environmental health.

In addition, our posturing to continue to build this non-functional system stimulates other countries to strive harder and faster to develop nuclear weapons to protect themselves from the United States whom they perceive as a rogue state, that violated international law by invading Iraq. When other nations devote a larger percentage of their national budget on military and defense then the environmental issues are neglected. These countries will then unleash untold amounts of pollution and plunder their natural resources that are wasted all for the sake of protection from the United States, not the least of which is their own nuclear and toxic environmental exposures to the world's citizenry including the U.S. since nuclear fallout has no boundaries.

Of course it can't be stated enough that this cycle also increases the chances of a nuclear accident.

The costs of this program for the United States while increasing pollution, keeps us from devoting adequate funds from the clean up of former nuclear sites where at Hanford alone still threaten groundwater and the Columbia River.

Direct Environmental Impacts

The BMDS has unacceptable environmental risks.

1) The result of release of hydrogen chloride, aluminum oxide, and hydrochloric acid into the upper atmosphere will consume huge amounts of ozone, resulting in dramatic increases in UV light exposure with epidemics of skin cancer, cataracts and the less studied but know effects on sensitive species such as amphibians and microscopic organisms.

2) Radioactive fallout from intercepted missiles has not been considered in this PEIS. The accepted concept that a missile blown up in the outer reaches of the atmosphere is a the logical conclusion of the BMDS alone should keep us from deploying such a system and rather focus on truly preventative strategies that do not accept any nuclear weapon use by any country.

3) Rocket launches result in incredible amounts of chemical releases. Liquid propellants containing hydrazines, nitrogen tetraoxide, and other compounds are highly toxic to all living species. Ammonium perchlorate used in solid propellants blocks the formation of key thyroid hormones which are critical for growth and development especially in fetuses and children. The PEIS proposes to allow over 30-fold higher levels of perchlorate (200 parts per billion) than that proposed by the State of California (6 parts per billion).

4) The risk of accidental missile launching to civilian or military aircraft is a real concern. The window of opportunity for successful launch is too narrow given its unproven track record, that the target identification is inadequate. This will result in incredible toxins being released as aircraft contain fuel,

DC_E0402

sometimes depleted uranium ballast, among other cargos not to mention the deaths of innocent victims.

5) The fuel needed for space based interceptors or satellites will most likely be nuclear. Solar energy appears too unreliable hence our conclusion that nuclear sources will be used. Nuclear exposure will likely occur then given a 15% failure rate of launch, as evidenced by the recent satellite crash in southern United States with little and inadequate information on the nuclear waste exposure.

6) Space debris from high altitude, mid-course missile intercepts or destruction of satellites will also result and contribute to significant interference to peaceful satellite missions and rain down toxic debris.

Thank you for the opportunity to comment on this very important issue. I would like a receipt of my comments.

Sincerely,

Catherine Thomasson, MD

DC_E0423

Johnson, Kathryn

From: Lauren Ayers
Sent: Thursday, November 18, 2004 1:08 AM
To: mda.bmds.peis
Subject: Amended statement

To Whom It May Concern,

I've been alerted to the problems of BMDS and am submitting these comments on the PEIS.

My major concerns have no place in the narrow confines of the comment process but I add them at the end anyway because the unintended consequences of many seemingly benign endeavors have come back to haunt humanity.

To directly address the impacts of BMDS, I have these comments:

1. It is too expensive for what we get. The opportunity cost of that money going to BMDS could bankrupt us the way the USSR exhausted itself with its military budget. We would be better off with a more educated population who have decent jobs, and a cleaner environment, which we won't be able to afford.

2. The hydrogen chloride injected into the atmosphere with each launch has incredible potential to neutralize ozone, enlarging the famous hole which now requires Australian school children to be outside only with hats and long-sleeved shirts.

Now for the larger picture. The BMDS PEIS does not include a real "No Action Alternative" of not developing ballistic missile defenses, Like a number of medical treatments, from bleeding people hundreds of years ago to Viox a month ago, the remedy is worse than doing nothing.

As a teenager, I was proud that my father worked for the Arms Control & Disarmament Agency. Besides the huge tax savings that resulted from the test ban treaties, we have no idea of what sort of nuclear catastrophe we avoided.

Much later, when President Reagan brought up his Star Wars notion, the feasibility reports made it clear what a ridiculous idea this was, like trying to stop a bullet with a bullet. Nevertheless, by preying on Americans' fears, Star Wars was moving ahead. Luckily, the collapse of the Soviet Union ended the foolishness.

By building Star Wars, we set a terrible example to other nations that we intend to be invulnerable, and therefore we become a threat to all other nations. They have no reason to trust us not to initiate war.

We now live in a world of terrorist threat. We need to learn that resentment of imperious America fuels more violence than we can ever head off, and that threats to our security will be as low tech as having religious fundamentalists give up their lives to pilot planes into office buildings. Fairness, respect, and cooperation are key in defusing

True, there are other nuclear nations that could launch against us. However, it would be far wiser to give every North Korean, Pakistani and Indian a share of what it would cost to build Star Wars so they can buy land, build houses, start businesses, and educate their children. Peace comes from contented people in prosperous nations.

Americans don't pay much attention to complex technological and scientific issues. But when they find out the monetary and social costs of following the wrong experts' advice, they get very angry.

Citizens rose up to stop above ground atomic bomb testing and supported the test ban treaty. We insisted on the Clean Air and Clean Water Acts. We buy more organic food every year because that is safer to eat and better for the environment.

Why not do the right thing now, instead of trying to clean up the mess later? An ounce of prevention is worth a pound of cure.

Lauren Ayers

Johnson, Kathryn

From: Robert Gould
Sent: Thursday, November 18, 2004 1:20 AM
To: mda.bmds.peis
Subject: Comments on Proposed BMDS PEIS

11-17 Gould-NMD Comments.doc (...

November 17, 2004

MDA BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

To whom it may concern:

I am submitting the following brief comments regarding the BMDS PEIS. In addition to being an Associate Pathologist at Kaiser Hospital in San Jose for more than 23 years, I am currently Immediate Past President of the national organization Physicians for Social Responsibility (PSR), which comprises approximately 30,000 members. Our organization is committed to the elimination of nuclear and other weapons of mass destruction, the achievement of a sustainable environment, and the reduction of violence and its causes. PSR is the U.S. affiliate of the International Physicians for the Prevention of Nuclear War (IPPNW), recipient of the 1985 Nobel Prize for Peace for its efforts to prevent nuclear war. I have been President of the SF-Bay Area Chapter of PSR since 1989, and I am writing this on behalf of our approximately 2,000 physician and allied health professional membership.

In considering the Environmental Impact of the proposed BMD system, the PEIS should address the full extent of possible environmental impacts on our planet and the proposed surrounding outer space intended field of operations. Concerns include not just potential direct environmental damage, but indirect effects. The latter include the potential for encouraging the continued global proliferation of nuclear weapons with associated environmental effects ranging from development, production, testing, deployment and use. They also include the fiscal impact of projected costs of the BMD system that could otherwise be used to redress the significant health and environmental problems that plague our planet, and that would likely increase with anticipated accelerated global climate change. These problems need major investments in capital that are being squandered on wasteful projects such as the BMD that inherently violate fundamental public and environmental health principles of primary prevention—-in this case concentrating on eliminating the source of the problem being "defended" against: the continued stockpiling and proliferation of nuclear weapons.

Specific comments follow:

1) The BMDS PEIS does not adequately address a number of potential environmental and health hazards that would be associated with various aspects of development and deployment. These include:

a) The planned heightened increase in missile launches would potentially lead to increased exposures to the population from toxic pollutants. These include liquid propellants containing hydrazines, nitrogen tetroxide, and other toxic compounds. In addition, the ammonium perchlorate used in solid propellants blocks the formation of key thyroid hormones which are critical for the growth and development especially in fetuses and children. The PEIS proposes to allow an over 30-fold higher level of perchlorate (200 parts per billion) than those proposed by the State of California (6 parts per billion). The numerous anticipated rocket launches will release chemicals including aluminum oxide,

hydrogen chloride and hydrochloric acid into the upper atmosphere, with the potential for further depleting the diminished ozone layer.

For example, each molecule of hydrogen chloride consumes 100,000 molecules of ozone, resulting in the widening of the ozone hole, thereby dramatically increasing levels of UV light. Elevated levels of UV light cause sunburn, skin cancer, cataracts, and many other forms of UV damage to sensitive species;

b) The potential risks posed by BMD missiles accidentally shooting down civilian and/or friendly military aircraft;

c) The potential impacts of space debris from high altitude, mid-course missile intercepts or destruction of satellites on global populations;

d) The potential environmental impacts of nuclear power sources that would likely be employed for deploying space-based satellites and interceptors;

e) The potential radioactive fallout from intercepted missiles.

2) The proposed BMDS is extremely economically wasteful at a time of constrained domestic budgets that are likely to persist far into the future, given the combination of massive military budgets and tax cuts. As indicated in the aforementioned general comments, the monies proposed for the BMDS could better be spent to redress a variety of compelling national and global health and environmental problems.
In 2004, the U.S. is spending approximately $450 billion on its military – and this does not include the past and present "supplemental" costs of the wars in Iraq and Afghanistan, which are already estimated at an excess of $200 billion. The DoD missile defense and space budgets of over $23 billion do not include highly classified "black budget" items. On top of this, in five years, the present U.S. Administration estimates that ballistic missile defenses will cost approximately $53 billion per year. The full cost of deploying and maintaining BMDS has been estimated to be between $800 billion and $1,00 billion over the next 15 years.

3) The BMDS is being proposed at a time when there are only two potential US adversaries (China and Russia) that have the capacity to deliver a long-range missile that can reach the United States. Currently, China maintains only 18 de-alerted missiles that can reach the US mainland. At present no other nations threaten to deploy attack weapons in space. We believe that US deployment of anti-missiles and space-based weapons will provoke increased hostility towards the U.S., heightening the chances of China and Russia and other nations responding with their own innovations and counter-measures. A good example of this was the announcement by Russian President Putin of a new nuclear missile system in line with previously disclosed plans to develop a new generation of sea- and land-based missiles capable of penetrating ballistic missile defense systems. ("Russia Is Said to Develop New Nuclear Missile," AP, New York Times, November 17, 2004) Hence, instead of affording Americans secure protection from missile attack, the proposed defenses may lead to a situation of greater danger. It is also well-known that the elaborate BMD systems being planned would be ineffective against low-tech attacks by terrorists who have already demonstrated the deadly use of box cutters and smuggled weapons, or who could possibly employ radiological weapons in the future.

4) The BMDS PEIS does not include a real "No Action Alternative". Such an alternative that does not include further development testing or deployment of BMDS weapon systems needs to be considered and included in the PEIS. Such a "No Action Alternative" would include strong support for efforts by the UN and nations around the world to enhance security through strengthening inspection and verification protocols of existing treaties, and by re-commitment to arms control and disarmament approaches that to date have served to limit global Weapons of Mass Destruction (WMD) proliferation. As such, the PEIS needs to consider explicitly whether the BMDS would itself encourage the proliferation of WMD, as well as an arms race in space, with examination of the likely response of other nations to the BMDS. As the BMDS is coupled to continued U.S. nuclear weapons programs, will this lead other nations horizontally proliferate for "deterrence" capabilities?

Please acknowledge that you have received these comments.

Respectfully submitted,

Robert M. Gould

____

DC_E0425

Johnson, Kathryn

From: Jonathan Parfrey
Sent: Thursday, November 18, 2004 2:36 AM
To: mda.bmds.peis
Subject: last minute additional comment

November 17, 2004
11:32 PM (PST)

MDA BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031
(sent via email)

Attention: Public Participation Officer

Dear Sir or Madam,

Please factor an inhalation pathway for exposure to ammonium perchlorate. Please asses for both public and occupational exposure. For toxicity information on this newly discovered pathway please see the following study.

1: Wei Sheng Yan Jiu. 2004 Mar;33(2):208-10. Related Articles, Links

[Study on the injury effect of ammonium perchlorate to lung]

[Article in Chinese]

Yang H, Peng K, Chu Q, Zhao S.

Public Health School, Tongji Medical College, Huazhong University of Science and Technology, Wuhan 430030, China.

OBJECTIVE: To study the injury effect of ammonium perchlorate (AP) to lung and to explore whether AP can cause pulmonary fibrosis. METHODS: To detect the levels of cell counts, TNF-alpha, MDA, HYP and the synthesis of collagen in BALF or rat lung after a certain time when rats were injected AP by intratracheal instillation. RESULTS: AP could bring about acute lung damage and inflammatory reaction. The levels of TNF-alpha of different groups in different time were obviously higher than the normal control group($P < 0.05$). AP could affect the levels of MDA, HYP and the synthesis of collagen. But it had no obviously pathological change of pulmonary fibrosis. CONCLUSION: There were acute injury effect about AP to lung, but this experiment could not make sure whether AP could cause pulmonary fibrosis.

PMID: 15209008 [PubMed - indexed for MEDLINE]

Thank you.

DC_E0425
Jonathan Parfrey

DC_E0427

Johnson, Kathryn

From: Jimmy Spearow
Sent: Thursday, November 18, 2004 8:11 AM
To: mda.bmds.peis
Subject: MDA PEIS Form Responses

Dear MDA I am not sure if the web site properly submited my BMDS PEIS comments so I am sending a duplicate copy of them again below . It was nice meeting you in Sacramento. Thank you very much.
Jimmy

Missile Defense Agency
BMDS PEIS
Comment Form

Name: Jimmy Spearow, Ph.D.
Ph, D. in Genetics,
With experience in Genetics, Physiology and Reproductive Toxicology
Member Physicians for Social Responsibility

Organization: United States Citizen

Address1:

Address2:

Comments:

November 17, 2004

Dear US Missile Defense Agency (MDA);

Please consider the following comments on the Draft Programmatic Environmental Impact Statement (PEIS) of the Ballistic Missile Defense System (BMDS).

1) Addressing Scoping Comments: I submitted a number of comments, on the scope of the BMDS several of which appear to have not been adequately addressed in the draft BMDS PEIS. These will be addressed in each specific comment. As discussed with Mda officials at the Sacramento public hearing, the MDA should provide more time for additional individuals from the most affected regions, including California and Alaska to comment on the BMDS PEIS.

2) Security, freedom, civil liberties, prosperity, the rule of law and the defense of the US constitution and its environment are very important to me as a citizen of this great country. Environmental sustainability is indelibly tied to our prosperity, and more abstractly to our security and freedom. We all want to be safe form missile attack. However, I am very concerned about the interconnected environmental, security and arms proliferation consequences of the US Missile Defense Agency (MDA) plans to establish a vast land, air, sea, and space- based Ballistic Missile Defense System (BMDS) including interceptor and laser weapon systems, sensors and command and control communication systems. The BMDS presents a number of toxic contamination and exposure risks as well as risks to

DC_E0427

health and safety that must be considered under the National Environmental Policy Act (NEPA). In so many cases the BMDS PEIS under estimates the magnitude or importance of these risks. These underestimates of environmental effects will be discussed under specific comments.

3) The BMDS PEIS does not include a real "No Action Alternative". Such an alternative that does not include further development testing or deployment of these weapon systems needs to be considered and included in the PEIS. The BMDS PEIS has not considered the "No action Alternative" of re-joining the UN and many nations of the world in working to enhance security through treaties and arms control and disarmament approaches, e.g. the approach that has provided us with long-term security to date.

4) The BMDS does not consider the direct, indirect and cumulative effects of the BMDS as required by NEPA, especially in regard the effects of the BMDS on the Arms race, which puts us closer to the disaster of nuclear war. In this regard, the PEIS is completely lacking a non-proliferation analysis. The BMDS tries to sell missile defenses to the public as a way to go beyond nuclear deterrence. Yet the BMDS is a dramatic escalation of a missile defenses that is not relevant for defending from terrorists who are much more likely to smuggle WMD. Securing loose nuclear materials is a much more effective strategy for preventing such terrorist nuclear threats.
The BMDS PEIS ignores the fact that the US posses extensive offensive nuclear and conventional weapon systems and that the proposed BMDS will operate along side these offensive weapon systems.
The BMDS PEIS ignores the fact that the U.S. has a preemptive nuclear and conventional first-strike warfare policy and has exercised this policy in preemptively / preventatively invading other countries that have not attacked the U.S. including Iraq. Pronouncements of US preemptive offensive nuclear and conventional first strike policy as articulated in the 2002 Nuclear Posture Review; the 2002 Defense Guidance Policy; many statements of Bush, Cheney, Rumsfeld, and Wolfowitz, as well as the unprovoked 2003 invasion of Iraq, have together furthered international fears of the prospect of unprovoked unilateral attacks by the US. Building a massive land, sea, air and spaced-based BMDS is very likely to further invoke international fears that it will be used in conjunction with US offensive first strike and command and control communication systems to attack and/or dominate other countries.

The BMDS PEIS ignores the reasonable forseeability that it forces other nations to proliferate and/or smuggle WMD so that they can re-establish deterrence. Indeed, Russia and China have already started to proliferate and develop counter measures in response to the impending development of the U.S. BMDS (Evans 2004). Previously non-nuclear nations such as North Korea have stated that they also proliferated in order to establish a deterrent. In short, many nations are concerned that a US BMDS will eliminate their ability to deter attack, and assure the ability of U.S. forces to intervene anywhere in the world with offensive weapons systems. Such fear and insecurity has a reasonable forseeability of driving WMD proliferation and thereby decreasing rather than increase our security for years to come. Such WMD proliferation and the treat of nuclear war will have major environmental consequences. Thus, the BMDS needs a non-proliferation analysis which considers the direct, indirect and cumulative effects of the BMDS as well as other entities.

In essence, the combined direct, indirect and cumulative effects of the proposed BMDS in conjunction with US offensive weapon systems and US preemptive first strike military policy is very likely to invoke fear of US actions and intentions. Furthermore, a BMDS would be much more likely to be effective in intercepting ICBMs of another nation, if the BMDS were to be used following a preemptive nuclear first strike. Since the nation that strikes second loses for sure, the BMDS destabilizes the policy of nuclear deterrence that has helped to keep the peace for over 50 years. There is more than a reasonable foreseeability that the resulting paranoia will cause a major arms race, and send us into confrontations and wars of great scale. Such wars seriously threaten all we as a people hold dear; health, safety, and our environment.
The threat of the BMDS leading to a more aggressive nuclear policy and nuclear war can be seen in the

historic article "Victory is Possible" by Colin S. Gray and Keith Payne, Foreign Policy Summer 1980, pp. 14-27. These authors state: "If American nuclear power is to support U.S. foreign policy objectives, the United States must possess the ability to wage nuclear war rationallyŠ.
"ŠThe United States should plan to defeat the Soviet state and to do so at a cost that would not prohibit U.S. recoveryŠ.
Washington should identify war aims that in the last resort would contemplate the destruction of Soviet political authority and the emergence of a postwar world order compatible with Western valuesŠ.
Once the defeat of the Soviet state is established as a war aim, defense professionals should attempt to identify an optimum targeting plan for the accomplishment of that goal. For example, Soviet political control of its territory in Central Asia and in the Far East could be weakened by discriminate nuclear targeting. The same applies to Transcaucasia and Eastern EuropeŠ.
Strategists cannot offer painless conflicts or guarantee that their preferred posture and doctrine promise a greatly superior deterrence posture to current American schemes. But, they can claim that an intelligent U.S. offensive strategy, wedded to homeland defenses, should reduce U.S. casualties to approximately 20 million, which should render U.S. strategic threats more credible. Š
A combination of counterforce offensive targeting, civil defense, and ballistic missile and air defense should hold U.S. casualties down to a level compatible with national survival and recovery. The actual number would depend on several factors, some of which the United States could control (the level of U.S. homeland defenses); some of which it could influence (the weight and character of the Soviet attack); and some of which might evade anybody's ability to control or influence (for example, the weather). Š
No matter how grave the Soviet offense, a U.S. president cannot credibly threaten and should not launch a strategic nuclear strike if expected U.S. casualties are likely to involve 100 million or more American citizens." Š (**Victory is Possible** by Colin S. Gray and Keith Payne *Foreign Policy*, Summer 1980, pp. 14-27).
Note that these authors also helped to write the 2002 US Nuclear Posture review, which further solidifies the US preemptive nuclear first strike policy. Gray and Payne make it clear that BMD is essential for a more aggressive US nuclear first strike policy. Thus, there is a reasonable foreseeability that the BMDS in conjunction with US offensive nuclear forces will increase the probability of a massive nuclear war. Thus, the BMDS needs to include a detailed analysis of the environmental effects of "limited" and "all out" nuclear war, including: medical radiological, blast, burn, fallout, disease, and cancer effects to health and safety; effects on nuclear winter, as well as effects on atmosphere, global supplies of fresh water, global food supplies, and nuclear power plants and power systems. The prospect of the BMDS leading to more aggressive US policies that result in a massive nuclear war also needs to be considered in regard to a true no action alternative.
In short, since there is a reasonable forseeability that the BMDS in conjunction with US and Allied nuclear weapon systems and current US nuclear weapons policy as defined in the 2002 Nuclear policy review will destabilize the nuclear arms race and lead to nuclear war, the environmental consequences of nuclear war need to be considered I detail in the BMDS PEIS. (Ambio Volume XI number 2-3, 1982, Nuclear War: The Aftermath. Entire journal dedicated to the effects of nuclear war, including effects on heath and safety, Air, water resources, agriculture, biological resources, and nuclear winter.)

This requested in my scoping comments was ignored. e.g. Scoping comment "#18) The MDA needs to consider whether the BMDS in conjunction with offensive first strike weapon systems and first strike policy increase the probably of a major nuclear war or other disturbance that could result in nuclear Winter, with the associated loss of species"

5) **The BMDS PEIS did not adequately consider impacts of Hazardous waste and materials and on Health and safety, Water Resources and Biological resources of environmental contamination from toxic and hazardous components of rocket fuels and explosives.**
The BMDS PEIS markedly under reports the emissions of representative interceptors. Exhibit 4-11

reports the emission of (90+58+52+22+17+6+6)=251 pounds for a representative interceptor. However, ground based interceptors are much larger (approximately 54 feet long 3 stage solid propellant rockets (such as the Minuteman III) weighting 22.5 to 25 tons and containing approximately 30,000 to 45,000 pounds of solid propellant. Thus the MDA underestimates the emissions from such interceptor rockets by factor of greater than 100. This is totally unacceptable. This underestimate of BMDS pollutants is apparently repeated in Exhibits 4-13, 4-14 and 4-15. Thus the MDA needs to revaluate the environmental effects of these pollutants. Also the MDA should define what are the emissions from the missiles used to launch spaced based interceptors, and sensors.

6) Not only does the BMDS PEIS under represent the total amount of emissions, from the estimated 515 BMDS rocket launches over the next several years, it also discounts that this program will be injecting large quantities of chemicals including aluminum oxide, hydrogen chloride and hydrochloric acid into the upper atmosphere, stratosphere, etc. Most concerning is the injection of hydrogen chloride into the upper atmosphere where the breakdown of each hydrogen chloride molecule to chloride ion catalyzed the breakdown of 100,000 ozone molecules, thereby depleting ozone, and decreasing the blocking of UV rays. This depletion of ozone will increase risk of cataracts and skin cancer. Thus, the BMDS will have a much greater effect on ozone depletion and skin cancer than HCl released at sea level.

7) Liquid propellants containing hydrazines, nitrogen tetroxide, and other compounds are highly toxic. At very low concentrations, hydrazines irreversibly cross link to aldehyde groups on proteins at slightly acidic pH and can cause cancer. One of the most concerning pollutants from the firing of rocket engines is HCl, which combines with atmospheric water to produce acid rain. The PEIS did not address potential for interactions between HCl and hydrazines commonly used in rocket engines such as monomethylhydrazine (MMH) and Unsymmetric dimethylhydrazine (UDMH). Specifically does the toxicity of hydrazine increase under acidic conditions found in acidic rocket exhaust?

8) Ammonium perchlorate is one of the main components of rocket fuel, typically constituting 60% to 75% of missile propellant and about 70% of space shuttle rocket motors. Since the fuel and perchlorate goes flat, the fuel/perchlorate has to be replaced every few years or it will fail to function properly, thereby increasing the amount of perchlorate waste and exposure problems.
Ammonium Perchlorate is well characterized as a thyroid hormone disruptor.
http://www.ewg.org/reports/rocketscience/chap3.html . At high enough concentrations, perchlorate can affect thyroid gland functions, where it blocks iodide uptake necessary for the synthesis of thyroid hormones (Urbansky 2002). Perchlorate can cause hypothyroidism, and thyroid cancer. The environmental levels of perchlorate have been show to inhibit development in frogs (Goleman et al. 2002). California has extensive perchlorate contamination problems with the drinking water sources of at least 7 million Californians and millions of other Americans are contaminated with perchlorate. A federal **safe daily perchlorate exposure has not yet been set by the EPA, and its expected release in 2002 has been delayed. It has been delayed since the DoD objected to EPA studies suggested a standard of 1 ppb.** Senator Barbara Boxer has introduced legislation to require the EPA to establish a standard for perchlorate contamination by July 1, 2004. While most contaminated samples are in the 4 to 20 ppb levels, surveys of California water sources show several sites with perchlorate levels from 4 to 820 ppb.
http://www.ewg.org/reports/rocketwater/table1.php
Ammonium perchlorate used in solid propellants blocks the formation of key thyroid hormones which are critical for growth and development especially in fetuses and children. The PEIS proposes to allow over 30-fold higher levels of perchlorate (200 parts per billion) than that proposed by the State of California (6 parts per billion). As pointed out in the comments of Lenny Siegel: The reason that there is no federal drinking water standard for perchlorate is that the Defense Department objected to EPA studies that suggested a standard of one part per billion (ppb). Meanwhile, regulatory agencies are using levels far below the 200 ppb asserted in the PEIS. On the way to establishing its own legal standard,

California has adopted a Public Health Goal of 6 ppb (Frequently Asked Questions (FAQs) About the Public Health Goal for Perchlorate," California Office of Environmental Health Hazard Assessment (OEHHA), March 11, 2004. http://www.oehha.ca.gov/public_info/facts/perchloratefacts.html). Even these levels of perchlorate may be detrimental to fetuses and infants. The human study considered in setting the California public health goal did not evaluate pregnant women, fetuses or infants (Greer et al. 2002). The study of Greer et al 2002, only used a 14-day exposure to perchlorate, which is insufficient to deplete thyroid colloid which acts as a storage form of thyroid hormones. Thus this study is insufficient to estimate the effect of long-term perchlorate exposure on iodine uptake or thyroid hormone levels. Since the effect of long term perchlorate exposure on reducing thyroid hormone levels, especially in the fetus and in infants has not been considered, the MDA needs to evaluate these effects on these sensitive groups as required by federal law. In May, 2004, Massachusetts identified a reference dose for perchlorate that would correspond to a 1 ppb drinking water exposure limit. Also note that perchlorate is found in milk and in several plant species, including lettuce, where high levels have been reported. Thus multiple sources of perchlorate exposure need to be considered.

9) To ensure maximum environmental protection and reduce known, widespread human health risks from the use and disposal of rocket propellants, the BMDS PEIS should compare the proposed alternatives against a real No Action Alternative. At a minimum the BMDS PEIS should:
A. Acknowledge and address emerging regulatory standards for perchlorate exposure.
B. Consider the effects of perchlorate on susceptible subpopulations, including fetuses, and children. The MDA also needs to consider the effects of perchlorate exposure on even more sensitive congenitally hypothyroid populations, so that these individuals are not detrimentally affected by perchlorate from BMDS missile launches.
C. Since water supplies in several regions of central and southern California are already at, exceeding and in some cases markedly exceeding the emerging regulatory standards for perchlorate, the MDA should acknowledge and address the perchlorate problem so as to protect the public.

10**) The BMDS PEIS did not address my scoping comments that the** PEIS should address whether the BMDS testing endangers Health and Safety by missing its target or targeting the incorrect vehicle. The BMDS as described on the MDA web site is a risk to public safety as shown by the Patriot 3 (PAC-3) shooting down US and Allied British military planes during the 2003 US / British invasion of Iraq. According to a report in USA Today April 15, 2003, titled "Patriot Missile: Friend Or Foe To Allied Troops?" By Andrea Stone, It is seems that the Patriot has difficulty determining "friend from foe". In the first incident, on March 22, a Patriot missile downed a British Tornado GR4 fighter-bomber near the Iraq-Kuwait border, killing the two-man British crew. A U.S. F-16 fighter jet had to fire on a Patriot missile radar in Iraqi after the radar "locked on" to the jet. A Patriot-3 battery was also suspected in the downing of a U.S. Navy F/A-18 Hornet near Karbala on April 2, killing the pilot. Since several other Patriot friendly fire malfunctions are known, the MDA needs to consider how many civilians will be killed by the patriot BMDS.
Furthermore, the Aegis Cruiser system is a threat to commercial aircraft, as shown by the USS Vincennes mistakenly shooting down the Iranian Airbus commercial airliner flight 655 on July 3, 1988, killing all 290 civilians aboard http://www.geocities.com/CapitolHill/5260/vince.html . Over 100 witnesses reported seeing an upward arching flash of light immediately before TWA flight 800 exploded off of New York. However, government investigators refused to consider whether a missile launched from an unannounced ongoing naval exercise could have been the cause of the crash. The point is that the activation of BMDS risks accidentally shooting down civilian airliners, which was not even considered in the BMDS. While the BMDS states that warning will be provided to enable time to clear the airspace, it is highly doubtful that such time would be allowed in a perceived emergency. The BMDS PEIS needs to address these threats.

Both the PAC-3 and Aegis Cruisers are included as components of the proposed BMDS Since the PAC-

3 is a relatively short range system and is not designed for intercepting ICBMs, how many PAC-3 batteries will have to be deployed to offer full protection for the American and allied cities and military bases. Are these within range of any civilian aircraft? How will they discriminate attacking aircraft from commercial and civilian aircraft? The MDA needs to consider how many civilians and US/allied military personnel will be accidentally killed by the BMDS.

11) The PEIS provides conflicting information on the effects of the ABL on health and safety. The PEIS does not quantitatively assess the risk of the Airborne Weapons Laser (in a Boeing 747) blinding pilots and/or other civilians, stating mainly that humans and others would be exposed to the laser beam, mainly as reflected light for less than 0.01 seconds. However the PEIS provides no data on the wattage or power of these lasers in the PEIS making it impossible to assess the dangers of such laser exposure, especially to the eyes.
On Oct. 30, 1995, a Southwest Airlines' pilot in control of a flight departing McCarran International Airport in Las Vegas was temporarily blinded by a laser light. According to news reports, the incident was serious enough to force the plane's captain to take control until the pilot regained his sight. "Had it hit me and the other pilot simultaneously, I shudder to think what would have happened," the pilot told reporters. (http://www.fda.gov/fdac/departs/496_irs.html). Had the pilot been exposed to a high energy laser (HEL) as used in the BMDS the results could be much more debilitating, endangering the health and safety of numerous passengers.

The BMDS PEIS (page 4-32) cites that exposure to a reflected laser beam while in the air operating environment would be very short, < 0.01 seconds that and would not impact the health and safety (US Air Force 1997A). But no estimates are provided for the actual danger zone for the HEL to detrimentally affect health and safety, e.g. causing skin and especially retinal damage. The Draft Supplemental Environmental Impact Statement for the Airborne Laser Program (2002) (page 99) cites the power of the HEL as about 107 watts per square centimeter. Ten million watts per square centimeter will burn retinas and eyeballs very quickly. While the PEIS states that medium energy lasers such as the SHEL if focused at point 12 km away, would be hazardous to the human eye 2 km before to 2 km past the focus point. Where as the other lasers and especially the HEL would be hazardous immediately after leaving the turret of the ABL. While the PEIS states that the BILL and TILL no hazard distance would extend > 10 km beyond the target, and the HEL hazard distance would extend even beyond these distances. But the BILL, TILL and I presume the HEL hazard distances are apparently classified. How can the public comment on the effects of the BILL TILL and especially the HEL on health and safety if the of distance at which these lasers cause eye damage is not available? The public and the MDA / Air force need to make this information available to better ensure the heath and safety of the public.

The PEIS focuses on the testing of these lasers, but fails to reveal whether once deployed, the ABL or any other BMDS weapons lasers will ever be directed toward aircraft including airliners, or individuals on the surface of the earth, e.g. on land or at sea. If so, the MDA needs to address the effects of HEL and other weapons lasers on endangering health and safety, especially skin and eye damage.

12) The MDA PEIS needs to consider whether boost phase BMDS interceptors could be launched erroneously, causing another country to believe it was under attack, and thereby triggering a nuclear war. The American Physical Society examined the issue of boost phase intercept, and determined that the interceptor has to be very close to the ICBM, be launched within about 15-60 seconds from the time the ICBM was launched, and have much greater accelerations than the ICBM http://www.physicstoday.org/vol-57/iss-1/p30.html (Kleppner et al. 2004). The problem of boost Phase intercept is greater for solid rockets with high accelerations than for slower accelerating liquid rockets. The further problem is that ship based interceptors are not big enough and do not have sufficient accelerations to make a boost phase intercept even from a small country like North Korea and if it did intercept it is likely the warhead would not be destroyed by a kinetic hit-to-kill interceptor and would

continue on to near its intended destination. Finally, they point out that a boost phase launch intercept of a ICBM from North Korea would likely occur over northern China, further risking causing China to think it was under attack by the US which could cause a nuclear war (Kleppner et al. 2004). The BMDS needs to consider the realities of the limitations of any BMDS relative to a real no-action alternative of working toward disarmament through arms control treaties.

13) Space debris from high altitude, mid-course missile intercepts or destruction of satellites. The PEIS does mention that even tiny particles of space debris traveling at extremely high speeds in orbit can destroy space suits, rockets and satellites. While the PEIS correctly points out that debris from low orbital intercepts will decelerate once it hits the atmosphere, and thereby de-orbit. However the PEIS fails to consider the space debris from high altitude intercepts which risk producing space debris that could make space unusable for many years. While the PEIS considers testing the BMDS on "targets of opportunity", no mention is made of space debris resulting if other nations target US BMDS satellites or components in high orbit as "targets of opportunity". This must be considered since the resulting space debris could destroy objects in space, making space unusable as well as violating the 1967 space treaty.

14) The environmental consequences of many rocket launches needed to deploy and maintain space-based interceptors has not been adequately considered, nor has the environmental consequences of their fuel. Will space-based satellites/interceptors use nuclear power sources? Will any BMDS interceptors ever use nuclear warheads? While nuclear tipped-interceptors are not mentioned in the PEIS, per se. In Section 2.2.1.1 the PEIS does mention the possibly of destroying a missile by using interceptors with directed blast fragmentation kill vehicles. However the PEIS, fails to reveal the nature of the blast fragmentation device, which is needed for evaluation of its environmental effects. Instead the MDA PEIS states that "the interceptors will be discussed and analyzed for environmental impacts at the booster and kill vehicle level. This will allow the MDA the flexibility to configure new interceptors based on boosters and kill vehicles analyzed in this document to address new or emerging threats." This does not allow a satisfactory evaluation of the hazards of the BMDS components. What blast fragmentation devices will be used? The PEIS needs to include the details of chemical and toxicant use and exposure.

15) Radioactive and/or biological weapons fallout from intercepted missiles has not been considered in the PEIS. If a kinetic hit to kill interceptor knocks out an ICBM in the mid phase or terminal phase, the nuclear warhead or its fragments are going to produce a tremendous amount of radioactive contamination where ever they land. Such radioactive fallout will clearly have major, highly deleterious effects on adults, children, and especially on developing embryos, and fetuses. While such an interception is very likely to be highly preferable to damage resulting from an air or ground burst over a city, the resulting radioactive contamination needs to be considered. The effects of war are normally excluded from analysis by the National Environmental Policy Act (NEPA). However, the proposed BMDS action is very likely to provoke a worldwide WMD arms race, and force other nations to prepare to launch a massive retaliation against the US should war ensue. Thus, these effects need to be considered relative to a real no action alternative. Since the proposed BMDS is very likely to cause a massive arms race, the environmental consequences of a resulting War involving nuclear or other WMD should not be ignored. The PEIS needs to consider the environmental effects of fallout from intercepted WMD as well as the effects of WMD the BMDS fails to intercept. Thus PIES needs to consider these hazardous waste and materials issues. Appropriate references include "The Effects of Nuclear Weapons, Compiled and Edited by Samuel Glasstone and Philip Dolan, third Ed. DOD, DOE. 1977.

The American Physical society also identified the issue that boost phase intercept has a high probability of munitions carryover. A successful boost phase intercept is unlikely to disable ICBM's warheads or munitions. They will be deflected only slightly, if at all, and will continue on ballistic trajectories (Kleppner et al. 2004).

16) Will any interceptors use nuclear warheads? The PEIS does not address the inability of mid-course or terminal kinetic interceptors to stop a "threat cloud" once a attack missile has MIRVed, or released many decoys or countermeasures (Richard L. Garwin. Holes in the Missile Shield. Scientific American, November 2004, page 70-79). The MDA may be temped to intercept such a threat by using large nuclear tipped interceptors. The potential use of nuclear tipped interceptors was discussed by high ranking US DOD officials in 2002 http://www.washingtonpost.com/ac2/wp-dyn/A28866-2002Apr10?language=printer. If such nuclear tipped interceptors were deployed, the environmental risks would be much greater. If so, the environmental consequences of the nuclear fallout and electromagnetic pulses from such high altitude nuclear detonations must be considered in detail. This would include analysis of risks to health and safety, contamination of water, land, soils, EMP effects on civilian and medical electrical and computer systems and infrastructure. The MDA should also consider the effects of radioactive fallout on health and safety, biological resources, and contamination of land and water resources.
Furthermore, given the historic 15% missile launch failure rate, the radioactive fallout from accidents with nuclear tipped interceptors must be considered in detail. The public should have full opportunity to consider and comment on the use of such nuclear tipped interceptors in this PEIS. The point is that the blast fragmentation devices need to be described in detail to enable adequate evaluation of its environmental effects.

17) Also note that the technology and environmental effects of "advanced systems" remain to be defined. How can the environment effects of an undefined "advanced system" be evaluated in this PEIS? A full environmental analysis is needed for each component of the PEIS to be added. If any component of the BMDS will ever use nuclear warheads in any interceptors the MDA needs to thoroughly consider the environmental effects, as discussed above.

18) Will any MDA interceptors or Lasers use anti-matter weapons? A US Air Force anti-mater weapons research programs has recently been described in the SF Chronicle http://sfgate.com/cgi-bin/article.cgi?file=/c/a/2004/10/04/MNGM393GPK1.DTL. IF the BMDS will use antimatter weapons or energy sources, the environmental effects including the health and safety risks, and chemical exposure risks need to be described in detail.

19) **The BMDS PEIS needs to consider direct, indirect and cumulative effects of the proposed project in conjunction with other federal offensive military weapons systems and policies were not addressed**, but need to be addressed. The National Environmental Policy Act (NEPA) (http://ceq.eh.doe.gov/nepa/regs/nepa/nepaeqia.htm) and especially **The Regulations for Implementing NEPA** (http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm), state that both the direct and indirect effects of the proposed project as well as the Cumulative impact of the project should be considered. Sec. 1508.7 States that the "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
In the context of this global ballistic missile defense system, the cumulative impact of reasonably foreseeable future actions of the US as well as other nations, agencies and persons need to be considered. Yet the reasonable foreseeable actions of other nations and individuals responding to the BMDS by proliferating WMD was not considered by the MDA in this PEIS.
As stated in Sec. 1508.8 "Effects" include:(a) Direct effects, which are caused by the action and occur at the same time and place and (b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on

the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.
Thus, by law the MDA also needs to consider the Direct, Indirect and Cumulative impacts on the environment of the proposed BMDS along with other US offensive weapons systems and stated & demonstrated US preemptive first-strike policy.

The following points are points that need to be considered in the no action alternative.
20) The PEIS needs to consider whether the BMDS will result in Proliferation of Weapons of Mass Destruction (WMD) and an arms race in space. The response of other nations to the BMDS has not been considered. Specifically, the BMDS is coupled to other offensive weapons programs and will force other nations to proliferate and/or smuggle WMD so that they can re-establish deterrence. Relatively inexpensive countermeasures to BMD will likely thwart the goals of BMD. Such proliferation coupled with increased international tension will decrease rather than increase our security and lock us in to an expensive and destabilizing arms race and will have devastating long-term environmental consequences.

21) Alternative 3: Not developing, or building the BMDS or any of its components and instead renegotating an expanded and verifiable ABM / BMDS treaty: The ABM treaty helped to stabilize and de-escalate the nuclear arms race for all of its 29 years of existence. No country dared attack the US with nuclear missiles, in part because the U.S. would know exactly where the missile came from and have the clear ability to retaliate and bomb them into obivilion. That is certainly still the case. This option would preserve deterrence and peace. Yet it would enable the nuclear nations to abide by the NPT and reduce the overall level of nuclear weapons, in exchange for non-nuclear nations not developing nuclear weapons.

22) Alternative 4: Preserving Space for non-military purposes. The MDA should consider the alternative of not militarizing space. The planned US militarization and domination of space as described in the US Space Command Vision for 2020
(http://www.fas.org/spp/military/docops/usspac/lrp/ch02.htm) and as described in the 2002 US defense guidance policy and elsewhere, will certainly create and intensify conflicts over the control of space for years to come. These US policy documents talk about "Full Spectrum Domination", "negating" or "destroying" the enemy's satellites and use of space. As US citizens we would like for the US to protect space from militarization, but do we want the US to dominate space, and to start a series of space wars? Think about how you would feel if you lived in another nation and some one destroyed your satellites. Would such actions be considered an act of war?
Additionally how does the BMDS PEIS affect US compliance with the Outer Space Treaty?

23) Alternative 5: Deployment of a much more limited land and or Sea based theatre BMD that would offer protection from attack by short or intermediate range missiles. For example, rather than develop the extensive land, Sea, air and space based system, the US and its allies could instead deploy a currently available Aegis missile cruiser(s) off of North Korea. Such a small, affordable, alternative system would immediately meet the needs of defending Japan against missiles that might be launched by North Korea without invoking fears that it would be used to enable invasions and/or domination of the world and thereby starting a massive global arms race.

24) NONPROLIFERATION ANALYSIS COMMENT
Based on my expertise in the area of genetics, physiology, toxicology and nuclear weapons control/non-proliferation, it is a **reasonable foreseeability** and in my opinion a very high probability that the proposed BMDS creates a significant risk of nuclear and biological weapons proliferation. This

proliferation risk goes hand in hand with a greater security risk, and both increase the potential harm to the environment and the public.

As pointed out by Nicole C. Evans, National missile defenses may undermine strategic stability by threatening the ability of other countries to retaliate, which is the core of their deterrence. Theater missile defenses do not pose this danger (Evans 2004). Evans goes on to describe Russian and Chinese concerns to National Missile Defense (NMD) and especially Global Missile Defense (GMD) as described in the BMDS PEIS. She also describes how Russia and China have already started to proliferate in response to the US renigging on the ABM treaty and preparing to deploy GMD, e.g. the BMDS.

Evans points out that; "Russia and China share two key concerns about American missile defense plans: that their nuclear deterrent is threatened and that American missile defense plans will destabilize arms control. Š
Both Russia and China have responded actively to the American abandonment of the ABM Treaty by developing asymmetrical measures to neutralize any potential threat. By withdrawing from START II, Russia was able to continue deploying multiple independently targetable reentry vehicles (MIRVs) on intercontinental ballistic missiles (ICBMs). Putin announced in October 2003 that Moscow intends to place on combat duty dozens of MIRVed SS-19s, and Russia has also extended the service life of its SS-18 heavy ICBMs. Russia has begun building the fourth-generation *Borey* class of submarines, is MIRVing its silo-based Topol-M, and is finishing testing the mobile version of the Topol-M." In February 2004 Russia also "successfully tested a new hypersonic "Crazy Ivan" warhead that follows a nonclassical scenario, changing flight altitude and course repeatedly, making it nearly impossible to track and target." Evans also points out that "Russia has also upgraded the A-135 strategic single-site ABM system covering Moscow, the only such system currently in operation. In 2002, Russia began working in earnest on TMD and is currently developing several advanced missile interceptors (Evans 2004).

Evans points out that "Both Russia and China appear unconvinced by American assurances that global missile defense is not directed against them, despite echoing American rhetoric about the need to defend against the terrorist threat. Senior Russian military and foreign affairs officials have argued that while the United States proclaims its partnership with Russia, its actions show anything but that. ŠRussian concerns are further aggravated by America's stated intention not to cut its nuclear arsenal to levels designated by the Moscow Treaty of May 2002--instead moving the missiles as well as the warheads into storage as a hedge against an uncertain future." (Evans 2004).

Evans then goes on to describe how China is responding to the US BMDS threat and "is moving toward a more diversified, invulnerable, and combat-ready operational nuclear triad." "Second, Russia and China are very concerned that American missile defense plans will destabilize existing arms control regimes and forestall future agreements."
Russia, China, and other states express deep concern about the weaponization of space. In 2003, Russia and China proposed an agreement for the non-weaponization of space, and negotiations continue at the Conference on Disarmament in Geneva. Both Moscow and Beijing maintain that nonproliferation measures and policing regimes are a better way of dealing with weapons of mass destruction than attempts to develop missile shields" (Evans 2004).
Evans Concludes "The real danger lies in the potential of GMD to disrupt delicate regional balances and to encourage the further development and deployment of nuclear weapons. The United States, China, and Russia have all stepped up their offensive weapons programs since the dissolution of the ABM Treaty. The danger has been succinctly summarized by Mohamed El Baradei, head of the International Atomic Energy Agency: "If we don't stop using double standards, we shall be piled high with an even greater number of nuclear weapons." That would create the exact opposite of the professed objective of

DC_E0427

global missile defense: security for all who want it" (Evans 2004). This article and several others by Arms Control experts show evidence that the BMDS is causing and will continue to cause WMD proliferation rather than preventing it. **Thus, a non-proliferation analysis is needed for the BMDS PEIS particularly in regard to a genuine no action alternative.**

The BMDS PEIS (page 2-68) provided a justification based on politics rather than on analysis of environmental policy as the rationale for not considering a real "No Action Alternative", namely the canceling of Ballistic Missile Defense Capabilities (and re-engaging in treaty - based arms reductions). On page 2-68 the PEIS states " As suggested to the MDA during the scoping process, one alternative would involve canceling the development of all ballistic missile defense capability development and testing. Such an alternative would rely on diplomacy and military measures to deter missile threats against the U.S. However, this proposed alternative would eliminate the capability to defend the U.S., it's deployed forces, allies or assets for a ballistic missile attack should diplomacy of other deterrents fail. This alternative does not meet the purpose of or need for the proposed action as described in Sections 1.3 and 1.4, respectively; does not meet the direction of the President and the U.S. congress; and therefore will not be analyzed further."

A mainly political justification was also given on BMDS PEIS pages 1-14 for not considering scoping comments showing "concern that the BMDS would create an arms race, especially in space" Š comments showing "opposition to the development of nuclear weapons and concern that missile defense could be a first strike capability for U.S. worldwide military domination". Specifically, the MDA PEIS stated the rationale for excluding these comments is that "Public comments concerning DoD policy, budget and program issues are outside the scope of the Draft BMDS PEIS".

These political justifications used by the MDA are insufficient for excluding these and related issues of non-proliferation from analysis in the BMDS PEIS. A non-proliferation analysis is needed for the BMDS. We all want to be safe from missile attack. The non-proliferation analysis is needed to determine if the BMDS is likely to ultimately increase our security, and maintaining environmental quality or result in an out of control arms race that decreases our security and wreaks wide spread environmental destruction.

Because of the reasonable foreseeability of increased potential for environmental harm due to proliferation and security risks, I strongly recommend that the MDA prepare a detailed Nonproliferation Impact Review for the BMDS PEIS including a Nonproliferation Impact Review EIS for each BMD component and for each BMD site or location. These reviews will determine the scope and need for a MDA high-level program and the alternative that would cause the least environmental harm. If the BMDS is the best alternative for such a program, these review processes will thoroughly assess the potential proliferation, security and environmental harms and ways to mitigate those potential harms. This will mean that proactive plans to protect the environment, public safety and national security will be developed in advance rather than in response to a problem, accident or crisis.

DOE Programmatic EIS Precedent

The DOE has set an important precedent by conducting a Programmatic EIS, including a Nonproliferation Impact Review (NIR), for its Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, including the Role of the Fast Flux Test Facility in December 2000 and for its Stockpile Stewardship and Management in September 1996. Furthermore, Nonproliferation Analyses were conducted in the following DOE EIS or Site-Wide EIS review documents:

· Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling (October 1995); Section 1.5.6 Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel, Page 1-10.

DC_E0427

· Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site(August 1998);

·Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor (March 1999).): 1.3.5
Nonproliferation, Page 1-9 and 1-10.

Final Site-Wide Environmental Impact Statement for the Y-12 National Security _ _Complex_ (September 2001): Section 2.2.3 Nonproliferation and National Security, Page 2-7.

Following this precedent, the MDA BMDS, in my opinion, necessitates an equally comprehensive review. Such a Nonproliferation Review Should Include Public Hearing, Scoping and Comment.

25) I highly recommend that the Nonproliferation Impact Review be conducted like the NEPA process that includes public participation in the scoping phase and a draft document circulated for public comment. This open process is critical because intent really is the biggest differentiating factor between defensive and offensive military research. The participation of individual citizens who live near the proposed facility and have personal concerns such as health and property values, as well as representatives from professional and nonprofit groups who specialize in public health, emergency response, sewage treatment, landfills, water, environment, toxicology, science, medicine and arms control may identify unforseen problems, more cost-effective solutions and new ways to open up the process while maintaining necessary security. This scrutiny and public debate can only improve the quality of the decision-making process and will likely result in more confidence in the final decision on the part of those most directly impacted.

26) Which government and university institutions in the State of California will be conducting research to support the BMDS research and development and, if so, please describe their roles, responsibilities and the specific projects they will be involved in? Specifically, will Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratory -- Livermore, or the University of California at Berkeley, Davis or Los Angeles be conducting research or development on the BMD for the MDA or DoD and, if so, what specifically will each that is involved be doing? This is important for people in these areas to know in order to understand, consider and evaluate the possible environmental, health, and safety impacts on their communities.

Thank you for considering these public comments on the BMDS PEIS.

Please confirm that you have received my comments.

Jimmy L. Spearow, Ph.D.

"We must abandon the unworkable notion that it is morally reprehensible for some countries to pursue weapons of mass destruction yet morally acceptable for others to rely on them for security and indeed to continue to refine their capacities and postulate plans for their use." Mohammad ElBaradei, IAEA Director General (http://www.wagingpeace.org/articles/2004/03/26_road-prolilferation.htm)

Additional References:

Evans, N. C. (2004). "Missile defense: Winning minds, not hearts." Bulletin of the Atomic Scientists **60** (September/October): 48-55.

DC_E0427

Koster, K. (2004). "The Best Defense: The Bush Administration Promises That Its Ambitious Plan for Missile Defense Is Purely Benign, but It Looks a Lot Like a Shield-and-Spear Strategy." Bulletin of the Atomic Scientists **60**(September-October): 26-28.
Goleman, W. L., L. J. Urquidi, T. A. Anderson, E. E. Smith, R. J. Kendall and J. A. Carr (2002). "Environmentally relevant concentrations of ammonium perchlorate inhibit development and metamorphosis in Xenopus laevis." Environ Toxicol Chem **21**(2): 424-30. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=11833812
Greer, M. A., G. Goodman, R. C. Pleus and S. E. Greer (2002). "Health effects assessment for environmental perchlorate contamination: the dose response for inhibition of thyroidal radioiodine uptake in humans." Environ Health Perspect **110**(9): 927-37. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=12204829
Kleppner, D., F. K. Lamb and D. E. Mosher (2004). "Boost-Phase Defense Against Intercontinental Ballistic Missiles." Physics Today.org(January). http://www.physicstoday.org/vol-57/iss-1/p30.html
Urbansky, E. T. (2002). "Perchlorate as an environmental contaminant." Environ Sci Pollut Res Int **9**(3): 187-92. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=12094532
Ambio Volume XI number 2-3, 1982, Nuclear War: The Aftermath.

DC_E0428

Johnson, Kathryn

From:	Marvin l Lewis
Sent:	Thursday, November 18, 2004 9:37 AM
To:	mda.bmds.peis
Subject:	Subject: comments for PEIS on proposed Ballistic Missile Defense System

To the Missile Defense Agency (MDA):

The following comments on the environmental and political effects caused by the proposed Ballistic Missile Defense System (MDS) are submitted a day late. I respectfully request that the deadline for submittal of comments be extended for cause. The cause is that there was very little notice to the general public, and only those versed as to the ADAMS or government notice agencies or methods were privy to the proposed invitation to comment.

Comments:

Due to the lateness and my inabilities to absorb the entire contents of the notice in a timely manner I respectfully request that the following be accepted as my comments.

Major deficiencies:

The major deficiencies seem to be the lack of detrimental effects reported in the notice. There will be negative and detrimental effects.

One such effect is that Earth orbital space is gathering 'junk'. This 'junk' makes space incursions dangerous due to the possibility of crashes. Add to this the possibility that the new 'junk' from this program will be armed in various ways, and the detrimental effects suddenly become a major obstacle to the commercialization of space.

Another possible detrimental effect is that we are only now coming into new data on the effects of 'global warming gases' in the upper atmosphere. Some gases which acts as global warming gases at low altitude become global cooling gases at very high atmosphere. Water vapor is such as gas. The global heating effect of such gases in rocket exhaust is not well explored in the notice and deserves better exploration.

International Treaties:

There are several international treaties that affect this BMDS. Since I am not a lawyer, I shall limit my comment on this issue to the request that more concern be shown to the issue of international treaties before any action be taken.

Predicting the future:

Any proposal assumes predictions of the future. Some of these prediction are inadequate. The predictions should contain the experience of the present and the past. This notice does not look adequately at the presently available information.

At a minimum the notice should look at the rate of accumulation of information. What is proposed here does not adequately take into account what we know today.

1. The proposed BMDS can easily be as outmoded as the Maginot Line due to new technologies that are presently being developed. Nanotechnology is on the move. A nanotechnological technique loosed into outer space would easily affect a missile without any of the present technologies able to stop it.
2. EMP weapons are well developed. Hardening a BD against EMP would increase the weight to a point that the missile could not perform its function.
3. Commercials exploitation of space is in its infancy. Adding BMDS which would appear as a danger to tourists is not a great way to make space more commercially exploitable.
4. Other commenters have pointed out many negatives to this approach and I wish to join other commenters in their views of the negatives of BMDS outweighing any positives.
5. This BDMS has the potential to be so costly as to destroy the fiscal soundness of the United States.

Respectfully submitted,
Marvin Lewis

DC_E0428

Look for special offers at Best Buy stores.

DC_E0429

Johnson, Kathryn

From: Lenny Siegel [lsiegel@cpeo.org]
Sent: Thursday, November 18, 2004 11:39 AM
To: mda.bmds.peis
Cc: Jonathan Parfrey
Subject: My comments

Siegel-PEIS.doc (197 KB)

On October 14, 2004, I orally presented commented on the BMDS PEIS, and I submitted a hard copy of my full comments. Here, for your convenience, is an electronic version of that expanded testimony.

Lenny Siegel
--

Lenny Siegel

DC_E0429

CENTER FOR PUBLIC ENVIRONMENTAL OVERSIGHT
c/o PSC, 278-A Hope Street, Mountain View, CA 94041
Voice: 650-961-8918 or 650-969-1545 Fax: 650-961-8918 http://www.cpeo.org

PERCHLORATE AND THE PROPOSED BALLISTIC MISSILE DEFENSE SYSTEM:

COMMENTS ON THE PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

Lenny Siegel
October, 2004

Executive Summary

The Programmatic Environmental Impact Statement (PEIS) for the Ballistic Missile Defense System (BMDS) not only does an inadequate job of addressing the environmental impact of solid rocket propellant associated with this program, but it seems to ignore the purpose of the National Environmental Policy Act (NEPA). That is, rather than consider how to minimize negative environmental impacts in the design of a program, through “cradle to grave analysis,” it uses the environmental document to justify decisions that have already been made.

Furthermore, the PEIS lacks a genuine “No Action Alternative,” even though NEPA requires that such an alternative serve a baseline against which to compare the environmental impacts of the other alternatives. In particular, a No Action Alternative that posits little or no use of rocket propellant is essential if the program’s proponents are to minimize releases of pollutants—particularly solid rocket propellant and its byproducts—into our nation’s water supplies, air, or the upper atmosphere, either by selecting a program alternative or agreeing to binding mitigation measures.

Solid rocket propellant that contains ammonium perchlorate as an oxidizer is designed to generate large quantities of hydrogen chloride, which reacts with moisture in the atmosphere to create hydrochloric acid—that is, acid precipitation. The PEIS should consider how the missile defense program might develop and test alternate launch technologies that are not so environmentally destructive.

DC_E0429

When rockets are launched into the upper atmosphere, they directly deliver hydrogen chloride to the ozone layer, exposing human, other animals, and other biota to the harmful, persistent effects of ultraviolet-B radiation (UVB). Rocket launches are among the largest causes of ozone depletion, and the persistence of such substances from other sources is no excuse for additional pollution. The BMDS program should at the very least evaluate the mitigation of such seriously harmful environmental consequences through the development and deployment of alternative solid rocket propellants.

Perchlorate, primarily from the manufacturing, testing, aborted launches, maintenance, and decommissioning of solid rocket motors, is polluting the drinking water of more than twenty million people and may be endangering natural ecosystems from Cape Canaveral to the Marshall Islands. The PEIS understates the risks of exposure, and it fails to provide data on the quantities of solid rocket propellant likely to be produced, used, released, and disposed by the BMDS. The PEIS should consider the environmental consequences of various disposal strategies so the BMDS program can develop the technology or capacity to address its waste or consider the use of alternative launch technologies or strategies to minimize either the waste or the negative environmental impacts.

Conclusion

To ensure maximum environmental protection and reduce known, widespread human health risks from the use and disposal of solid rocket propellant, the Programmatic Environmental Impact Systems for the Ballistic Missile Defense System should compare the proposed alternatives against a genuine No Action Alternative. At a minimum it should::

1. **Provide more detailed estimates of perchlorate waste likely to be generated by system development, testing, deployment, maintenance, and decommissioning *and* acknowledge emerging regulatory standards for perchlorate exposure.**

2. **Consider in detail the management practices—launch protocols, treatment technologies, etc.—necessary to mitigate the significant environmental impacts, including increased depletion of the stratospheric ozone layer and the likely release of perchlorate into groundwater, surface water, and soil.**

3. **Evaluate alternative launch technologies not based upon ammonium perchlorate.**

Based upon such additional environment review, which I believe is mandated by any fair reading of the National Environmental Policy Act and its implementing regulations, Program Managers should use the information generated to help evaluate all alternatives and to mandate actions to minimize or mitigate the serious environmental consequences associated with such a large and continuing use of solid rocket propellant. Such steps are necessary to protect the American people, the ostensible purpose of the Ballistic Missile Defense System.

Introduction

I have been asked, by Physicians for Social Responsibility-Los Angeles, to review the draft Programmatic Environmental Impact Statement (PEIS) for the Ballistic Missile Defense System (BMDS), with a focus on the environmental impact of solid rocket propellant associated with this program. I find not only that the PEIS does an inadequate job of addressing these impacts, but like many other environmental reviews it seems to ignore the purpose of the National Environmental Policy Act (NEPA). That is, rather than consider how to minimize negative environmental impacts in the design of a program, through "cradle to grave analysis," it uses the environmental document to justify decisions that have already been made.

The PEIS lacks a genuine, "No Action Alternative," as required under NEPA. It rejects evaluation of the alternative, "Cancel Development of Ballistic Missile Defense Capabilities," because it "does not meet the purpose of or need for the proposed action ..." (page 2-68). This approach misunderstands how NEPA works. It is acceptable to evaluate and reject a No Action Alternative because it doesn't meet the purpose of a program, but the environmental impacts of that alternative must be considered as a baseline against which to compare the environmental impacts of the other alternatives.

In particular, a No Action Alternative that posits little or no use of rocket propellant is essential if the program's proponents are to minimize releases of pollutants into our nation's water supplies, air, or the upper atmosphere, either by selecting a program alternative or agreeing to binding mitigation measures.

The bulk of my analysis focuses on the manufacture, use, and disposal of solid rocket propellant containing ammonium perchlorate, because that is the propellant to be most widely used by the Ballistic Missile Defense program. However, liquid propellants, such as the hypergolic propellant containing hydrazine compounds and nitrogen tetroxide, are highly toxic, and the PEIS should consider how to minimize their environmental, health, and safety impacts as well.

At least by number, the 515 projected BMDS launches over the decade beginning this year dwarfs the 99 other projected government launches and the 77 estimated U.S. commercial launched anticipated over the same time period. The environmental review of such a large system, to be developed over a period of many years and potentially deployed for decades, provides an opportunity to reconsider the technologies that our country uses for launching rockets. The draft Programmatic Environmental Impact Statement ignores that opportunity.

Air Emissions

Solid rocket propellant that contains ammonium perchlorate as an oxidizer is designed to generate large quantities of hydrogen chloride. That is, hydrogen chloride is not generated as a product of incomplete combustion of when a system leaks. Rather, it is released as the normal combustion product of the reaction of aluminum and ammonium perchlorate. Then, hydrogen chloride reacts with moisture in the atmosphere to create hydrochloric acid—that is, acid precipitation. The PEIS briefly recognizes this:

> In biomes where rain is a frequent occurrence, launches with solid boosters have an increased likelihood of contributing to acid rain, thereby increasing the amount of HCl deposited in regional surface waters. In areas with low velocity of surface and groundwater movement and relatively shallow ground water table it is possible that deposition of acidic water may impact water resources. The potential for and extent of impact would need to be examined in site-specific environmental analysis. (page 4-60)

Waiting for site-specific analysis in the indefinite future condemns project sites to acid precipitation. There is no hint of how such an environmental impact might be mitigated. The proper analysis, at this stage, is to consider how the missile defense program might develop and test alternate launch technologies that are not so environmentally destructive. That is, the best solution is not likely be site-specific, so the PEIS itself should evaluate this impact.

The PEIS suggests that aluminum oxide, the other major combustion product of solid propellant, is non-toxic. (page 4-60) However, there is some evidence that aluminum in acid environments is toxic to fish.[1] The PEIS should review the literature and reconsider its conclusion based upon the weight of evidence.

Ozone Depletion

Furthermore, when rockets are launched into the upper atmosphere, they directly deliver hydrogen chloride to the ozone layer that protects the Earth against the harmful, persistent effects of ultraviolet-B radiation (UVB). The hydrogen chloride breaks down, releasing chloride ions that trigger catalytic reactions in which one chlorine atom can destroy over 100,000 ozone molecules. I call the delivery of chloride, in the form of rocket exhaust, to the upper atmosphere: "Free-basing the ozone layer."

Increased exposure to ultraviolet radiation causes universal damage to both human health and the natural environment. "… UVB causes nonmelanoma skin cancer and plays a major role in malignant melanoma development. In addition, UVB has been linked to cataracts.… Physiological and developmental processes of plants are affected by UVB radiation…. Scientists have demonstrated a direct reduction in phytoplankton production due to ozone depletion-related increases in UVB.… Solar UVB radiation has been found to cause damage to early developmental stages of fish, shrimp, crab, amphibians and other animals.…"[2]

Once again, the PEIS acknowledges this environmental impact, but it plays it down: "The cumulative impact on stratospheric ozone depletion from launches would be far below and indistinguishable from the effects caused by other natural and man-made causes." (page 4-114). I

[1]See, for example, Baker & Schofield, "Aluminum Toxicity to Fish in Acidic Waters," *Water, Air, and Soil Pollution,* 1987, cited in Heinz J. Mueller, Chief, Environmental Policy Section, Federal Activities Branch, U.S. EPA Region 4, "Environmental Assessment (EA) and Finding for No Significant Impact (FONSI) for the Proposed Titan IV Upgrade Program. Cape Canaveral Air Force Station (CCAFS) and Kennedy Space Center (KSC), FL," letter to Captain Anthony E. Fontana, III, Environmental Planning Division, Regional Civil Engineer, Eastern Region, Department of the Air Force, March 28, 1990.

[2]"The Effects of Ozone Depletion: The Connection Between Ozone Depletion and UVB Radiation," U.S. EPA, June 21, 2004. http://www.epa.gov/ozone/science/effects.html

appreciate the data presented in Appendix I, but the conclusion reached by the authors is implausible.

The PEIS estimates that proposed BMDS launches from 2004 through 2014 would release approximately 1,350,000 kilograms (3,000,000 pounds) of chlorine, primarily in the form of hydrogen chloride, in the stratosphere. Annually, that would be 135,000 kilograms (300,000 pounds). In comparison, official U.S. EPA data estimates annual (2001) U.S. emissions of most destructive industrial ozone-depleting chemicals to total about 50,000,000 kilograms (110,000,000 pounds).[3] Compensating for the chlorine share of the industrial molecules, this means that the potential BMDS launch impact represents about .4% (.004) of the U.S. contribution to ozone depletion.

However, the industrial "emissions" are actually the residuals of production and use of chemical which have been phased out, under the Clean Air Act Amendments of 1990 and a series of international protocols. That is, these substances are already in the environment; nothing can be done to put them back in the bottle. Thus, each year stratospheric releases of rocket fuel exhaust become a larger fraction of the problem, as fewer industrial ozone-depleters are manufactured.

More important, the fractional contribution of rocket-launches to ozone depletion does not make it desirable. It is as large as all but the largest industrial releasers, before the phase-out took effect, and orders of magnitude larger than the releases from a home refrigerator or a car air conditioning system. Our environmental laws and policies do not excuse pollution simply because there are other, larger sources. That is, if I were a repairer of air conditioning systems, I could not—and should not—release chlorine-containing refrigerants into the atmosphere simply because a Titan or Delta launch vehicle emits much more chlorine.

For those unfamiliar with the working of our environmental laws, an analogy in criminal law might be instructive. We don't legalize shoplifting simply because some people conduct million-dollar armored car heists. We may tailor our response to the crime, but we don't say it's acceptable.

Similarly, with the release of ozone-depleting compounds to the atmosphere, we as a society might decide that we shouldn't abruptly end space launches that depend upon solid rocket propellant. Instead, we might set a goal for the deployment of alternatively fueled rockets. The PEIS considers no such goal, despite the urgent need to mitigate global ozone depletion.

The Defense Department, NASA, and others have conducted research on propellants designed to achieve the thrust of ammonium-perchlorate-based fuels without the environmental hazards, but these efforts are poorly funded, and there appears to be no urgency. The BMDS program should at the very least, in its PEIS, evaluate the mitigation of seriously harmful environmental consequences through the development and deployment of alternative solid rocket propellants.

~~[3]"Inventory of U.S. Greenhouse Ga~~s Emissions and Sinks: 1990-2001," EPA 430-R-03-004, April, 2003. http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsGHGEmissionsUSEmissionsInventory2003.html. Note that these numbers overstate the actual chlorine mass in these emissions, but they exclude less destructive substitute compounds.

Perchlorate Releases

In 1990, when I wrote my report, "No Free Launch,"[4] I focused on the exhaust emissions from solid rocket motors. For the past several years, however, another environmental catastrophe, the pollution of our nation's drinking water with perchlorate, has emerged as a comparable challenge. As many as 20 million people are today drinking water containing perchlorate from rocket fuel production, and hundreds of wells have been taken out of service to avoid further public exposure.

Even in low concentrations, perchlorate in drinking water and food poses a threat to public health, particularly for newborns and other young children. U.S. EPA explains:

> Perchlorate interferes with iodide uptake into the thyroid gland. Because iodide is an essential component of thyroid hormones, perchlorate disrupts how the thyroid functions. In adults, the thyroid helps to regulate metabolism. In children, the thyroid plays a major role in proper development in addition to metabolism. Impairment of thyroid function in expectant mothers may impact the fetus and newborn and result in effects including changes in behavior, delayed development and decreased learning capability. Changes in thyroid hormone levels may also result in thyroid gland tumors. EPA's draft analysis of perchlorate toxicity is that perchlorate's disruption of iodide uptake is the key event leading to changes in development or tumor formation.[5]

Rocket fuel wastes, from manufacturing, testing, training, maintenance, and decommissioning are a significant environmental hazard. This is a front page news story from California to Massachusetts, but it is barely mentioned in the PEIS.

Where it is mentioned, the authors understate the risks of exposure:

> It is now known that perchlorate's direct effects on the human body are limited to the thyroid gland, and only if ingested at very high levels for a prolonged period of time (typically years). Peer-reviewed studies suggest that perchlorate in drinking water below 200 parts per billion has no measurable effect on human health. These findings provide reason to believe that low levels of perchlorate (below 200 parts per billion) also have no measurable effect on pregnant women or fetuses. (Council on Water Quality, 2003) Currently there are no Federal drinking water standards for perchlorate. (4-56)[6]

[4]Lenny Siegel, "No Free Launch: The Toxic Impact of America's Space Programs," National Toxics Campaign Fund, August 1, 1990.

[5]"Perchlorate: Frequently Asked Questions," U.S. EPA, August 5, 2004. http://www.epa.gov/safewater/ccl/perchlorate.html

[6]Note: The cleverly named Council on Water Quality is an association of companies that have released perchlorate pollution into the environment, not a government agency or an unbiased observer.

The reason that there is no federal drinking water standard for perchlorate is that the Defense Department objected to EPA studies that suggested a standard of one part per billion (ppb). Meanwhile, regulatory agencies are using levels far below the 200 ppb asserted in the PEIS. On the way to establishing its own legal standard, California has adopted a Public Health Goal of 6 ppb.[7] In May, 2004, Massachusetts identified a reference dose for perchlorate that would correspond to a 1 ppb drinking water exposure limit. It too is close to promulgating a binding standard.[8] And while U.S. EPA will not promulgate a standard until after the National Academy of Sciences has completed its review, in the interim it has instructed its personnel to use an action level range of 4 to 18 ppb.[9]

The PEIS should offer estimates of the quantities of solid rocket fuel that will be manufactured for the BMDS, not just for testing, but for missiles that will be deployed and hopefully never be launched. From that figure, it can estimate the quantities of manufacturing waste—propellant flakes, chips, and wastewater—likely to be generated. The PEIS estimates that the BMDS program will launch 413 solid-propellant rockets, containing from under 500 kilograms (1,102 pounds) to 60,000 kilograms (132,277 pounds) of solid propellant each. About 70% of that propellant, by weight, will consist of ammonium perchlorate. But nowhere does it estimate what quantity of propellant will be contained in deployed missiles, or even how many missiles will be part of that system. Without that information there is no way to project the amount of propellant waste likely to be generated by the program.

Propellant Disposal

Disposal of missile propellant, for both refurbishing and decommissioning, is a significant financial and environmental cost. NEPA provides the opportunity to weigh those costs before system acquisition, so technological choices that minimize such costs can be considered. The Government Accountability Office (formerly the General Accounting Office) wrote:

> DOD regularly disposes of missiles and has an amount for disposal costs included in its annual budget request. Thus, because it is known at the time of acquisition that costs will be incurred for missile disposal, the probability criterion for recording a liability is met. The Congress has also recognized that disposal costs will be incurred and has emphasized the importance of accumulating and considering this information. For example, the National Defense Authorization Act for Fiscal Year 1995 requires the Secretary of Defense to determine, as early in the acquisition process as feasible, the life-cycle environmental costs for major defense acquisitions programs, including the

[7]"~~Frequently Asked Questions (FAQ~~s) About the Public Health Goal for Perchlorate," California Office of Environmental Health Hazard Assessment (OEHHA), March 11, 2004.
http://www.oehha.ca.gov/public_info/facts/perchloratefacts.html
[8]"Perchlorate: Toxicological Profile And Health Assessment," Massachusetts Department of Environmental Protection, Office of Research And Standards, Final Draft, May, 2004.
http://www.mass.gov/dep/ors/files/perchlor.pdf.
[9]Marianne Lamont Horinko, Assistant Administrator, "Memorandum: Status of EPA's Interim Assessment Guidance for Perchlorate," U.S. EPA, January 22, 2003.
http://www.safedrinkingwater.com/community/2003/021203perchlorate_memo.pdf

> materials to be used and methods of disposal. The life-cycle cost estimates are required before proceeding with the major acquisition.[10]

Solid rocket fuel, when deployed in missile systems, does not last indefinitely. It has a shelf life. Both strategic and tactical missiles must be de-fueled and re-fueled or replaced periodically. By 2009, the Army will need to demilitarize over 102,000 Tube-launched, Optically-tracked, Wire-Guided (TOW) tactical anti-tank missiles, and by 2015 over 306,000 Multiple Launch Rocket System (MLRS) rockets will also require demilitarization. These weapons contain over 45,000,000 pounds of ammonium perchlorate, as well as nearly 1,200,000 pounds of RDX and HMX, two other energetic contaminants.[11]

Other missiles become obsolete and require replacement. The Navy reportedly destroyed more than 350 Poseidon Sea-Launch Ballistic Missile second stage motors, each containing 17,000 pounds of solid propellant—about 6,000,000 pounds total—at Hill Air Force Base in Utah, and it is scheduled to be about a third of the way into the destruction of 800 larger Trident I rocket motors.[12]

GAO did not separate disposal requirements for refurbishing from disposal for decommissioning. In 1998, it tabulated over 574,000 missiles and 5,871 large solid rocket motors in the Defense Department inventory, most of which would require disposal.[13]

Yet the PEIS appears not to address the environmental aspects of missile maintenance and it gives only cursory mention to decommissioning:

> Decommissioning of missiles would first require the removal and proper disposal of liquid, solid, or hybrid (liquid and solid combination) propellants from the booster(s). Where possible, propellants would be recovered and reused. Aging motors that contain flaws would likely be decommissioned using open detonation.… Solid rocket propellant would be removed for reclamation or burning in a controlled environment, such as an incinerator. Where practicable, incineration or closed burning of rocket propellant would be performed. Most of the acid and particulates ejected during the burn would be collected in plume scrubber water. This water would be treated for acceptance by a publicly owned (or federally owned) water treatment works in accordance with a National Pollutant Discharge Elimination System (HPDES) permit. (p. 4-16)

Once again, the PEIS authors don't seem to be reading the newspapers. The disposal of solid rocket propellant through "hog-out" (washing out the propellant) or open burning/open detonation are some of the major sources of perchlorate contamination across the country. The

[10]"Financial Management: DOD's Liability for Missile Disposal Can Be Estimated," U.S. General Accounting Office, GAO/AIMD-98-50R, January 7, 1998, page 6.
[11]"Reusing and Disposing of Missile Munitions: Phase 2," U.S. Army Audit Agency, AA 02-145, February 25, 2002, pages 20-21.
[12]"Hill AFB to Destroy 800 Trident Motors, Project Expected to Last 17 Years," *Defense Cleanup,* June 19, 1998, page 4.
[13]"Financial Management," page. 8.

PEIS should note how much propellant will be used, how often it will be necessary to dispose, and what the environmental impacts of each disposal or treatment method are likely to be. Such information is necessary, not just to estimate the life-cycle costs of the program, but also to figure out in advance how to reduce financial costs and environmental impacts through system redesign or ongoing mitigation activities. That's the purpose of the NEPA process.

To its credit, the Defense Department has developed better technologies for treating and recycling solid rocket propellant. For example, the Army Aviation and Missile Command's Research, Development, and Engineering Center uses super-critical ammonia to process and reclaim the ammonium perchlorate from solid propellant. The Hawthorne Army Depot, Nevada, has installed a prototype biodegradation system processing wastewater containing ammonium perchlorate.[14]

However, the Defense Department does not currently have the capacity to dispose of its current missile demilitarization and disposal inventory by any method, let alone the dispose of solid-propellant in an environmentally sound manner.

- Thermal treatment can release dioxins into the atmosphere. Even at very low concentrations, these compounds are a global, persistent threat to public health.
- Open burning and detonation often releases perchlorate into soil and groundwater.
- Recycling means that significant quantities of perchlorate are likely to be used in construction and mining. However, evidence is emerging—from Westford, Massachusetts, for example—that such uses may be generating unacceptable levels of pollution, as well.[15]
- Treatment systems installed to date lack the capacity to treat all the solid or liquid wastes likely to be generated by BMDS manufacture, maintenance, and decommissioning.

Overall, the PEIS puts off consideration of the challenge of waste decommissioning, stating, "The environmental impacts associated with decommissioning of specific components would be more appropriately addressed in subsequent tiered environmental analysis…" (ES-20)

This is unacceptable. It can only lead to "end-of-pipe" solutions, even though the Defense Department's own environmental managers and specialists agree that environmental protection should be integrated into acquisition and even research and development. The 2001 Munitions Action Plan, for example, states:

> The current emphasis in acquisition of munitions of all types (air delivered, ground launched, and sea launched) is on improving accuracy, reliability and increasing distances between firing or launch points and targets (i.e., so-called standoff ranges). At the same time, the public and regulatory bodies are raising concerns about explosives safety and the environmental effects of muni-

[14]"~~Joint Demilitarization Technolog~~y Program," Department of Defense, October, 2003.
http://www.dtic.mil/biosys/org/demil_rept2003_final.pdf
[15]Carrie Simmons, "DEP: Westford 'Responsible' for Water Clean-Up," *Westford Eagle* (Massachusetts), September 30, 2004.

> tions. The DoD is also becoming more aware of the cleanup and environmental compliance costs associated with training, testing, demilitarization, and unexploded ordnance (UXO) responses.
>
> These developments have highlighted the need for DoD to address environmental and safety concerns, and costs, throughout the munitions life cycle. This cycle starts from the technology development and design phase to the end-state of use, UXO and munitions constituents cleanup on ranges, or demilitarization. Addressing these concerns early in the life cycle (during requirements definition and acquisition) has the potential to significantly reduce costs and avoid problems later.[16]

That is, if the review of the potential environmental impacts of a system such as the BMDS finds the potential for significant negative environmental impacts, then those designing the system, selecting programmatic alternatives, and managing its testing and deployment should continuously evaluate ways to minimize those impacts, from the beginning.

The PEIS should consider the environmental consequences of various disposal strategies so the BMDS program can develop the technology or capacity to address its waste or consider the use of alternative launch technologies or strategies to minimize either the waste or the negative environmental impacts.

Perchlorate Debris

The PEIS raises and then dismisses the potential environmental impacts from perchlorate debris from launch failure. Presumably the same issues arise if a missile is intercepted before burning all its fuel. It states:

> During flight termination or catastrophic missile failure of solid propellant boosters, pieces of unburned propellant could be dispersed over an ocean area of up to several hundred kilometers. Once in the water, ammonium perchlorate could slowly leach out and would be toxic to plants and animals. In freshwater at 20º C (68º F), it is likely to take over a year for the perchlorate contained in solid propellant to leach out into the water. (Lang et al, 2000, as referenced in U.S. Army Space and Missile Defense Command, 2003) Lower water temperatures and more saline waters would likely slow the leaching of perchlorate from the solid propellant into the water. Over this time, the perchlorate would be diluted in the water and would not reach significant concentrations. (U.S. Army Space and Missile Defense Command, 2003) (page 4-51)

The PEIS authors apparently not followed carefully the research of the Aerospace Corporations team, headed by V.I. Lang, mentioned in their text. This group, which has been

[16]*Munitions Action Plan: Maintaining Readiness through Environmental Stewardship and Enhancement of Explosives Safety in the Life Cycle Management of Munitions,* U.S. Department of Defense Operational and Environmental Executive Steering Committee for Munitions (OEESCM), November, 2001, page 16.

DC_E0429

studying perchlorate releases from launch operations for the Air Force, concluded in their most recent report:

> As illustrated by our hypothetical case study, risks associated with the inadvertent release of perchlorate from accidental launch failures must be managed on a case by case basis because of the complexity of variables that can affect the release rate from propellants, and because each launch location has unique environmental characteristics. The same type of approach can be used to assess the risk of perchlorate releases from other operations where sold propellant may be dispersed.
>
> We recommend that a systematic approach to assessing potential impacts be used in the initial planning stages of a launch program, for example, in the AF Environmental Impact Analysis Process, which complies with the National Environmental Policy Act (NEPA). Regulatory agencies may require such analyses be performed prior to new launch programs. In this report, we have presented one type of step-wise approach to assessing perchlorate releases for a typical launch scenario.
>
> Initial studies performed by the University of Alaska on fish exposed to solid propellant in water samples, and in particular on fish exposed to perchlorate in water, indicate the potential for significant biological effects. Studies are also under way to determine the effect of released perchlorate on soil and plant species.[17]

The Army should follow the advice of the Air Force contractors and conduct site-specific analysis of the impact of perchlorate debris on any freshwater lake that might receive perchlorate debris as well as confined oceans waters, such as within the Marshall Islands, where repeated releases of perchlorate could damage sensitive ecosystems or essential food supplies. It should also work with NASA and the Air Force to ground-truth models on perchlorate releases by conducting actual water, soil, and sediment sampling for perchlorate at major launch facilities such as Cape Canaveral and Vandenberg Air Force Base.

Conclusion

To ensure maximum environmental protection and reduce known, widespread human health risks from the use and disposal of solid rocket propellant if the Ballistic Missile Defense System moves forward, the Programmatic Environmental Impact Systems for the Ballistic Missile Defense System should compare the proposed alternatives against a genuine No Action Alternative. At a minimum, to comply with the National Environmental Policy Act, it should::

[17] ~~V.I. Lang et al, “Assessment of P~~erchlorate Releases in Launch Operations III,” The Aerospace Corporation (No. TR-2003(1306)-2, prepared for the Air Force Space Command Space and Missile Systems Center (SMC-TR-04-11), September 18, 2003, page 27. This and other valuable Air Force/Aerospace Corporation studies on the likely environmental impacts of space launches may be found at http://ax.losangeles.af.mil/axf/studies/studypage.htm.

DC_E0429

1. **Provide more detailed estimates of perchlorate waste likely to be generated by system development, testing, deployment, maintenance, and decommissioning *and* acknowledge emerging regulatory standards for perchlorate exposure.**
2. **Consider in detail the management practices—launch protocols, treatment technologies, etc.—necessary to mitigate the significant environmental impacts, including increased depletion of the stratospheric ozone layer and the likely release of perchlorate into groundwater, surface water, and soil.**
3. **Evaluate alternative launch technologies not based upon ammonium perchlorate.**

Based upon such additional environment review, which I believe is mandated by any fair reading of the National Environmental Policy Act and its implementing regulations, Program Managers should use the information generated to help evaluate all alternatives and to mandate actions to minimize or mitigate the serious environmental consequences associated with such a large and continuing use of solid rocket propellant. Such steps are necessary to protect the American people, the ostensible purpose of the Ballistic Missile Defense System.

DC_E0431

Johnson, Kathryn

From: jon.francine
Sent: Thursday, November 18, 2004 2:34 PM
To: mda.bmds.peis
Subject: PEIS Noise section comment

In Section 3.1.10 - Noise, there are numerous errors.

An increase of 1 dB is not a doubling of sound energy. Decibel are on a quasi-logrithmic scale and it does not function like the Richter scale. An increase of 3 dB is a doubling of sound pressure.

dBA is not used to assess human reaction to a single noise event averaged over a 24-hour period. dBA is measure of sound pressure using the A-weighted scale. Many other acoustical metric are used to assess human reaction, including Leq - equivalent noise level, sound exposure level, Ldn, etc.

It is obvious that this section was written by someone without knowledge of basic acoustics. This section should be re-done by an acoustician. If there is a complete misunderstanding of noise, how can the impacts be correctly assessed?

Jon

DC_E0439

Johnson, Kathryn

From: Jimmy L. Spearow
Sent: Monday, November 22, 2004 3:57 AM
To: bmds.peis@mda.osd.mil; mda.bmds.peis
Cc:
Subject: BMDS PEIS Comments: Correction of Typos

Dear MDA
1) Did the MDA extend the deadline for BMDS PEIS comments and organize additional hearings to enable citizens in regions more affected by the BMDS to attend hearings and comment? This was requested at the Sacramento hearing.

2) I discovered typos in the BMDS PEIS comments that I submitted earlier. If possible, could you replace my BMDS PEIS comments that I submitted a couple of days ago with my edited comments below. The edited typos are in parts of only nine sentences. If needed, I will be happy to indicate the edits.

Please let me know if you can substitute my BMDS PEIS comments below for the ones I submitted earlier.

Thank You and may you have a happy Thanksgiving holiday

Jimmy Spearow

Missile Defense Agency
BMDS PEIS
Comment Form

Name: Jimmy Spearow, Ph.D.
Ph, D. in Genetics,
With experience in Genetics, Physiology and Reproductive Toxicology
Member Physicians for Social Responsibility

Organization: United States Citizen

Address1:

Address2: e

Comments:

November 17, 2004

Dear US Missile Defense Agency (MDA);

Please consider the following comments on the Draft Programmatic Environmental Impact Statement (PEIS) of the Ballistic Missile Defense System (BMDS).

DC_E0439

1) Addressing Scoping Comments: I submitted a number of comments, on the scope of the BMDS several of which appear to have not been adequately addressed in the draft BMDS PEIS. These will be addressed in each specific comment. As discussed with Mda officials at the Sacramento public hearing, the MDA should provide more time for additional individuals from the most affected regions, including California and Alaska to comment on the BMDS PEIS.

2) Security, freedom, civil liberties, prosperity, the rule of law and the defense of the US constitution and its environment are very important to me as a citizen of this great country. Environmental sustainability is indelibly tied to our prosperity, and more abstractly to our security and freedom. We all want to be safe from missile attack. However, I am very concerned about the interconnected environmental, security and arms proliferation consequences of the US Missile Defense Agency (MDA) plans to establish a vast land, air, sea, and space- based Ballistic Missile Defense System (BMDS) including interceptor and laser weapon systems, sensors and command and control communication systems. The BMDS presents a number of toxic contamination and exposure risks as well as risks to **health and safety** that must be considered under the National Environmental Policy Act (NEPA). In so many cases the BMDS PEIS under estimates the magnitude or importance of these risks. These underestimates of environmental effects will be discussed under specific comments.

3) The BMDS PEIS does not include a real "No Action Alternative". Such an alternative that does not include further development testing or deployment of these weapon systems needs to be considered and included in the PEIS. The BMDS PEIS has not considered the "No action Alternative" of re-joining the UN and many nations of the world in working to enhance security through treaties and arms control and disarmament approaches, e.g. the approach that has provided us with long-term security to date.

4) The BMDS does not consider the direct, indirect and cumulative effects of the BMDS as required by NEPA, especially in regard the effects of the BMDS on the Arms race, which puts us closer to the disaster of nuclear war. In this regard, the PEIS is completely lacking a non-proliferation analysis. The BMDS tries to sell missile defenses to the public as a way to go beyond nuclear deterrence. Yet the BMDS is a dramatic escalation of a missile defenses that is not relevant for defending from terrorists who are much more likely to smuggle WMD. Securing loose nuclear materials is a much more effective strategy for preventing such terrorist nuclear threats.
The BMDS PEIS ignores the fact that the US posses extensive offensive nuclear and conventional weapon systems and that the proposed BMDS will operate along side these offensive weapon systems. The BMDS PEIS ignores the fact that the U.S. has a preemptive nuclear and conventional first-strike warfare policy and has exercised this policy in preemptively / preventatively invading other countries that have not attacked the U.S. including Iraq. Pronouncements of US preemptive offensive nuclear and conventional first strike policy as articulated in the 2002 Nuclear Posture Review; the 2002 Defense Guidance Policy; many statements of Bush, Cheney, Rumsfeld, and Wolfowitz, as well as the unprovoked 2003 invasion of Iraq, have together furthered international fears of the prospect of unprovoked unilateral attacks by the US. Building a massive land, sea, air and spaced-based BMDS is very likely to further invoke international fears that it will be used in conjunction with US offensive first strike and command and control communication systems to attack and/or dominate other countries.

The BMDS PEIS ignores the reasonable forseeability that it forces other nations to proliferate and/or smuggle WMD so that they can re-establish deterrence. Indeed, Russia and China have already started to proliferate and develop counter measures in response to the impending development of the U.S. BMDS (Evans 2004). Previously non-nuclear nations such as North Korea have stated that they also proliferated in order to establish a deterrent. In short, many nations are concerned that a US BMDS will eliminate their ability to deter attack, and assure the ability of U.S. forces to intervene anywhere in the world with offensive weapons systems. Such fear and insecurity has a reasonable forseeability of driving WMD proliferation and thereby decreasing rather than increase our security for years to come.

DC_E0439

Such WMD proliferation and the treat of nuclear war will have major environmental consequences. Thus, the BMDS needs a non-proliferation analysis which considers the direct, indirect and cumulative effects of the BMDS as well as other entities.

In essence, the combined direct, indirect and cumulative effects of the proposed BMDS in conjunction with US offensive weapon systems and US preemptive first strike military policy is very likely to invoke fear of US actions and intentions. Furthermore, a BMDS would be much more likely to be effective in intercepting ICBMs of another nation, if the BMDS were to be used following a preemptive nuclear first strike. Since the nation that strikes second loses for sure, the BMDS destabilizes the policy of nuclear deterrence that has helped to keep the peace for over 50 years. There is more than a reasonable foreseeability that the resulting paranoia will cause a major arms race, and push us into confrontations and wars of great scale. Such wars seriously threaten all we as a people hold dear; health, safety, and our environment.
The threat of the BMDS leading to a more aggressive nuclear policy and nuclear war can be seen in the historic article "Victory is Possible" by Colin S. Gray and Keith Payne, Foreign Policy Summer 1980, pp. 14-27. These authors state: "If American nuclear power is to support U.S. foreign policy objectives, the United States must possess the ability to wage nuclear war rationallyŠ.
"ŠThe United States should plan to defeat the Soviet state and to do so at a cost that would not prohibit U.S. recoveryŠ.
Washington should identify war aims that in the last resort would contemplate the destruction of Soviet political authority and the emergence of a postwar world order compatible with Western valuesŠ.
Once the defeat of the Soviet state is established as a war aim, defense professionals should attempt to identify an optimum targeting plan for the accomplishment of that goal. For example, Soviet political control of its territory in Central Asia and in the Far East could be weakened by discriminate nuclear targeting. The same applies to Transcaucasia and Eastern EuropeŠ.
Strategists cannot offer painless conflicts or guarantee that their preferred posture and doctrine promise a greatly superior deterrence posture to current American schemes. But, they can claim that an intelligent U.S. offensive strategy, wedded to homeland defenses, should reduce U.S. casualties to approximately 20 million, which should render U.S. strategic threats more credible. Š
A combination of counterforce offensive targeting, civil defense, and ballistic missile and air defense should hold U.S. casualties down to a level compatible with national survival and recovery. The actual number would depend on several factors, some of which the United States could control (the level of U.S. homeland defenses); some of which it could influence (the weight and character of the Soviet attack); and some of which might evade anybody's ability to control or influence (for example, the weather). Š
No matter how grave the Soviet offense, a U.S. president cannot credibly threaten and should not launch a strategic nuclear strike if expected U.S. casualties are likely to involve 100 million or more American citizens." Š (**Victory is Possible** by Colin S. Gray and Keith Payne *Foreign Policy*, Summer 1980, pp. 14-27).
Note that these authors also helped to write the 2002 US Nuclear Posture review, which further solidifies the US preemptive nuclear first strike policy. Gray and Payne make it clear that BMD is essential for a more aggressive US nuclear first strike policy. Thus, there is a reasonable foreseeability that the BMDS in conjunction with US offensive nuclear forces will increase the probability of a massive nuclear war. Thus, the BMDS needs to include a detailed analysis of the environmental effects of "limited" and "all out" nuclear war, including: medical radiological, blast, burn, fallout, disease, and cancer effects to health and safety; effects on nuclear winter, as well as effects on atmosphere, global supplies of fresh water, global food supplies, and nuclear power plants and power systems. The prospect of the BMDS leading to more aggressive US policies that result in a massive nuclear war also needs to be considered in regard to a true no action alternative.
In short, since there is a reasonable forseeability that the BMDS in conjunction with US and Allied nuclear weapon systems and current US nuclear weapons policy as defined in the 2002 Nuclear policy

DC_E0439

review will destabilize the nuclear arms race and lead to nuclear war, the environmental consequences of nuclear war need to be considered in detail in the BMDS PEIS. (Ambio Volume XI number 2-3, 1982, Nuclear War: The Aftermath. Entire journal dedicated to the effects of nuclear war, including effects on heath and safety, Air, water resources, agriculture, biological resources, and nuclear winter.) This request in my scoping comments was ignored. e.g. Scoping comment "#18) The MDA needs to consider whether the BMDS in conjunction with offensive first strike weapon systems and first strike policy increase the probably of a major nuclear war or other disturbance that could result in nuclear Winter, with the associated loss of species"

5) **The BMDS PEIS did not adequately consider impacts of Hazardous waste and materials and on Health and safety, Water Resources and Biological resources of environmental contamination from toxic and hazardous components of rocket fuels and explosives.**
The BMDS PEIS markedly under reports the emissions of representative interceptors. Exhibit 4-11 reports the emission of (90+58+52+22+17+6+6)=251 pounds for a representative interceptor. However, ground based interceptors are much larger (approximately 54 feet long 3 stage solid propellant rockets (such as the Minuteman III) weighting 22.5 to 25 tons and containing approximately 30,000 to 45,000 pounds of solid propellant. Thus the MDA underestimates the emissions from such interceptor rockets by factor of greater than 100. This is totally unacceptable. This underestimate of BMDS pollutants is apparently repeated in Exhibits 4-13, 4-14 and 4-15. Thus the MDA needs to revaluate the environmental effects of these pollutants. Also the MDA should define what are the emissions from the missiles used to launch spaced based interceptors, and sensors.

6) Not only does the BMDS PEIS under represent the total amount of emissions, from the estimated 515 BMDS rocket launches over the next several years, it also discounts that this program will be injecting large quantities of chemicals including aluminum oxide, hydrogen chloride and hydrochloric acid into the upper atmosphere, stratosphere, etc. Most concerning is the injection of hydrogen chloride into the upper atmosphere where the breakdown of each hydrogen chloride molecule to chloride ion catalyzed the breakdown of 100,000 ozone molecules, thereby depleting ozone, and decreasing the blocking of UV rays. This depletion of ozone will increase risk of cataracts and skin cancer. Thus, the BMDS will have a much greater effect on ozone depletion and skin cancer than HCl released at sea level.

7) Liquid propellants containing hydrazines, nitrogen tetroxide, and other compounds are highly toxic. At very low concentrations, hydrazines irreversibly cross link to aldehyde groups on proteins at slightly acidic pH and can cause cancer. One of the most concerning pollutants from the firing of rocket engines is HCl, which combines with atmospheric water to produce acid rain. The PEIS did not address potential for interactions between HCl and hydrazines commonly used in rocket engines such as monomethylhydrazine (MMH) and Unsymmetric dimethylhydrazine (UDMH). Specifically does the toxicity of hydrazine increase under acidic conditions found in acidic rocket exhaust?

8) Ammonium perchlorate is one of the main components of rocket fuel, typically constituting 60% to 75% of missile propellant and about 70% of space shuttle rocket motors. Since the fuel and perchlorate goes flat, the fuel/perchlorate has to be replaced every few years or it will fail to function properly, thereby increasing the amount of perchlorate waste and exposure problems.
Ammonium Perchlorate is well characterized as a thyroid hormone disruptor.
http://www.ewg.org/reports/rocketscience/chap3.html . **At high enough concentrations, perchlorate can affect thyroid gland functions, where it blocks iodide uptake necessary for the synthesis of thyroid hormones (Urbansky 2002). Perchlorate can cause hypothyroidism, and thyroid cancer.** The environmental levels of perchlorate have been shown to inhibit development in frogs (Goleman et al. 2002). California has extensive perchlorate contamination problems with the drinking water sources of at least 7 million Californians and millions of other Americans are contaminated with perchlorate. A federal **safe daily perchlorate exposure has not yet been set by the**

DC_E0439

EPA, and its expected release in 2002 has been delayed. It has been delayed since the DoD objected to EPA studies suggested a standard of 1 ppb. Senator Barbara Boxer has introduced legislation to require the EPA to establish a standard for perchlorate contamination by July 1, 2004. While most contaminated samples are in the 4 to 20 ppb levels, surveys of California water sources show several sites with perchlorate levels from 4 to 820 ppb.
http://www.ewg.org/reports/rocketwater/table1.php
Ammonium perchlorate used in solid propellants blocks the formation of key thyroid hormones which are critical for growth and development especially in fetuses and children. The PEIS proposes to allow over 30-fold higher levels of perchlorate (200 parts per billion) than that proposed by the State of California (6 parts per billion). As pointed out in the comments of Lenny Siegel: The reason that there is no federal drinking water standard for perchlorate is that the Defense Department objected to EPA studies that suggested a standard of one part per billion (ppb). Meanwhile, regulatory agencies are using levels far below the 200 ppb asserted in the PEIS. On the way to establishing its own legal standard, California has adopted a Public Health Goal of 6 ppb (Frequently Asked Questions (FAQs) About the Public Health Goal for Perchlorate," California Office of Environmental Health Hazard Assessment (OEHHA), March 11, 2004. http://www.oehha.ca.gov/public_info/facts/perchloratefacts.html). Even these levels of perchlorate may be detrimental to fetuses and infants. The human study considered in setting the California public health goal did not evaluate pregnant women, fetuses or infants (Greer et al. 2002). The study of Greer at al 2002, only used a 14-day exposure to perchlorate, which is insufficient to deplete thyroid colloid which acts as a storage form of thyroid hormones. Thus this study is insufficient to estimate the effect of long-term perchlorate exposure on iodine uptake or thyroid hormone levels. Since the effect of long term perchlorate exposure on reducing thyroid hormone levels, especially in the fetus and in infants has not been considered, the MDA needs to evaluate these effects on these sensitive groups as required by federal law. In May, 2004, Massachusetts identified a reference dose for perchlorate that would correspond to a 1 ppb drinking water exposure limit. Also note that perchlorate is found in milk and in several plant species, including lettuce, where high levels have been reported. Thus multiple sources of perchlorate exposure need to be considered.

9) To ensure maximum environmental protection and reduce known, widespread human health risks from the use and disposal of rocket propellants, the BMDS PEIS should compare the proposed alternatives against a real No Action Alternative. At a minimum the BMDS PEIS should:
A. Acknowledge and address emerging regulatory standards for perchlorate exposure.
B. Consider the effects of perchlorate on susceptible subpopulations, including fetuses, and children. The MDA also needs to consider the effects of perchlorate exposure on even more sensitive congenitally hypothyroid populations, so that these individuals are not detrimentally affected by perchlorate from BMDS missile launches.
C. Since water supplies in several regions of central and southern California are already at, exceeding and in some cases markedly exceeding the emerging regulatory standards for perchlorate, the MDA should acknowledge and address the perchlorate problem so as to protect the public.
10**) The BMDS PEIS did not address my scoping comments that the** PEIS should address whether BMDS testing and deploying interceptors endanger Health and Safety by their targeting the incorrect vehicle, e.g. civilian aircraft. The BMDS as described on the MDA web site is a risk to public safety as shown by the Patriot 3 (PAC-3) shooting down US and Allied British military planes during the 2003 US / British invasion of Iraq. According to a report in USA Today April 15, 2003, titled "Patriot Missile: Friend Or Foe To Allied Troops?" By Andrea Stone, It is seems that the Patriot has difficulty determining "friend from foe". In the first incident, on March 22, a Patriot missile downed a British Tornado GR4 fighter-bomber near the Iraq-Kuwait border, killing the two-man British crew. A U.S. F-16 fighter jet had to fire on a Patriot missile radar in Iraqi after the radar "locked on" to the jet. A Patriot-3 battery was also suspected in the downing of a U.S. Navy F/A-18 Hornet near Karbala on April 2, killing the pilot. Since several other Patriot friendly fire malfunctions are known, the MDA needs to consider how many civilians will be killed by the patriot BMDS.

DC_E0439

Furthermore, the Aegis Cruiser system is a threat to commercial aircraft, as shown by the USS Vincennes mistakenly shooting down the Iranian Airbus commercial airliner flight 655 on July 3, 1988, killing all 290 civilians aboard http://www.geocities.com/CapitolHill/5260/vince.html . Over 100 witnesses reported seeing an upward arching flash of light immediately before TWA flight 800 exploded off of New York. However, government investigators refused to consider whether a missile launched from an unannounced ongoing naval exercise could have been the cause of the crash. The point is that the activation of BMDS risks accidentally shooting down civilian airliners, which was not even considered in the BMDS. While the BMDS states that warning will be provided to enable time to clear the airspace, it is highly doubtful that such time would be allowed in a perceived emergency. The BMDS PEIS needs to address these threats.

Both the PAC-3 and Aegis Cruisers are included as components of the proposed BMDS Since the PAC-3 is a relatively short range system and is not designed for intercepting ICBMs, how many PAC-3 batteries will have to be deployed to offer full protection for the American and allied cities and military bases. Are these within range of any civilian aircraft? How will they discriminate attacking aircraft from commercial and civilian aircraft? The MDA needs to consider how many civilians and US/allied military personnel will be accidentally killed by the BMDS.

11) The PEIS provides conflicting information on the effects of the ABL on health and safety. The PEIS does not quantitatively assess the risk of the Airborne Weapons Laser (in a Boeing 747) blinding pilots and/or other civilians, stating mainly that humans and others would be exposed to the laser beam, mainly as reflected light for less than 0.01 seconds. However the PEIS provides no data on the wattage or power of these lasers in the PEIS making it impossible to assess the dangers of such laser exposure, especially to the eyes.
On Oct. 30, 1995, a Southwest Airlines' pilot in control of a flight departing McCarran International Airport in Las Vegas was temporarily blinded by a laser light. According to news reports, the incident was serious enough to force the plane's captain to take control until the pilot regained his sight. "Had it hit me and the other pilot simultaneously, I shudder to think what would have happened," the pilot told reporters. (http://www.fda.gov/fdac/departs/496_irs.html). Had the pilot been exposed to a high energy laser (HEL) as used in the BMDS the results could be much more debilitating, endangering the health and safety of numerous passengers.
The BMDS PEIS (page 4-32) cites that exposure to a reflected laser beam while in the air operating environment would be very short, < 0.01 seconds that and would not impact the health and safety (US Air Force 1997A). But no estimates are provided for the actual danger zone for the HEL to detrimentally affect health and safety, e.g. causing skin and especially retinal damage, if the HEL or other lasers are directed at plants, animals, or people. The Draft Supplemental Environmental Impact Statement for the Airborne Laser Program (2002) (page 99) cites the power of the HEL as about 10 million watts per square centimeter. Ten million watts per square centimeter will burn retinas and eyeballs very quickly. The PEIS states that medium energy lasers such as the SHEL if focused at point 12 km away, would be hazardous to the human eye 2 km before to 2 km past the focus point. Where as, the other lasers and especially the HEL would be hazardous immediately after leaving the turret of the ABL. While the PEIS states that the BILL and TILL no hazard distance would extend > 10 km beyond the target, and the HEL hazard distance would extend even beyond these distances. But the BILL, TILL and I presume the HEL hazard distances are apparently classified. How can the public comment on the effects of the BILL TILL and especially the HEL on health and safety if the of distance at which these lasers cause eye damage is not available? The public and the MDA / Air force need to make this information available to better ensure the heath and safety of the public.

The PEIS focuses on the testing of these lasers, but fails to reveal whether once deployed, the ABL or any other BMDS weapons lasers will ever be directed toward aircraft including airliners, or individuals on the surface of the earth, e.g. on land or at sea. If so, the MDA needs to address the effects of HEL

DC_E0439

and other weapons lasers on endangering health and safety, especially skin and eye damage.
12) The MDA PEIS needs to consider whether boost phase BMDS interceptors could be launched erroneously, causing another country to believe it was under attack, and thereby triggering a nuclear war. The American Physical Society examined the issue of boost phase intercept, and determined that the interceptor has to be very close to the ICBM, be launched within about 15-60 seconds from the time the ICBM was launched, and have much greater accelerations than the ICBM http://www.physicstoday.org/vol-57/iss-1/p30.html (Kleppner et al. 2004). The problem of boost Phase intercept is greater for solid rockets with high accelerations than for slower accelerating liquid rockets. The further problem is that ship based interceptors are not big enough and do not have sufficient accelerations to make a boost phase intercept even from a small country like North Korea. If it did intercept, it is likely the warhead would not be destroyed by a kinetic hit-to-kill interceptor and would continue on to near its intended destination. Finally, they point out that a boost phase launch intercept of a ICBM from North Korea would likely occur over northern China, further risking causing China to think it was under attack by the US which could cause a nuclear war (Kleppner et al. 2004). The BMDS needs to consider the realities of the limitations of any BMDS relative to a real no-action alternative of working toward disarmament through arms control treaties.

13) Space debris from high altitude, mid-course missile intercepts or destruction of satellites. The PEIS does mention that even tiny particles of space debris traveling at extremely high speeds in orbit can destroy space suits, rockets and satellites. While the PEIS correctly points out that debris from low orbital intercepts will decelerate once it hits the atmosphere, and thereby de-orbit. However the PEIS fails to consider the space debris from high altitude intercepts which risk producing space debris that could make space unusable for many years. While the PEIS considers testing the BMDS on "targets of opportunity", no mention is made of space debris resulting if other nations target US BMDS satellites or components in high orbit as "targets of opportunity". This must be considered since the resulting space debris could destroy objects in space, making space unusable as well as violating the 1967 space treaty.

14) The environmental consequences of many rocket launches needed to deploy and maintain space-based interceptors has not been adequately considered, nor has the environmental consequences of their fuel. Will space-based satellites/interceptors use nuclear power sources? Will any BMDS interceptors ever use nuclear warheads? While nuclear tipped-interceptors are not mentioned in the PEIS, per se. In Section 2.2.1.1 the PEIS does mention the possibly of destroying a missile by using interceptors with directed blast fragmentation kill vehicles. However the PEIS, fails to reveal the nature of the blast fragmentation device, which is needed for evaluation of its environmental effects. Instead the MDA PEIS states that "the interceptors will be discussed and analyzed for environmental impacts at the booster and kill vehicle level. This will allow the MDA the flexibility to configure new interceptors based on boosters and kill vehicles analyzed in this document to address new or emerging threats." This does not allow a satisfactory evaluation of the hazards of the BMDS components. What blast fragmentation devices will be used? The PEIS needs to include the details of chemical and toxicant use and exposure.

15) Radioactive and/or biological weapons fallout from intercepted missiles has not been considered in the PEIS. If a kinetic hit to kill interceptor knocks out an ICBM in the mid phase or terminal phase, the nuclear warhead or its fragments are going to produce a tremendous amount of radioactive contamination where ever they land. Such radioactive fallout will clearly have major, highly deleterious effects on adults, children, and especially on developing embryos, and fetuses. While such an interception is very likely to be highly preferable to damage resulting from an air or ground burst over a city, the resulting radioactive contamination needs to be considered. The effects of war are normally excluded from analysis by the National Environmental Policy Act (NEPA). However, the proposed BMDS action is very likely to provoke a worldwide WMD arms race, and force other nations to prepare to launch a massive retaliation against the US should war ensue. Thus, these effects need to be

DC_E0439

considered relative to a real no action alternative. Since the proposed BMDS is very likely to cause a massive arms race, the environmental consequences of a resulting War involving nuclear or other WMD should not be ignored. The PEIS needs to consider the environmental effects of fallout from intercepted WMD as well as the effects of WMD the BMDS fails to intercept. Thus PIES needs to consider these hazardous waste and materials issues. Appropriate references include "The Effects of Nuclear Weapons, Compiled and Edited by Samuel Glasstone and Philip Dolan, third Ed. DOD, DOE. 1977.

The American Physical society also identified the issue that boost phase intercept has a high probability of munitions carryover. A successful boost phase intercept is unlikely to disable ICBM's warheads or munitions. They will be deflected only slightly, if at all, and will continue on ballistic trajectories (Kleppner et al. 2004).

16) Will any interceptors use nuclear warheads? The PEIS does not address the inability of mid-course or terminal kinetic interceptors to stop a "threat cloud" once a attack missile has MIRVed, or released many decoys or countermeasures (Richard L. Garwin. Holes in the Missile Shield. Scientific American, November 2004, page 70-79). The MDA may be temped to intercept such a threat by using large nuclear tipped interceptors. The potential use of nuclear tipped interceptors was discussed by high ranking US DOD officials in 2002 http://www.washingtonpost.com/ac2/wp-dyn/A28866-2002Apr10?language=printer. If such nuclear tipped interceptors were deployed, the environmental risks would be much greater. If so, the environmental consequences of the nuclear fallout and electromagnetic pulses from such high altitude nuclear detonations must be considered in detail. This would include analysis of risks to health and safety, contamination of water, land, soils, EMP effects on civilian and medical electrical and computer systems and infrastructure. The MDA should also consider the effects of radioactive fallout on health and safety, biological resources, and contamination of land and water resources.
Furthermore, given the historic 15% missile launch failure rate, the radioactive fallout from accidents with nuclear tipped interceptors must be considered in detail. The public should have full opportunity to consider and comment on the use of such nuclear tipped interceptors in this PEIS. The point is that the blast fragmentation devices need to be described in detail to enable adequate evaluation of its environmental effects.

17) Also note that the technology and environmental effects of "advanced systems" remain to be defined. How can the environment effects of an undefined "advanced system" be evaluated in this PEIS? A full environmental analysis is needed for each component of the PEIS to be added. If any component of the BMDS will ever use nuclear warheads in any interceptors the MDA needs to thoroughly consider the environmental effects, as discussed above.

18) Will any MDA interceptors or Lasers use anti-matter weapons? A US Air Force anti-mater weapons research programs has recently been described in the SF Chronicle http://sfgate.com/cgi-bin/article.cgi?file=/c/a/2004/10/04/MNGM393GPK1.DTL. IF the BMDS will use antimatter weapons or energy sources, the environmental effects including the health and safety risks, and chemical exposure risks need to be described in detail.

19) **The BMDS PEIS needs to consider direct, indirect and cumulative effects of the proposed project in conjunction with other federal offensive military weapons systems and policies were not addressed**, but need to be addressed. The National Environmental Policy Act (NEPA) (http://ceq.eh.doe.gov/nepa/regs/nepa/nepaeqia.htm) and especially **The Regulations for Implementing NEPA** (http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm), state that both the direct and indirect effects of the proposed project as well as the Cumulative impact of the project should be considered. Sec. 1508.7 States that the "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably

DC_E0439

foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
In the context of this global ballistic missile defense system, the cumulative impact of reasonably foreseeable future actions of the US as well as other nations, agencies and persons need to be considered. Yet the reasonable foreseeable actions of other nations and individuals responding to the BMDS by proliferating WMD was not considered by the MDA in this PEIS.
As stated in Sec. 1508.8 "Effects" include:(a) Direct effects, which are caused by the action and occur at the same time and place and (b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial.
Thus, by law the MDA also needs to consider the Direct, Indirect and Cumulative impacts on the environment of the proposed BMDS along with other US offensive weapons systems and stated & demonstrated US preemptive first-strike policy.

The following points are points that need to be considered in the no action alternative.
20) The PEIS needs to consider whether the BMDS will result in Proliferation of Weapons of Mass Destruction (WMD) and an arms race in space. The response of other nations to the BMDS has not been considered. Specifically, the BMDS is coupled to other offensive weapons programs and will force other nations to proliferate and/or smuggle WMD so that they can re-establish deterrence. Relatively inexpensive countermeasures to BMD will likely thwart the goals of BMD. Such proliferation coupled with increased international tension will decrease rather than increase our security and lock us in to an expensive and destabilizing arms race and will have devastating long-term environmental consequences.

21) Alternative 3: Not developing, or building the BMDS or any of its components and instead renegotating an expanded and verifiable ABM / BMDS treaty: The ABM treaty helped to stabilize and de-escalate the nuclear arms race for all of its 29 years of existence. No country dared attack the US with nuclear missiles, in part because the U.S. would know exactly where the missile came from and have the clear ability to retaliate and bomb them into obivilion. That is certainly still the case. This option would preserve deterrence and peace. Yet it would enable the nuclear nations to abide by the NPT and reduce the overall level of nuclear weapons, in exchange for non-nuclear nations not developing nuclear weapons.

22) Alternative 4: Preserving Space for non-military purposes. The MDA should consider the alternative of not militarizing space. The planned US militarization and domination of space as described in the US Space Command Vision for 2020 (http://www.fas.org/spp/military/docops/usspac/lrp/ch02.htm) and as described in the 2002 US defense guidance policy and elsewhere, will certainly create and intensify conflicts over the control of space for years to come. These US policy documents talk about "Full Spectrum Domination", "negating" or "destroying" the enemy's satellites and use of space. As US citizens we would like for the US to protect space from militarization, but do we want the US to dominate space, and to start a series of space wars? Think about how you would feel if you lived in another nation and some one destroyed your satellites. Would such actions be considered an act of war?
Additionally how does the BMDS PEIS affect US compliance with the Outer Space Treaty?

23) Alternative 5: Deployment of a much more limited land and or Sea based theatre BMD that would offer protection from attack by short or intermediate range missiles. For example, rather than develop the extensive land, Sea, air and space based system, the US and its allies could instead deploy a currently available Aegis missile cruiser(s) off of North Korea. Such a small, affordable, alternative system would immediately meet the needs of defending Japan against missiles that might be launched by North Korea without invoking fears that it would be used to enable invasions and/or domination of the world and thereby starting a massive global arms race.

24) NONPROLIFERATION ANALYSIS COMMENT
Based on my expertise in the area of genetics, physiology, toxicology and nuclear weapons control/non-proliferation, it is a **reasonable foreseeability** and in my opinion a very high probability that the proposed BMDS creates a significant risk of nuclear and biological weapons proliferation. This proliferation risk goes hand in hand with a greater security risk, and both increase the potential harm to the environment and the public.

As pointed out by Nicole C. Evans, National missile defenses may undermine strategic stability by threatening the ability of other countries to retaliate, which is the core of their deterrence. Theater missile defenses do not pose this danger (Evans 2004). Evans goes on to describe Russian and Chinese concerns to National Missile Defense (NMD) and especially Global Missile Defense (GMD) as described in the BMDS PEIS. She also describes how Russia and China have already started to proliferate in response to the US renigging on the ABM treaty and preparing to deploy GMD, e.g. the BMDS.

Evans points out that; "Russia and China share two key concerns about American missile defense plans: that their nuclear deterrent is threatened and that American missile defense plans will destabilize arms control. Š
Both Russia and China have responded actively to the American abandonment of the ABM Treaty by developing asymmetrical measures to neutralize any potential threat. By withdrawing from START II, Russia was able to continue deploying multiple independently targetable reentry vehicles (MIRVs) on intercontinental ballistic missiles (ICBMs). Putin announced in October 2003 that Moscow intends to place on combat duty dozens of MIRVed SS-19s, and Russia has also extended the service life of its SS-18 heavy ICBMs. Russia has begun building the fourth-generation *Borey* class of submarines, is MIRVing its silo-based Topol-M, and is finishing testing the mobile version of the Topol-M." In February 2004 Russia also "successfully tested a new hypersonic "Crazy Ivan" warhead that follows a nonclassical scenario, changing flight altitude and course repeatedly, making it nearly impossible to track and target." Evans also points out that "Russia has also upgraded the A-135 strategic single-site ABM system covering Moscow, the only such system currently in operation. In 2002, Russia began working in earnest on TMD and is currently developing several advanced missile interceptors (Evans 2004).

Evans points out that "Both Russia and China appear unconvinced by American assurances that global missile defense is not directed against them, despite echoing American rhetoric about the need to defend against the terrorist threat. Senior Russian military and foreign affairs officials have argued that while the United States proclaims its partnership with Russia, its actions show anything but that. ŠRussian concerns are further aggravated by America's stated intention not to cut its nuclear arsenal to levels designated by the Moscow Treaty of May 2002--instead moving the missiles as well as the warheads into storage as a hedge against an uncertain future." (Evans 2004).

Evans then goes on to describe how China is responding to the US BMDS threat and "is moving toward a more diversified, invulnerable, and combat-ready operational nuclear triad." "Second, Russia and China are very concerned that American missile defense plans will destabilize existing arms control regimes and forestall future agreements."

Russia, China, and other states express deep concern about the weaponization of space. In 2003, Russia and China proposed an agreement for the non-weaponization of space, and negotiations continue at the Conference on Disarmament in Geneva. Both Moscow and Beijing maintain that nonproliferation measures and policing regimes are a better way of dealing with weapons of mass destruction than attempts to develop missile shields" (Evans 2004).
Evans Concludes "The real danger lies in the potential of GMD to disrupt delicate regional balances and to encourage the further development and deployment of nuclear weapons. The United States, China, and Russia have all stepped up their offensive weapons programs since the dissolution of the ABM Treaty. The danger has been succinctly summarized by Mohamed El Baradei, head of the International Atomic Energy Agency: "If we don't stop using double standards, we shall be piled high with an even greater number of nuclear weapons." That would create the exact opposite of the professed objective of global missile defense: security for all who want it" (Evans 2004). This article and several others by Arms Control experts show evidence that the BMDS is causing and will continue to cause WMD proliferation rather than preventing it. **Thus, a non-proliferation analysis is needed for the BMDS PEIS particularly in regard to a genuine no action alternative.**

The BMDS PEIS (page 2-68) provided a justification based on politics rather than on analysis of environmental policy as the rationale for not considering a real "No Action Alternative", namely the canceling of Ballistic Missile Defense Capabilities (and re-engaging in treaty - based arms reductions). On page 2-68 the PEIS states " As suggested to the MDA during the scoping process, one alternative would involve canceling the development of all ballistic missile defense capability development and testing. Such an alternative would rely on diplomacy and military measures to deter missile threats against the U.S. However, this proposed alternative would eliminate the capability to defend the U.S., it's deployed forces, allies or assets for a ballistic missile attack should diplomacy of other deterrents fail. This alternative does not meet the purpose of or need for the proposed action as described in Sections 1.3 and 1.4, respectively; does not meet the direction of the President and the U.S. congress; and therefore will not be analyzed further."
A mainly political justification was also given on BMDS PEIS pages 1-14 for not considering scoping comments showing "concern that the BMDS would create an arms race, especially in space" Š comments showing "opposition to the development of nuclear weapons and concern that missile defense could be a first strike capability for U.S. worldwide military domination". Specifically, the MDA PEIS stated the rationale for excluding these comments is that "Public comments concerning DoD policy, budget and program issues are outside the scope of the Draft BMDS PEIS".
These political justifications used by the MDA are insufficient for excluding these and related issues of non-proliferation from analysis in the BMDS PEIS. A non-proliferation analysis is needed for the BMDS. We all want to be safe from missile attack. The non-proliferation analysis is needed to determine if the BMDS is likely to ultimately increase our security, and maintaining environmental quality or result in an out of control arms race that decreases our security and wreaks wide spread environmental destruction.
Because of the reasonable foreseeability of increased potential for environmental harm due to proliferation and security risks, I strongly recommend that the MDA prepare a detailed Nonproliferation Impact Review for the BMDS PEIS including a Nonproliferation Impact Review EIS for each BMD component and for each BMD site or location. These reviews will determine the scope and need for a MDA high-level program and the alternative that would cause the least environmental harm. If the BMDS is the best alternative for such a program, these review processes will thoroughly assess the potential proliferation, security and environmental harms and ways to mitigate those potential harms. This will mean that proactive plans to protect the environment, public safety and national security will be developed in advance rather than in response to a problem, accident or crisis.

DOE Programmatic EIS Precedent

The DOE has set an important precedent by conducting a Programmatic EIS, including a Nonproliferation Impact Review (NIR), for its Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, including the Role of the Fast Flux Test Facility in December 2000 and for its Stockpile Stewardship and Management in September 1996. Furthermore, Nonproliferation Analyses were conducted in the following DOE EIS or Site-Wide EIS review documents:

· Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling (October 1995); Section 1.5.6 Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel, Page 1-10.

· Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site(August 1998);

·Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor (March 1999).): 1.3.5
Nonproliferation, Page 1-9 and 1-10.

Final Site-Wide Environmental Impact Statement for the Y-12 National Security _ _Complex_ (September 2001): Section 2.2.3 Nonproliferation and National Security, Page 2-7.

Following this precedent, the MDA BMDS, in my opinion, necessitates an equally comprehensive review. Such a Nonproliferation Review Should Include Public Hearing, Scoping and Comment.

25) I highly recommend that the Nonproliferation Impact Review be conducted like the NEPA process that includes public participation in the scoping phase and a draft document circulated for public comment. This open process is critical because intent really is the biggest differentiating factor between defensive and offensive military research. The participation of individual citizens who live near the proposed facility and have personal concerns such as health and property values, as well as representatives from professional and nonprofit groups who specialize in public health, emergency response, sewage treatment, landfills, water, environment, toxicology, science, medicine and arms control may identify unforseen problems, more cost-effective solutions and new ways to open up the process while maintaining necessary security. This scrutiny and public debate can only improve the quality of the decision-making process and will likely result in more confidence in the final decision on the part of those most directly impacted.

26) Which government and university institutions in the State of California will be conducting research to support the BMDS research and development and, if so, please describe their roles, responsibilities and the specific projects they will be involved in? Specifically, will Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratory -- Livermore, or the University of California at Berkeley, Davis or Los Angeles be conducting research or development on the BMD for the MDA or DoD and, if so, what specifically will each that is involved be doing? This is important for people in these areas to know in order to understand, consider and evaluate the possible environmental, health, and safety impacts on their communities.

Thank you for considering these public comments on the BMDS PEIS.

Please confirm that you have received my comments.

Jimmy L. Spearow, Ph.D.

"We must abandon the unworkable notion that it is morally reprehensible for some countries to pursue weapons of mass destruction yet morally acceptable for others to rely on them for security and indeed to continue to refine their capacities and postulate plans for their use." Mohammad ElBaradei, IAEA Director General (http://www.wagingpeace.org/articles/2004/03/26_road-prolilferation.htm)

Additional References:

Evans, N. C. (2004). "Missile defense: Winning minds, not hearts." Bulletin of the Atomic Scientists **60** (September/October): 48-55.

Goleman, W. L., L. J. Urquidi, T. A. Anderson, E. E. Smith, R. J. Kendall and J. A. Carr (2002). "Environmentally relevant concentrations of ammonium perchlorate inhibit development and metamorphosis in Xenopus laevis." Environ Toxicol Chem **21**(2): 424-30. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=11833812
Greer, M. A., G. Goodman, R. C. Pleus and S. E. Greer (2002). "Health effects assessment for environmental perchlorate contamination: the dose response for inhibition of thyroidal radioiodine uptake in humans." Environ Health Perspect **110**(9): 927-37. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=12204829
Kleppner, D., F. K. Lamb and D. E. Mosher (2004). "Boost-Phase Defense Against Intercontinental Ballistic Missiles." Physics Today.org(January). http://www.physicstoday.org/vol-57/iss-1/p30.html
Koster, K. (2004). "The Best Defense: The Bush Administration Promises That Its Ambitious Plan for Missile Defense Is Purely Benign, but It Looks a Lot Like a Shield-and-Spear Strategy." Bulletin of the Atomic Scientists **60**(September-October): 26-28.

Urbansky, E. T. (2002). "Perchlorate as an environmental contaminant." Environ Sci Pollut Res Int **9**(3): 187-92. http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=12094532
Ambio Volume XI number 2-3, 1982, Nuclear War: The Aftermath.

--

Jimmy L. Spearow, Ph.D.

DC_F0003

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

November 17, 2004

Missile Defense Agency
Ballistic Missile Defense System PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Mr. Lehner:

In accordance with our responsibilities under Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the Environmental Protection Agency (EPA) has reviewed the Missile Defense Agency's (MDA) Ballistic Missile Defense System (BMDS) Draft Programmatic Environmental Impact Statement (DPEIS) (CEQ # 040438).

The DPEIS identifies, evaluates and documents, at the programmatic level, the potential environmental impacts of activities associated with the development, testing, deployment, and planning for the eventual decommissioning of the BMDS. It considers the current technology components, support assets, and programs that make up the proposed BMDS as well as the development and application of new technologies.

EPA commends the efforts that MDA has commenced in producing such a comprehensive and well organized document. We also appreciate your efforts in utilizing the extensive environmental analysis that is available for many of the existing components of the proposed BMDS. Based on our review of the DPEIS, we have rated the document as LO - Lack of Objections (see attached "Summary of EPA Rating System"). Although EPA has no objections to the proposed action, there are a few issues that should be clarified.

DC_F0003

1) General Comments:

a. To assess the impacts of implementing the proposed BMDS, the DPEIS characterized the existing condition of the affected environment in the locations where various BMDS implementation activities are proposed to occur. MDA has determined that activities associated with the proposed BMDS might occur in locations around the world. Therefore, the affected environment has been considered in terms of global biomes, broad ocean areas, and the atmosphere. This has resulted in the DPEIS being very conceptual and general in nature. EPA understands that once potential BMDS locations are determined, more detailed site-specific documents will be prepared. Through the discussions on the "block approach" or the "block development process", the DPEIS has given clear indications of when follow-on NEPA analysis will occur. We agree with this approach. However, while the documents give representative examples of past, current, or proposed locations where proposed activities may occur within each biome, EPA recommends that the EIS discuss the criteria that MDA will use in making future decisions for site-specific locations.

b. The resource areas considered in this analysis are those resources that MDA believes can potentially be affected by implementing the proposed BMDS. EPA agrees that some resource areas are site-specific or local in nature and, therefore, cannot be effectively analyzed in this type of programmatic document and that the potential impacts on these resources are more appropriately discussed in subsequent site-specific documentation tiered from this PEIS. However, EPA recommends that the final document discuss the existence of multiple species habitat conservation planning efforts that are proximate to DoD lands and the potential impacts of debris on marine and aquatic ecosystems.

c. As suggested by CEQ regulations, MDA has taken advantage of the extensive environmental analyses that already exist for many of the existing components of the proposed BMDS by incorporating these materials into the DPEIS by reference. However, some of these documents are greater than 10 years old. The PEIS should confirm the validity of the information in these documents.

2) Perchlorate Comment: Because there have been differing interpretations of the science associated with the impact on human health from low level exposure to perchlorate and in the interest of resolving scientific questions, EPA, the Department of Defense, the Department of Energy, and the National Aeronautics and Space Administration - members of a broader Interagency Working Group on Perchlorate led by the Office of Science and Technology Policy - have referred scientific issues and EPA's 2002 Draft Health Assessment on Perchlorate to the National Academy of Science (NAS) for review. NAS is currently conducting a study to determine the best science and model to use for determining the health impacts and standards for perchlorate. A report on this study is expected to be completed by the end of 2004. EPA recommends that the results of the report be incorporated into the FPEIS.

DC_F0003

We appreciate the opportunity to review this DPEIS. We also look forward to reviewing the FPEIS related to this project. The staff contact for the review is Marthea Rountree and she

Sincerely,

[signature] for

Anne Norton Miller
Director
Office of Federal Activities

Enclosure: Summary of Rating Definitions

DC_F0003

SUMMARY OF EPA RATING SYSTEM

Rating the Environmental Impact of the Action

- **LO (Lack of Objections)** The review has not identified any potential environmental impacts requiring substantive changes to the preferred alternative. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposed action.
- **EC (Environmental Concerns)** The review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact.
- **EO (Environmental Objections)** The review has identified significant environmental impacts that should be avoided in order to adequately protect the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). The basis for environmental objections can include situations:
  1. *Where an action might violate or be inconsistent with achievement or maintenance of a national environmental standard;*
  2. *Where the Federal agency violates its own substantive environmental requirements that relate to EPA's areas of jurisdiction or expertise;*
  3. *Where there is a violation of an EPA policy declaration;*
  4. *Where there are no applicable standards or where applicable standards will not be violated but there is potential for significant environmental degradation that could be corrected by project modification or other feasible alternatives; or*
  5. *Where proceeding with the proposed action would set a precedent for future actions that collectively could result in significant environmental impacts.*
- **EU (Environmentally Unsatisfactory)** The review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposed action must not proceed as proposed. The basis for an environmentally unsatisfactory determination consists of identification of environmentally objectionable impacts as defined above and one or more of the following conditions:
  1. *The potential violation of or inconsistency with a national environmental standard is substantive and/or will occur on a long-term basis;*
  2. *There are no applicable standards but the severity, duration, or geographical scope of the impacts associated with the proposed action warrant special attention; or*
  3. *The potential environmental impacts resulting from the proposed action are of national importance because of the threat to national environmental resources or to environmental policies.*

Adequacy of the Impact Statement

- **Category 1 (Adequate)** The draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.
- **Category 2 (Insufficient Information)** The draft EIS does not contain sufficient information to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the proposal. The identified additional information, data, analyses, or discussion should be included in the final EIS.
- **Category 3 (Inadequate)** The draft EIS does not adequately assess the potentially significant environmental impacts of the proposal, or the reviewer has identified new, reasonably available, alternatives, that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. The identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. This rating indicates EPA's belief that the draft EIS does not meet the purposes of NEPA and/or the Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS.

DC_F0004

To:

Cover Sheet 11/17/04
M.D.A.

TO: P E I S Comments
from Public.

5 pages to follow.

Please Call
to Confirm the reception of
these pages. Thank you,

from: V. J. Kennedy

called to confirm receipt of
[illegible] comments [illegible] PEIS

DC_F0004

①

11/16/04

Missile Defense Agency BMDS
P.E.I.S. Comments by Public
United States of America

To whom it may Concern or Cares,

My name is Vikki Jo Kennedy. I am a exiled (Since March 2002) resident of Kodiak Island Alaska. I am Currently Surviving in Ritchie Co. West Virginia.

I miss Kodiak every day + want to go back Someday.

My comments on the P.E.I.S. are as follows.

I became personally effected by N.M.D. plans when it was announced on July 13th 2001 that Missile Silos were to be installed by N.M.D. at the Kodiak Launch Complex. And that it was Now a Missile Defense Site. NOT just a simple "Commercial" Rocket Launch Complex as were told it was at first. This "Site" is only 12 Air miles from the town of Kodiak where over 3/4 of the Islands Population is located. I was devastated by the announcement buried on Pg. 5 of our Local Lil Paper. For the 5 or 6 years previous to that announcement I was a Supporter of the K.L.C. + A.A.D.C. I was the tour guide to the Site on many tours. Some of which were for big dignitaries + ranking Military personal. Future plans were often discussed in my presence. I Sometimes questioned some

DC_F0004

Of the plans but was told all was OK and to "NOT worry or be Concerned..." "They" Knew what to do and all. I went along. I sometimes scoffed at the small group of Kodiak Citizens (who were all Very educated + Wise) that were Opposed and skeptical of the KLC. They said it was Sinister etc. The

DC_F0004

②

very first thing to throw-up there red flag was the 23 million dollars the U.S.A.F. gave the A.A.D.C. when the State of Alaska ran Short of funding to Complete the State owned K.L.C. they questioned why would the D.O.D. want to put in monies? Well, on July 13th 2001 that all became very apparent to me + many Other Kodiak Citizens. I felt So betrayed + used as an Advocate of a program far + beyond what I was told it was to be. I knew I was fooled + Tricked out of my hopefulness that the KLC. was A good thing for Kodiak. Now as I sit here writting these Comments 3 years 4 months and 3 days later (But who's Counting - right) I have No Hope this will ever be any good for the Citizens of Kodiak and beyond. I wish it would all just "Go Away" But... We all know that won't happen. Now with the Bush Admin. back in for 4 more Long years God only knows where this will all lead our world too.

So... If you must proceed with this Outrageous Program and Launch rockets for military (B.S.) From Kodiak Please Consider my "Wish List" of Concerns + requests OK.

① Take this whole program out to the Aleutian Islands! That's were all this experimental D.O.D. Stuff Should have been put all along. This is all testing. the Kodiak People + Flora + fauna Should not be used this way. Take it West to Adak + Shemya where the D.O.D.

③

has been set-up doing "there thing" since prior to WW II ! Just by the Adak base back from the Native Corp. (It should have never been Sold to them in the first place!) You have all your infrastructure already there too. You Can do lots of experiments out there with lil effects on US citizens if done Correctly.
But.. I'm probably dreaming Big + unrealistic Aye. But... It's better then Crying buckets of tears like I have for the past 3 yrs 4 mos + 3 days + more to come I'm Sure. Just Consider it all please. They Can be a high strike zone" (Target area more then we Can too!)
Since this is a test site for for the G.B.M.D.S. of the M.L.M.D. Please use extream Caution over Safety at All times wherever you do your testing, Please.

① the Planned Rocket Trajectories that go over Kodiak Island + skirt very close to the East Side are just totally unacceptable! We have to many Native Villages + Bush People who live there year round. Not to mention all the Wildlife (Bears! Rare Kodiak Brown Bears!) that live there too. It is just to damn dangerous to launch over the Island. Period! That Can NOT proceed as planned.

② You have Said in the past year that there are no longer plans to install Missile Silos on Kodiak. Keep that Plan - No Silos .. Period.
You must keep your word true to us citizens. After all its OUR Home + OUR Program too.

④

③ When you have another Accident like the one on Nov.09,2001 where the rocket Blew-up, Tell us the truth right away. Don't lie then tell the truth (forced as it was) 6 mos. later. Maybe if you don't try launching in 40mph winds with Snow + rain you might have a better launch window + help the process alot .. just maybe Aye!

④ Dropping Rocket booster Stages Anywhere along the east side (or exterior) of Kodiak Island is totally unacceptable! It is all Critical habitat area for the endangered Steller Sea Lions. There are numerous haul-outs + rookeries all along the Coast of the Kodiak Archipelago. We Commercial fishermen have Severly Shut down from fishing near any of these places So.. You Can't disturb them either! If you kill any off We get the blame, and we will be Shut Completly down from fishing! Please Consider our fate to make a living OK.

⑤ You do not need to let the AADC gobble-up any-more land to use for this program. The additional 14,000 Acres is our only area on the Kodiak Road System we (the citizens) have that is open for Public Use. All the other land is private (Native Corps.) And 3/4 of the Island is in the Kodiak Island National Wildlife Refuge. Please Do NOT take Control of these lands. No more Land to USE. (the 3,800 Acres you

⑤

use Now is enough. No more OK. Please.

⑥ Keep it Clean wherever you go to put this all in. Clean up all your toxic Wastes + garbages. Kodiak Island is one of the most Pristine places left on this planet .. Please Keep it that way. Please.
Our Close Ocean Waters Are Our Living they must be kept Clean + respected!
Rockets + Missiles debrie and fish - just don't Mix! And Last but Not Least .. just be real damn Careful out there. I Love that Island and want to keep it Safe. Please Be Careful.

Thank you for this opportunity to express my opinions. Maybe they will be Considered? I only have true Concerns for my Home + my Country and Planet.

Sincerely,
Vikki Jo Kennedy

Vikki Jo Kennedy

Missile Defense Agency

Nov 17, 2004

Comments on PEIS submitted on behalf of LAWS, by Philip A. Fleming. 202-249-3608
Please acknowledge receipt.
Thank you

Philip Fleming

Responded on November 17, 2004 ([illegible]) [illegible]

LAWYERS ALLIANCE FOR WORLD SECURITY (LAWS)

COMMENTS ON THE BALLISTIC MISSILE DEFENSE SYSTEM DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

Submitted to the Department of Defense's Missile Defense Agency

By Philip A. Fleming, on behalf of LAWS

The draft Ballistic Missile Defense System (BMDS) Programmatic Environmental Impact Statement (PEIS), dated September 1, 2004, is required by NEPA to provide an objective and through assessment of the effects various missile defense architectures would have on the environment. LAWS submits that it fails in several respects to do this. Instead, it has been developed, organized and shaped to give credibility to the Bush Administration's continued assertions that the only way the United States can be protected from an ICBM attack is with a heavily tiered missile defense system. Consequently, the draft PEIS either does not discuss or dismisses real concerns about harmful negative consequences from developing such a system. In view of this fatal flaw, the draft PEIS is essentially an inadequate attempt to justify decisions that have already been made.

LAWS had assumed, when it submitted comments on October 14, 2004 at the public hearing in Crystal City, Virginia, that some of the PEIS deficiencies could be remedied by further analysis and substantive changes to the draft. However, upon further study and analysis of the draft PEIS, LAWS has reluctantly concluded that even this flawed document comes so late in BMDS development and testing that it is largely irrelevant. For example, Section 1.2 shows that environmental analyses have already been completed for most components, the notable exceptions being the Aegis BMD and space-based weapons. As we understand it, development and testing of most components are well underway and decisions about initial deployment of GBI's and Aegis BMD ships have been made.

Morever, the spiral development process, which is described on page ES-7 of the PEIS, allows MDA to "consider deployment of a missile defense system that has no specified final architecture and no set of operational requirements." Such a process is apparently intended to preclude any meaningful assessment, and thus far it has

succeeded brilliantly, to the detriment of the public interest, the national defense of the United States, and in frustration of the purpose of requiring careful NEPA analysis of major federal actions.

Another major deficiency of the draft PEIS is that it lacks a genuine "No Action Alternative", even though NEPA explicitly requires that such an alternative serve as a baseline against which to compare the environmental impacts of the other alternatives. LAWS is compelled to conclude that the MDA simply did not consider a "No Action Alternative" seriously. For example, the MDA asserts on page 2-67 that "it would not meet the purpose of or need for the proposed action or the specific direction of the President and the U.S. Congress." Further, footnote 19 on page 1-6 quotes the part of the 1999 Missile Defense Act which declares the policy "to deploy as soon as is technologically possible an effective NMD system." The PEIS also notes on page 1-6 that President Clinton decided in September 2000 not to authorize deployment of an NMD system for reasons including technical uncertainties and unsuccessful flight tests. The PEIS does not concede that even if the technology worked perfectly, the systems being deployed are vulnerable to countermeasures that are easier to build than the long-range missile on which they would be placed, another concern that contributed to President Clinton's decision not to deploy the system the Bush Administration is now rushing to deploy.

In addition, two GAO reports in 2003 and a Union of Concerned Scientists report titled "Technical Realities" released in May, 2004 raise further serious questions about the readiness for deployment of the current NMD components. It seems clear to LAWS that a properly-articulated "No Action Alternative" –which was essentially U.S. policy until 2002 – is vastly preferable until the MDA can persuasively demonstrate that an "effective" NMD is "technologically possible." Recent test results underscore this reality. The most recent NMD intercept attempt failed on December 11, 2002, six days before President Bush announced that the U.S. would deploy an initial NMD system. This rush to deploy an untested system flies in the face of the test results so far, and suggests that the independent analyses that state that it is at least questionable whether an effective NMD system is possible, have been ignored. The policy stakes are far too high, and the $10 billion annual expenditures far too great, to proceed with this global gamble.

LAWS submits that this extraordinary emphasis on missile defense represents misplaced priorities. As President Bush agreed in the pre-election debates with Senator Kerry, the Administration's top non-proliferation priority should be combating the threat of

nuclear terrorism by increasing its programs to keep nuclear warheads and fissile material out of the hands of terrorists. The Bush Administration, however, is giving this problem a fraction of the attention and a fraction of the funding being given to missile defense. Since the technology needed for an effective missile defense system still doesn't exist, LAWS believes that the missile defense system being rushed into deployment in Alaska and at Vandenberg AFB in California is not relevant to the war on terrorism.

I. THE PEIS IS FATALLY FLAWED BECAUSE IT DOES NOT COMPLY WITH NEPA

The width of the range of alternatives that an agency must identify and analyze in an EIS is based on the purpose of, and need for, the agency action. (See 40 C.F.R. Sec. 1502.13, 1502.14.) Therefore, a narrow project purpose and need requires a fewer number of reasonable alternatives than a broad project purpose and need, which may have an infinite number of alternatives. (See NRDC v. Morton, 458 F.2d 827, 835; D.C. Cir. 1972) In addition, the purpose of the proposed action also influences how the "no action" alternative should be presented. When the purpose is narrow, encompassing distinct federal action on a new project, the "no action" alternative must address the environmental effects of the action not going forward, including the effects of any probable outcomes that will occur without the project. (Forty Most Asked Questions, 46 F.R. 18026, at Answer 3.) Alternatively, when the project is broad, encompassing the next phase of federal action in a continuing project, as here, the "no action" alternative must consider the effects of "no change" from the present course of action. (See also American Rivers v. Federal Energy Regulatory Commission, 201 F. 3d 1186, 1201; 9th Cir. 1999).

Here, MDA's interpretation of the proposed project purpose and need is internally inconsistent in one case narrow, in the other broad. The MDA chooses its alternatives based on the narrow purpose of developing an integrated, multi-laycred BMDS while its "no action" alternative allowing for continued research and testing of a non-integrated BMDS, implying that the project supports the general purpose of protecting the United States from foreign missile attacks through any means necessary. (PEIS at pp. 1-1 to 1-8, describing the general history of the government's ongoing development of ballistic missile defense programs.) Consequently, in the PEIS, the MDA sets out two internally contradictory positions On the one hand, the MDA narrows the purpose of the proposed action, and thus the spectrum of alternatives to be considered, to the creation of a singular, integrated, multi-layered BMDS that is not part of a continuing program to protect the U.S. from ballistic missile attacks. On the other

hand, the agency relies on the long history of the U.S.'s missile defense actions to frame its "no action" alternative as a "no change" in an ongoing project with the broad purpose of protecting the U.S. from ballistic missile attacks. On either ground, the PEIS fails to meet the NEPA test – that it interprets its purpose too narrowly in order to develop a very narrow spectrum of alternatives, or that it interprets the purpose too broadly in order to assert a "no action" alternative that allows for continuing, non-integrated action – but not both.

In determining whether the alternatives analyzed within an EIS are adequate, courts have determined that the range of alternatives an agency must consider, although not "self-defining," is 'bounded by some notion of feasibility." (Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 551 (1978). Accordingly, the alternatives examined by an agency must include only those that are reasonable and feasible – i.e., that are "meaningly possible". However, reasonableness is determined through a fact-specific examination of each proposed project because "what constitutes a reasonable range of alternatives depends upon the nature of the proposal and the facts in each case.

A flaw in the PEIS is that the range of alternatives considered by the MDA is not adequate, because the agency unreasonably narrowed the range of alternatives to be examined by narrowly interpreting the purpose of the proposed action as the development of a multi-layered ballistic missile defense system. While courts typically afford agencies some discretion in defining the purpose and need of a proposed project, that discretion is limited by the reasonableness of the agency-defined purpose and need. It is also clear that an agency may not characterize its proposed action purpose so narrowly as to avoid its NEPA obligations. (See Friends of Southeast's Future v. Morrison, 153 F.3d 1059, 1066; 9th Cir. ~~1998~~, and ~~Simmons v. US Army Corps~~ of Engineers, 120 F 3d 664, ~~669-670~~; 7th Cir. 1997. ~~It seems to LAWS~~ that that is exactly what the MDA has done here. We doubt that a reviewing court would condone it, or find that when an agency varies its interpretation in order to avoid its NEPA responsibilities, the PEIS can be found to meet the NEPA standard.

In this connection, the spectrum of alternatives to be considered must be broader than those considered by the MDA. (See Morton, 458 F.2d at 837) Accordingly, a court could find that consistent with its obligations under NEPA that the MDA should have considered as an alternative the Theater Missile Defense System which has already been developed and, therefore, would not require excessive resources to implement. The MDA should also have considered, and included in the PEIS, alternatives that offer a less than complete solution to the problem. To the extent that it hasn't, the MDA should also have analyzed the BMDS platforms for each component and/or defense environment separately.

DC_F0005

Other options include an analysis of alternatives that include both weapon and non-weapon components; such as integration of land and sea-based platforms only with increased diplomatic efforts. As the Court said in Morton, an agency cannot restrict its alternatives because it is not part of its jurisdiction. Since the BMDS is part of a broader purpose of protecting the U.S., the MDA should have fulfilled its NEPA obligations by analyzing a much broader spectrum of alternatives to achieve this purpose.

As pointed out above, instead of crafting the PEIS to justify decisions that have already been made, the MDA should have included a genuine "No Action Alternative", as required under NEPA. Such an alternative could have been "Cancel Development of Ballistic Missile Defense Capabilities" because it does not meet the purpose of or need for the proposed action. It is acceptable under NEPA to evaluate and reject a No Action Alternative because it doesn't meet the purpose of a program, but the environmental impacts of that alternative must be considered as a baseline against which to compare the environmental impacts of the other alternatives. This the MDA has not done. For example, the PEIS projects 515 BMDS launches over the next decade. The sheer volume of this many launches dwarfs the number of projected government and commercial launches over the same period, and the volume of solid rocket propellant involved will generate large quantities of hydrogen chloride, which reacts in the atmosphere to create acid rain. The PEIS should provide more detailed estimates of perchlorate waste likely to be generated by system development, testing, deployment, maintenance, and decommissioning, and acknowldge the potential impacts of such exposure.

The draft PEIS fails to analyze what would be required to develop a space-based test bed, dismissing the suggestion as "too speculative." But that is precisely what the PEIS is supposed to – to examine the environmental effects of the proposed action. Accordingly, the draft PEIS is flawed for not looking at the effect of space-based interceptors in lieu of terrestrial-based ones - it simply suggests that future studies may be required. This dismissive attitude toward NEPA would not survive judicial scrutiny. Nor would the back-of-the-envelope dismissal of debris, orbital and otherwise. Frequently the PEIS posits that such debris poses a small risk, and downgrades the threat – which would come as a great surprise to our partners in the International Space Station. LAWS' adopts and incorporates here by reference the compelling exposition of the dangers from space debris set out in the October 18, 2004 testimony of Theresa Hitchens, Vice President and Director of Space Security of the Center for Defense Information. This is a dramatically fatal flaw in the PEIS; one that ought not be swept under the NEPA rug.

Some additional detailed comments and suggestions, in addition

DC_F0005

to those raised by others who testified and submitted statements at the four quasi-hearings the MDA held in October, include:

(1) In order to evaluate the risks from launch failures, the PEIS should give qualitative information on the reliabilities of the boosters to be used to launch targets for BMDS tests.
(2) The draft PEIS contains no discussion of INF Treaty restrictions on long-range air-launched and sea-launched targets, or START Treaty restrictions on sea-launched targets. Accordingly, the PEIS should examine in detail treaty compliance of various BMDS tests.
(3) The PEIS discussion of cumulative impacts in Sec. 4.1.4 and Appendix I contains no details about the location, schedule, and specific missiles to be used for the estimated 515 launches from 2004 to 2014. They are essential.
(4) The PEIS should indicate when an environmental analysis of the Aegis BMD system will be done. The earlier EIS relied upon at page D-15 is contains misleading information.
(5) The PEIS should review the testing of future laser weapons systems and specify testing plans for other high-power laser laser weapons and other energy-directed weapons. It does not.
(6) If interceptors armed with nuclear weapons are being considered or missile defenses, as some reports indicate, the PEIS should indicate what research and development work is being planned for such weapons as part of the Advanced Systems in Appendix F.

Please acknowledge that you have received these comments.

Philip A. Fleming

DC_F0006

Program Planning & Integration
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
13155 East West Highway
SSMC-3
Silver Spring, MD 20910

Assistant Administrator

Acting Director, Strategic Planning Office
James H. Butler

TO:	MDA BMDS PEIS c/o ICF CONSULTING	FROM:	RAMONA SCHREIBER
		Tel.:	
FAX:	877-851-5451	Number of Pages. (including cover sheet)	4

MESSAGE:

NOAA COMMENTS ON BMDS PEIS

DC_F0006

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

NOV 17 2004

MDA BMDS PEIS
C/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Project Leader:

Thank you for the opportunity to review the Missile Defense Agency Ballistic Missile Defense System Programmatic Environmental Impact Statement. On behalf of the National Oceanic and Atmospheric Administration (NOAA), provided here are comments developed by NOAA's National Marine Fisheries Service (NOAA Fisheries). NOAA's responsibilities include conservation of resources under the Magnuson-Stevens Act Essential Fish Habitat provisions, Endangered Species Act, and Marine Mammal Conservation Act.

Should you have questions and when you are ready to consult further with NOAA regarding requirements under the above statutes, please contact the NOAA Fisheries Southwest Regional Office at 562-980-4000.

Sincerely,

Ramona Schreiber
For Susan A. Kennedy
Acting NEPA Coordinator

Attachment

Printed on Recycled Paper

DC_F0006

NOAA Fisheries Southwest Region's comments for inclusion in a NOAA response for the Missile Defense Agency's proposed Ballistic Missile Defense System

The Southwest Region, National Marine Fisheries Service (SWR) has reviewed the September 1, 2004, draft Programmatic Environmental Impact Statement (draft PEIS) for the Missile Defense Agency's proposed Ballistic Missile Defense System (BMDS). The purpose of the proposed action is for the Missile Defense Agency to incrementally develop and field a BMDS that layers defenses to intercept ballistic missiles of all ranges in all phases of flight. The BMDS is proposed to be a layered system of defensive weapons that have the potential to impact particular trust resources of NOAA during activities associated with the development, testing, deployment, and planning for decommissioning of the BMDS. This memo letter the SWR's comments on the proposed action under purview of the Essential Fish Habitat (EFH) provisions in the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S. C. 1855, *et. seq.*), and protected resource provisions in the Marine Mammal Protection Act (16 U.S.C. 1361 *et. seq.*), and the Endangered Species Act (16 U.S.C. 1531 *et. seq.*).

<u>Essential Fish Habitat Conservation Recommendations</u>
Pursuant to 16 U.S.C. § 1855(b)(2) of the Magnuson-Stevens Act, Federal agencies are required to consult with the Secretary of Commerce (delegated to NOAA Fisheries) with respect to "any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any essential fish habitat identified under this Act." In addition, the Magnuson-Stevens Act also requires the Secretary of Commerce recommend to the federal action agency particular measures that can be taken by such agency to conserve fish habitat (16 U.S.C. § 1855(b)(4)(A).

This consultation involves the EFH of anadromous and marine species managed by the Pacific Regional Fishery Management Councils within the Exclusive Economic Zone of the United States for the Pacific Salmon Fishery Management Plan (FMP), the Coastal Pelagic Species FMP, the Pacific Groundfish FMP, and the Highly Migratory Species FMP. These species utilize various habitats that include riverine, estuarine, and marine systems and these habitats may be adversely affected by some of the activities associated with the development, testing, deployment and planning for decommissioning of the BMDS. Primarily, the agency is concerned about potential release of hazardous materials (e.g., chemicals, propellants, propellant by-products, launch emissions) that potentially could be released directly and indirectly to the habitat types listed above during various phases of the BMDS. In order to minimize these potential impacts, the SWR advises the following:

1. NOAA Fisheries recommends that the Missile Defense Agency be responsible for handling and disposing of all hazardous materials or hazardous wastes in all phases of the proposed action in accordance with applicable Federal, state, and local laws, utilizing best management practices at all life cycle activities of the proposed action and through appropriate project planning and design measures including appropriate spill prevention, control and contingency plans (e.g., Oil Discharge Prevention and Contingency Plan, Storm Water Pollution Prevention Plan) for each site.

DC_F0006

<u>Endangered Species Act</u>

Based on the information provided in the draft PEIS, NOAA Fisheries recommends that the Missile Defense Agency consult with the appropriate NOAA Fisheries Regional Office to determine if listed species under the Endangered Species Act (ESA) of 1973 as amended (16.U.S.C. 1531 *et. seq.*) may be affected by the proposed project. If it is determined that this project may affect a listed or proposed species, the Missile Defense Agency should request initiation of consultation with NOAA Fisheries pursuant to section 7 of the ESA.

<u>Marine Mammal Protection Act</u>

Whales, dolphins, seals, and sea lions are protected under the Marine Mammal Protection Act (MMPA). Under the MMPA, "take" of a small number of marine mammals is permitted by NOAA Fisheries under an Incidental Harassment Authorization (IHA) when the specified activity is incidental, but not intentional. "Take" is defined as harassing, hunting, capturing, or killing, or attempting to harass, hunt, capture, or kill any marine mammal. "Harassment" is defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal in the wild, or has the potential to disturb a marine mammal in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. Based on the information included in the draft PEIS, the proposed project may cause take of marine mammals under the jurisdiction of NOAA Fisheries. NOAA Fisheries recommends that the Missile Defense Agency consult with the appropriate NOAA Fisheries Regional Office when conducting the site-specific analyses for potential impacts to marine mammals.

DC_PHW0008

Women's International League for Peace and Freedom
United States Section
1213 Race Street, Philadelphia PA 19107-1691
(215) 563-7110 • Fax: (215) 563-5527 • Email: wilpf@wilpf.org
Website: www.wilpf.org

FIRST INTERNATIONAL PRESIDENT
Jane Addams
Nobel Peace Prize 1931

FIRST INTERNATIONAL SECRETARY
Emily Greene Balch
Nobel Peace Prize 1946

U.S. SECTION CO-PRESIDENT
Sandy Silver

EXECUTIVE DIRECTOR
Mary Day Kent

INTERNATIONAL OFFICE
Centre International
1 rue de Varembé
1211 Geneva 20
Switzerland
41-22-919-70-80
41-22-919-70-81 (fax)
info@iprolink.ch
www.wilpf.int.ch

SPONSORS
Julia Alvarez
Elise Boulding
Vinie Burrows
Rep. John Conyers, Jr.
Blanche Wiesen Cook
Frances Farenthold
Dolores Huerta
Yolanda King
Barbara Kingsolver
Elizabeth McAlister
Holly Near
Grace Paley
Suzanne Pharr
Betty Reardon
Sonia Sanchez
Alice Walker

October 19, 2004

Missile Defense Agency BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Friends,

Women's International League for Peace and Freedom (WILPF) submits the following initial comment on the current draft Programmatic Environmental Impact Statement of the Missile Defense Agency.

WILPF is a ninety year old non-governmental organization that has worked tirelessly since its inception to put an end to war. WILPF has supported the development of international institutions and international law, and non-violent methods of conflict resolution that together can facilitate the co-existence of diverse nations and peoples on this planet.

We nope the comments of ourselves, and of others who oppose the militarization of space, will be considered seriously, and that both environmental concerns and concerns for the future of our human race will lead to suspension of this ill-advised and destabilizing missile defense program.

The MDA draft PEIS seeks to answer to detrimental environmental effects of three alternative development plans for Ballistic Missile Defense. We have found the answers disturbingly incomplete. We have also carefully considered all three alternatives presented and have concluded that it would be dangerous – and indeed disastrous -- for the future of our nation to proceed with any of them. It is impossible to comment on all the details in the 701 page document in this short space, but we expect to submit several supplementary comment papers on a few of the many issues of deep concern to us.

First, we are convinced that Alternative 2, which includes development of space based interceptors, is completely unacceptable. We will submit additional comments on both the issue of debris from experiments with space based weapons and on the development of laser weapons. We have other concerns re Alternative 2 that you will perhaps argue are beyond the scope of this PEIS, but that makes them no less important. One is the creation of orbiting debris in space which will remain there

DC_PHW0008

as a threat to future space exploration. The second of these is that space based laser interceptors will be a first step toward the more ambitious program of space weaponization already developed by the Pentagon and the Space Command, and presented in detail in the November, 2003 *U.S. Air Force Transformation Flight Plan*. This is a direction in which no civilized nation should proceed!

We believe that Alternative 1, which does not include space based weapons, and Alternative 3, which is unclear on this point, are also unacceptable, even from a solely environmental viewpoint. We are concerned about the adverse effects in all of the resource areas discussed in the MDA PEIS including hazardous waste, legal restraints, decommissioning of the weapons systems, destruction of the ozone layer, global warming and rocket fuel pollution of our water and river systems. We are preparing supplemental comments on at least some of these concerns.

We also wonder why this expensive and almost certainly unachievable missile defense program has been developed in the first place. It does not answer to probable threats to our national security in the present or in the coming decade. It will do nothing to prevent terrorist attacks, and there is now no hostile country or group with the capability of firing inter-continental ballistic missiles at the United States. Missile defense seems rather to be preparation for future confrontation with the only two countries really capable of threatening our current military domination or challenging us with nuclear attack. Neither of them – China or Russia – is currently an enemy, but this aggressive program may well push them into organizing allies and forces against our own threat of global – and planetary -- domination.

With this in mind, we will submit an additional comment on what we consider to be the only feasible alternative approach to protection of our land and peoples from intercontinental ballistic missiles, from the ravages of nuclear, biological or chemical warfare – or, indeed, from either attacks by small bands of terrorists or from what we have come to call "conventional warfare" (e.g. our own recent "shock and awe" attack on Baghdad).

This Alternative 4 would include a return to the United Nations disarmament treaty process (which the current Administration is regrettably blocking), and assumption of a lead role in the continual development of enforceable and universally applied international law consistent with both the UN Charter and the Universal Declaration of Human Rights. The United States would re-enter that process as the most powerful and most militarized nation in the world and would have no substantial military rivals. This is a rare and critical moment in history and the choice is ours: the United States can lead the way toward a world freed from war with sustainable development and human rights for all – or this nation can drag the human race backward with it into a world ruled by war, military domination and the threat (or use) of weapons more powerful than any known before.

For us in the WILPF there is no question about which route is preferable. We are convinced that continuing with any of these three BMD programs will make the step-by-step process of nuclear disarmament impossible, make war on earth and in space inevitable, and seriously threaten human existence and the entire fragile web of life on our unique and precious planet. We urge all those in the Pentagon, the Missile Defense Agency and in the aerospace corporations to join us in choosing life over death and step-by-step peace building over further destruction of this planet and its fragile web of life.

Sincerely,

Sandy Silver

Sandy Silver, President
United States Section

DC_M0161

Missile Defense Agency
BMDS PEIS
c/o ICF Consulting
1300 Lee Highway
Fairfax, Va 22031

Gentlemen:

I urge that the employment of the untested missile defense system be halted until realistic testing can be completed.

As you know, the Missile Defense Agency is required by law to prepare a Programmatic Environmental Impact Statement to assess the missile defense system's environmental consequences, including national security concerns. The Bush Administration's intention of deploying the system without regard to the PEIS process, and without conducting realistic tests will result in its being ineffective against real attack.

According to expert analysis by the Union of Concerned Scientists, such tests are necessary to determine whether the system will work. It states that the system should be tested at full operational speeds, using components identical to those in the final version of the system, and should be tested against countermeasures such as decoys that could fool or overwhelm the defense. No tests have yet been conducted under these conditions.

In addition, the ADministration's missile defense system lacks a key component: the X-band radar intended to track incoming warheads and help guide the interceptors to their targets.

The present head of the Pentagon's testing office wrote in January 2004 that there were not enough test data to assess the effectiveness of the system planned for deployment. His predecessor recently wrote that the "system to be deployed in 2004 will not have the major elements needed to be operationally effective and would appear to be just for show." The statements of both heads of the testing office were according to reliable information obtained by the Union of Concerned Scientists.

The untested missile defense system has the potential to undermine space security, and is nothing more than a wasteful, and potentially dangerous, political charade, according to the Union of Concerned Scientists.

I respectfully request that you inform me as to what steps you intend to take in this matter in order that I may inform the head office of the Union of Concerned Scientists in Cambridge, Massachusetts.

Sincerely,

Louis S. Campbell
Louis S. Campbell
Member, Union of Concerned Scientists

DC_M0234 **Women's International League for Peace and Freedom**

November 8, 2004

MDA BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Re. NO ACTION Alternative is the only viable option

Dear Sir/Ma'am

In reviewing the three alternatives regarding a Draft Programmatic Environmental Impact Statement for the proposed Ballistic Missile Defense System, we find both Alternative 1 and Alternative 2 to be unacceptable in that if either were implemented, either would generate a new arms race in space, resulting in unimaginable environmental damage, even just from testing of its components, and possible accidents or errors

The NO ACTION alternative is the only acceptable option, but one in which there would be NO FURTHER RESEARCH OR DEVELOPMENT of "Missile Defense" systems or "Space Based Weapons"

The proposed Ballistic Missile Defense System (BMDS) would have unacceptable toxic and damaging environmental impacts at all stages of the project, particularly testing and deployment. Environmental consequences, if the system is ever used, could be severe in locations where impact would occur, and possibly impact neutral countries that were not a part of the nations which were at conflict.

In our view, our government has not made a convincing case that the BMDS is necessary or desirable. We firmly believe there is no credible enemy missile threat that would justify expending the huge cost (scarce materials, energy supplies, brain power, etc.) to create a complex system that in itself is causing environmental damage, and which diverts limited resources away from desperately needed infrastructure building or repair, or provision for a variety of human needs U.S. National Security will be enhanced if those funds are directed to environmental cleanup, a safe energy system that would disconnect our economy from oil dependency, a universal health care plan, public education, jobs, affordable housing, public transportation and the like

So our basic conclusion would be that a NO ACTION alternative, that truly means NO ACTION, cutting off all funding for any further development of BMDS or sub-systems of it.

The recent election has given this administration a vote of confidence for its "moral leadership." Those who plan military activities should take this moral mandate to heart, and plan a truly DEFENSIVE military program

The BMDS is part of a political mindset whose ultimate goal is U.S. supremacy by military might This is not a moral position or policy WILPF and the majority of U.S. citizens strongly oppose this goal The MORAL position would be to have policies that generate cooperation and

DC_M0234

co-existence of all peoples Such a policy of co-existence and cooperation would not destroy our environment by adding further to the ozone destruction with unneeded and resource-wasteful launches (test or actual firings) of a BMDS

The BMDS for which these comments are solicited would create a terrible arms race in space. Other countries may not be as careful as the U.S. in trying not to pollute the environment

Further testing and deployment of this system, whether U.S. or other countries that will be forced to compete with the U.S., would

1) cause further releases of toxic rocket exhaust that is already damaging the ozone. Present rocket launches must be reduced because of this perchlorate and other toxic releases

2) pave the way for use of nuclear reactors in space, a very dangerous precedent, with potentially catastrophic consequences. There have already been accidents of space vehicles whose instruments were powered by RTG's, spreading radiation in our atmosphere and also where crashes to earth have polluted the soil The same risks, only more severe, are inherent in launching nuclear reactors in space This is an unacceptable risk

3) greatly expand the amount of space debris, causing additional hazards for existing communications satellites and interference for future scientific space exploration

We strongly recommend that a United Nations oversight board be constituted that would review all space related activity... worldwide... with advisory AND enforcement capacity. Regulations must be set to curb extravagant uses of space, risky and unwise launches, reduce duplication of space exploration, and to encourage information sharing between countries. This oversight board could help minimize environmental pollution. Knowledge learned could be shared, to reduce the stress on the environment

In summary, we strongly advocate a No Action Alternative, and further request that the PEIS should be re-written to take into consideration the issues raised in this comment

These comments are submitted on behalf of the members of the Tucson Branch of the Women's International League for Peace and Freedom

Sincerely,

Patricia T. Birnie

Patricia Birnie Legislative Chair

DC_M0045

To: Missile Defense Agency November 12, 2004

Concerning: Environmental impact of Space based Missile Defense Systems

I am writing to express my concerns about the environmental impact of the Ballistic Missile Defense System.

At this time we are discovering just how polluting our use of fossil fuels is to our environment: creating global warming with it's multitude of known and unknown effects, and directly affecting the health of humans, as shown in the ever increasing numbers of people with asthma, especially in children.

Now our government plans to deploy even more satellites and space weapons, with more rocket fuel polluting our upper atmosphere. Even if we didn't use the space weapons (which is unlikely), we will change the earth's atmosphere in ways we won't know until it's too late, just by putting it in place and testing. This will affect not only our own country and people, but the whole world.

The cost of this unproven system will deny citizens their needs on earth, including measures to clean up and protect the environment. The expense of this system far outweighs it's (lack of) necessity. If we need money for security, the money should be spent on defense against the new reality of terrorism, which uses underground, low technology violence. Expensive space based defense answers the new violence with cold war thinking and will not protect us. Rather, the use of space based weapons would ultimately be detrimental to all through degradation of the atmosphere and our planet. Such degradation could also make scientific space exploration more difficult because of space "junk".

For all these reasons, I support ending all work on the Missile Defense system. None of the alternatives presented in your Draft Programmatic Environmental Impact Statement includes ending the program. Therefore, I call on you to rewrite and resubmit the PEIS for public comment, including another alternative: ending the Missile Defense System.

Nancy L. Lynch Nancy L. Lynch

This letter overrides my letter of Oct 19, 2004

DC_M0266

Women's International League for Peace and Freedom
United States Section
1213 Race Street, Philadelphia PA 19107-1691
(215) 563-7110 • Fax: (215) 563-5527 • Email: wilpf@wilpf.org
Website: www.wilpf.org

November 15, 2004

Missile Defense Agency BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

The No-Action Alternative

Dear Friends,

This is the second comment submitted by Women's International League for Peace and Freedom on the Missile Defense Agency draft *Programmatic Environmental Impact Statement*. This comment is submitted by the WILPF DISARM: Dismantle the War Economy committee. We are proposing a different text for Alternative 3, or it can be considered as Alternative 4.

The existing text for Alternative 3 is not a NO ACTION alternative. The MDA itself rejects it as an inadequate version of the first two alternatives presented. The present Alternative 3 would include all of the components in Alternatives 1 and 2 and apparently also space-based weapons, but MDA would develop them individually rather than as an integrated system.

WILPF believes a genuine alternative should be presented against which to compare the other two. A summary of proposed Alternative 4 is given here, followed by comments on the environmental impact and wider implications of this approach.

Alternative 4 (revised Alternative 3)

1) Beginning in January 2005 **the current Ballistic Missile Defense Program (BMD) would be suspended immediately and in entirety**, or a moratorium on deployment, research and development would be declared while a thorough investigation of the program occurs.

Congress, the Administration, auditors, scientists, aerospace engineers and the general public would participate in a thorough reconsideration of the costs, workability and desirability of this program in all its aspects.

2) The President of the United States would at the same time announce his intent to **return to the United Nations disarmament treaty process** which the United States has been blocking during the past four years. Of first importance would be reaffirmation of the *Nuclear Weapons Non-Proliferation Treaty* (NPT) and of our intent to keep the 13 promises made at the close of the NPT Treaty Review in 2000.

DC_M0266

In the past four years the present Administration has broken all but two of these promises. Continued pursuit of the BMD treaty will almost certainly result in the collapse of the NPT and in further nuclear weapons proliferation. This would be a tragic loss. The NPT has over the past 34 years resulted in the reduction of nations with nuclear weapons. Seventeen nations have given up their nuclear weapons. By 2002, with Cuba's accession, 188 nations were subject to the NPT's provisions. Only Israel, India and Pakistan, all with nuclear weapons programs, remained outside the treaty. In January 2003 the Democratic Republic of North Korea withdrew from the treaty, arguably in reaction to new, more aggressive U.S. nuclear policies including the BMD program, and our failure to help it solve its energy problems. **The aggressive pursuit of Missile Defense during the past four years and initial deployment, though its components are at present unworkable, is not consistent with support of the NPT.**

The President would, as a matter of greatest urgency, show U.S. support of the NPT in concrete ways. An announcement of the **dismantling of the BMD program** or a moratorium on its development would be a significant first step. A second would be to declare an **end to research and development of new classes of nuclear weapons**, in violation of Article Six of the NPT. Continuance with the BMD program almost certainly ensures a new nuclear arms race, and new era of either cold or hot war.

3) The President would at the same time work with our allies and the United Nations to **bring India, Pakistan, Israel and North Korea into the NPT.** The U.S. would support vigorous international inspections of all known and suspected nuclear weapons programs, including its own, in both nuclear and non-nuclear countries. The U.S. would also assist in the development and application of more adequate treaty enforcement mechanisms. The best alternative to the environmentally unfriendly Missile Defense, to a new nuclear arms race, and to the threat of global war is to move step-by-step toward nuclear weapons abolition as already agreed by the U.S. under the NPT.

4) The President would at the same time **declare an end to the Pre-emptive War Doctrine** put forth in the Nuclear Posture Review and the National Security Strategy, both issued in 2002. This doctrine, coupled with the development of BMD, is viewed as threatening by most non-nuclear nations and by some of the current nuclear weapons powers.

5) The President would at the same time declare the United States' intent to participate in good faith in all other treaties relevant to the control and eventual abolition of nuclear weapons.

Immediate steps would include reaffirmation of the intent to **ratify the Comprehensive Nuclear Test Ban Treaty (CTBT)** which the present Administration has declared against U.S. national interests, even though it was signed with intent to ratify by a previous President. The President should also announce a complete moratorium on preparations for nuclear weapons testing while pushing for Senate ratification of the CTBT. The U.S. should support the new treaty on fissile materials which it has recently blocked after years of work towards it. Many additional steps could be considered and undertaken.

DC_M0266

6) The President would at the same time reaffirm the U.S.'s continued support for other disarmament treaties previously ratified which we have been blocking or undermining during the past four years. This would include enforcement of **the 1967 Treaty on the Peaceful Uses of Space** and cooperation with Canada and other nations to expand it to include a ban on weaponization of space and rules for regulation of corporate development in space.

This reaffirmation would include **the Bio-weapons treaty**, for which the current Administration has rejected international monitoring and inspection. It would include the treaty on Chemical weapons with which there is currently evidence of U.S. compliance. Another argument put forth by the MDA for the BMD is the need to counter missiles carrying biological or chemical warfare agents. A better defense against these weapons of mass destruction would be the dismantling of all chemical and bio-weapons programs, and international monitoring and inspection to ensure continuing compliance with the existing Bio-weapons treaty. In addition, the United States should again contribute to development of international controls on, and eventual elimination of, inter-continental ballistic missiles.

7) The President would, at the same time or immediately after taking the above urgent steps, **reaffirm the entire UN treaty process** designed to promote sustainable economic and social development, human rights and democracy on a global scale. The United States should be a leader in the ratification of treaties ensuring human rights and sustainable development, rather than one of the laggards. Progress in these areas will remove many of the factors contributing to the non-state violence employed by relatively poorly armed rebels against powerful governments or formidable military forces which they perceive to be exploiting and/or oppressing them and their ethnic, religious or ideological groups.

Environmental impact: The detrimental environmental effects of this approach will be far less than those resulting from testing or utilizing the integrated Missile Defense System as outlined in Alternatives One, Two or Three. If the BMD system is suspended, the major detrimental effects would occur in the dismantling process. Even this process, however, would have far less impact than would dismantling the system after three or more decades of development. It would also have far less detrimental environmental impact than if BMD development triggers a new nuclear arms race or results in the actual use of nuclear, biological or chemical weapons. Indeed, laying down the BMD program would release funds and scientific expertise that could be turned to resolving he other great environmental problems now threatening the planet and its peoples.

Proponents of Ballistic Missile Defense should not be concerned that dismantling the BMD system would leave the United States more vulnerable to attack. The United States would be re-entering the United Nations treaty process in a position of unsurpassed military strength. The U.S. already possesses the most powerful military system in the history of the world, arguably more powerful than those of all other nation states combined. If a strong military gives security, then the United States should be the most secure nation on earth.

When the United States begins to lead the way in the UN disarmament treaty process it will not be engaging in unilateral disarmament, but rather joining other nations in a step-by-step

DC_M0266

process away from the horrors of war. The U.S. would not re-enter the treaty process in any greater danger than it can expect during the next decade while seeking to develop a Ballistic Missile Defense system. For that system – even if it eventually "works"--does nothing to protect against non-state violence, and the U.S. has no enemies at present among the nations capable of striking its territories with ICBMs. The continued development of this exorbitantly expensive BMD system that may never work raises tensions, creates enemies and makes both nuclear and conventional war on a global scale more, rather than less, likely to occur.

The United States would not put itself in any greater danger than at present, but would shift emphasis, choosing to work for the continuance of human life on earth, with liberty and justice for all, rather than blatantly risking humanity's final destruction in its search for global and planetary domination. There would be many challenges and difficulties along the way, but the choice is between the way of life and the way of death and destruction.

Let us choose the way of life.

In peace,

Ellen Barfield

Ellen Barfield, co-Chair

Carol Urner

Carol Urner, co-Chair

DISARM: Dismantle the War Economy Campaign
U.S Section, Women's International League for Peace and Freedom

DC_M0267

Women's International League for Peace and Freedom
United States Section
1213 Race Street, Philadelphia PA 19107-1691
(215) 563-7110 • Fax: (215) 563-5527 • Email: wilpf@wilpf.org
Website: www.wilpf.org

November 15, 2004

Missile Defense Agency BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Space-Based Interceptors

Dear Friends,

This is the third comment submitted by Women's International League for Peace and Freedom (WILPF) to the Missile Defense Agency regarding its draft Programmatic Environmental Impact Statement (PEIS). This comment is submitted by the WILPF *DISARM: Dismantle the War Economy Campaign.*

We are commenting briefly on the unacceptability, from an environmental standpoint, of space-based interceptors as proposed in both ALTERNATIVE 2 and ALTERNATIVE 3 (the so called NO ACTION ALTERNATIVE) in the draft PEIS. We see serious environmental threats from orbital debris, from development and testing of laser and kinetic kill weapons, from the possible use of nuclear power in space, and from the further development of weapons in space technology that can also be used against satellites and targets on earth.

Orbital debris: Testing and deployment of space-based interceptors can significantly increase space debris, endangering other objects in space, in the air and on land. We agree with the commentators from the Center for Defense Information that the PEIS does not answer sufficiently to these problems and dangers. We suspect the detrimental environmental effects are great enough in themselves to warrant cancellation of this portion of the program.

Laser and kinetic kill weapons: The PEIS does not really deal with the detrimental environmental effects that will result from the process of developing, testing and deploying laser and kinetic kill weapons. Yet, these weapons are integral to the entire program. We understand there are still many problems to be solved if these science fiction fantasies are to be translated into reality. These problems and the dangers posed to the environment should be included in the PEIS. We suspect that they are great enough to warrant cancellation of the space weapons program.

Nuclear power in space: It is posited that the space platforms may include as many as twenty (or even more) satellites in a constellation, kept in space for years with their

DC_M0267

own power system. What is that power system? We know that nuclear power has been considered, which we believe would carry us in a very dangerous direction. Possible power systems and their negative effects on the environment must also be realistically examined. We believe nuclear power in space would be an unacceptable alternative.

Weapons in space: The PEIS considers, albeit inadequately, only the question of space based interceptors as part of the missile defense program. It is clear, however, from documents like the *Air Force Transformation Flight Plan*, that the Pentagon intends to use this same laser and kinetic kill technology for both offensive and defensive attacks on satellites of other nations and for offensive and defensive destruction of targets on earth. Other weapons not suitable for missile interception, like the so-called "Rods from God," are also being planned. All of this is in clear violation of the intent of the 1967 treaty on the Peaceful Uses of Space, and it is a direction in which no civilized nation should proceed.

Why is our military moving to weaponize Space at a time when there is more hope than ever before in history of realizing the visions set forth in the American Constitution, the European Union, the United Nations Charter and the Universal Declaration of Human Rights? Other nations do not welcome United States plans for unassailable superiority in space and for global and planetary domination. We are actually forcing other governments - like those in the European Union, China, India, Russia and Brazil – to cut back on their social programs in order to develop their own military space programs in self-defense. Why must we threaten all the cooperative international institutions that nations have built together, with so much difficulty, over the past sixty years and force the world's peoples back on the road to global war?

We are women with a deep love for this planet and its peoples. We know well the horrors of war and we know that women and children suffer those horrors in full measure. It is for the sake of our sisters and their children around the globe, and for the sake of men as well, that our organization has worked for ninety years to develop alternatives to war. We have striven tirelessly for international institutions like the United Nations and the World Court, for international law, for conflict management and prevention, and for the meeting of basic human needs. We continue to have faith – based upon experience --that the nations and peoples on this planet, working together, can develop a world free of war with liberty and justice for all. We do not want our own nation, which has in the past contributed so much to the growth of democracy and human rights in the world, to now lead our human race into the untold horrors of Armageddon.

We urge abandonment of concepts like space weapons and war in space as well as suspension of the entire Missile Defense System. The immediate threats to the environment are reason enough to lay down the program. The threats to the planet and its peoples, if the war fighters ever get the battles for which they plan, are beyond contemplation.

In peace,
Ellen Barfield
Ellen Barfield, Co-chair
Carol Urner
Carol Urner, co-Chair

DISARM: Dismantle the War Economy Campaign
U.S. Section, Women's International League for Peace and Freedom

DC_M0268

Women's International League for Peace and Freedom
United States Section
1213 Race Street, Philadelphia PA 19107-1691
(215) 563-7110 • Fax: (215) 563-5527 • Email: wilpf@wilpf.org
Website: www.wilpf.org

FIRST INTERNATIONAL PRESIDENT
Jane Addams
Nobel Peace Prize 1931

FIRST INTERNATIONAL SECRETARY
Emily Greene Balch
Nobel Peace Prize 1946

U.S. SECTION PRESIDENT
Sandy Silver

EXECUTIVE DIRECTOR
Mary Day Kent

INTERNATIONAL OFFICE
Centre International
1 rue de Varembé
1211 Geneva 20
Switzerland
41-22-919-70-80
41-22-919-70-81 (fax)
info@wilpf.ch
www.wilpf.int.ch

SPONSORS
Julia Alvarez
Elise Boulding
Vinie Burrows
Rep. John Conyers, Jr.
Blanche Wiesen Cook
Frances Farenthold
Dolores Huerta
Yolanda King
Elizabeth McAlister
Holly Near
Grace Paley
Suzanne Pharr
Betty Reardon
Sonia Sanchez
Alice Walker

November 15, 2004

Missile Defense Agency BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Hazardous Waste

Dear Friends,

This is the fourth comment by Women's International League for Peace and Freedom (WILPF) on the Missile Defense Agency (MDA) Programmatic Environmental Impact Statement (PEIS). It is submitted by members of the DISARM: Dismantle the War Economy Campaign. It concerns the detrimental environmental impact of hazardous waste from various aspects of the Ballistic Missile Defense (BMD) program.

Acid rain: The MDA itself notes in the PEIS the possibility of acid rain caused by rocket launches: *In biomes where rain is a frequent occurrence, launches with solid boosters have an increased likelihood of contributing to acid rain, thereby increasing the amount of HCl deposited in regional surface waters. In areas with low velocity of surface and groundwater movement and relatively shallow ground water table it is possible that deposition of acidic water may impact water resources. The potential for and extent of impact would need to be examined in site-specific environmental analysis. (item 4-60)*

The MDA knows at present from where ground based interceptors will be launched, and site specific studies should be absolutely required in the PEIS.

Ammonium Perchlorate: This toxic rocket fuel additive is already a dangerous pollutant in California and the southwest. Across the United States some 20,000,000 people already have their drinking water contaminated by perchlorate. Further poisoning of the ground water and rivers from perchlorate is simply unacceptable. We must not further endanger the health and lives of people the BMD system claims to protect. We need to find ways to preserve the health of our people and our environmental systems, and not contribute further to their destruction.

Other hazardous waste: The MDA promises to dispose properly of hazardous materials from activation of laser weapons, such as chemical simulants, laser chemicals, asbestos, lead based paint, polychlorinated biphenyls, radon gas. However past experience tells us that military test sites are frequently left polluted and with ecosystems and surrounding communities endangered.

DC_M0268

When it comes time for decommissioning the military often finds it does not have the technology, or the funds required, to clean up damaged sites. This has certainly been true of other complex systems, like those involving chemical and nuclear weapons. In those cases there is still uncertainty about how to safely destroy or store decommissioned weapons and the associated toxic wastes. MDA needs to address these questions satisfactorily in advance. We suspect they are not addressed because costs involved would be prohibitive and in some cases the technology for disposal does not exist.

Hazards of use: Completely missing in this PEIS is an analysis of the hazards of use if the BMD system is ever employed. This is not a benign system, and possible hazards should be investigated. What would be the effect of a successful intercept over the Pacific Ocean or seconds after firing by another nation? What would be the extent of nuclear fall-out or the expectations of damage from an explosion of the incoming weapon? What would be the environmental effect of a successful intercept of a nuclear weapon over the United States, resulting in a high altitude nuclear explosion? Could electrical and communications systems across the US be destroyed? Could satellites be destroyed? Is it possible that the use of these interceptors to protect U.S. citizens could actually result in unintended destruction? Might other non-U.S. territories, in the path of the weapons, be harmed by interceptions and nuclear explosions above their areas or by debris falling onto their territory? What will be the possible effects on people and the environment on earth below if MDA war fighters actually use their weapons in space or in the skies?

Effect of hazardous and toxic waste on minority communities: As an organization we have a strong concern for human rights and racial justice. We note that the Environmental Impact Assessment requires consideration of undue negative impact on minority communities. It is our understanding that the test sites are mainly on Indian lands or on lands belonging to Marshall Islanders. The statement in the PEIS that *"Environmental justice analyses require information about local communities, and therefore will be analyzed in site specific environmental documentation."* is hardly adequate. We know what damage has been done to such communities already by bombing ranges (as in Puerto Rico) or nuclear weapons testing (as in the South Pacific and on Indian lands in the U.S. southwest). Such an analysis should have been made before the deployment and testing began. The program should be halted until thorough analysis is made, and it should not continue if there is evidence of detrimental effect on these populations and their environment.

We have been able to list only a few of our many concerns about this Draft PEIS, and to discuss them only briefly in our four comment papers.

We are convinced, however, that there are far too many questions for this program to be allowed to proceed. Not only is there a vast array of concerns regarding its adverse effects on the environment, there is also the overriding concern that pursuit of a Ballistic Missile Defense System will destroy all hopes of halting nuclear weapons proliferation and all hopes of continuing to develop as a world community of sovereign nations ruled by law. This system is being designed in a time of peace for global war – and its very existence can make that war inevitable.

DC_M0268

We believe that the BMD program should be immediately halted or, at the very least, a moratorium should be declared and a period of full examination of the system, its costs, and its dangers occur. The consequences are too great, the dangers too dire, to let development continue as at present.

In peace,

Ellen Barfield

Ellen Barfield, co-Chair

Carol Urner

Carol Urner, co-Chair

DISARM: Dismantle the War Economy Campaign
U.S. Section, Women's International League for Peace and Freedom

DC_M0274

BARBARA CARTWRIGHT

November 16, 2004

MDA BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

To whom it may concern,

I am alarmed that the Missile Defense Agency has authorized itself to continue research on Star Wars. I am opposed to any further development of a Star Wars program and strongly believe that such moneys would best be used on programs to improve the nation's health care, the nation's environmental problems, and to broaden educational opportunities for all Americans.

I believe the "no action alternative" is an insufficient brake to further Star Wars developments. I strongly urge a intensive rewriting of PEIS

Sincerely, Barbara Cartwright

Barbara Cartwright

DC_M0275

United States Department of the Interior
OFFICE OF THE SECRETARY
Washington, DC 20240

TAKE PRIDE IN AMERICA

NOV 18 2004

ER 04/701

MDA BMDS PEIS
C/O ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Ladies/Gentlemen:

The United States Department of the Interior has reviewed the Department of the Defense, Missile Defense Agency's (MDA) draft programmatic environmental impact statement (DPEIS) for the Ballistic Missile Defense System (BMDS) and offers the following comments.

Air Quality and Pollution

The Department's National Park Service (NPS) commends the MDA for recognizing that review requirements under the National Environmental Policy Act (NEPA) are not the same as those involving conformity and its willingness to comply with both NEPA and the conformity regulations. The Department also commends the MDA for examining potential impacts on air quality, including its recognition of visibility as an important issue, and looks forward to future reports that include an examination of visibility impacts.

Section 3.1.3 Biological Resources

Pages 3-16 to 3-17: The portion titled "Definition and Description" emphasizes consideration of Federal and State listed species, or species proposed for listing. However, NEPA requires that other species that may be impacted by the proposed activity must also be evaluated throughout the DPEIS. See also page 4-42, subportion "Launch/Flight Activities," where impacts to only species of concern are addressed. We recommend that the DPEIS address all applicable species

Pages 3-17 to 3-18: In the portion titled "Impact Assessment," we recommend the following text be inserted to address requirements in the referenced laws:

> If the proponent of the proposed activity determines that migratory bird species may be adversely impacted, then the proponent should confer with the Department's Fish and Wildlife Service's (FWS) Regional Migratory Bird Program to ensure

DC_M0275

> compliance with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act, where applicable. Under the MBTA, the taking of migratory birds is not authorized without a permit. The project proponent should also confer with the Service to determine if conservation measures may be implemented to minimize or avoid take of migratory birds.

Page 3-19. In the subportion "Determination of Significance," we recommend that reference to the MBTA be incorporated. We also recommend that the final PEIS indicate that military readiness activities implemented in the future by the MDA should be in compliance with the rule currently being finalized by the Service, "Migratory Bird Permits: Take of Migratory Birds by DoD."

Section 3.1.9 Land Use

Page 3-31: In the portion titled "Impact assessment," we suggest referencing the Service National Wildlife Refuges.

Section 4.1.1.1 Weapons – Lasers

Page 4-26: In the portion titled "Biological Resources," under the subportion "Land and Sea Operating Environments," we recommend adding text that indicates that hydrochloric acid could have an effect on shorebirds and waterbirds (in addition to waterfowl, which are already referenced).

Page 4-27: In the last paragraph under the subportion referenced above, we recommend that the text specify the maximum noise level, if available, for which animals "generally return to normal activities within a short time following noise disturbance." Most wildlife has a limited tolerance to noise. We recommend specifying the threshold at which this tolerance level would generally be exceeded and when adverse effects may occur. See also page 4-43 where impacts to birds from noise disturbance are discussed in greater detail. These two sections should be in agreement with each other. The statement on page 4-27 is not in concurrence with the discussions on page 4-43, which indicate there may be more than minor disturbances

Section 4.1.1.3 Sensors – Radars

Page 4-64 to 4-65: We believe the analysis of impacts on birds from radar in the "Biological Resources" portion is outdated and inadequate. The first paragraph of this portion does not address the potential effects of radar on very large flocks of migrating birds. Even if a bird is not "within the most intense area of the beam for any considerable length of time," there is insufficient evidence to support the statement that no significant adverse impacts to birds would occur. The 1993 report that is referenced to support this conclusion is outdated.

We recommend the analysis describe what constitutes a "relatively small" beam size. A beam going through a dense flock could have an adverse effect on birds, particularly for those species which are already significantly in decline. We recommend that this potential adverse effect be described.

We recommend that this section discuss the potential of using NEXRAD (Next Generation Weather Radar) to help evaluate when large flocks may be in the testing area. NEXRAD could provide valuable information regarding times when testing should not occur to reduce biological impacts. This technology is currently being used by the Air Force to reduce the potential for air strikes and by the Department of Defense to identify important stopover habitat in relation to Department of Defense installations.

We recommend that an avian physiologist, particularly one very knowledgeable of electromagnetic radiation, carefully review the effects of this proposed activity.

In reference to the Cobra Dane study, it should be noted in the DPEIS that arctic foxes, which are very efficient predators, are present on Shemya and other Aleutian Islands, and would quickly remove evidence of any bird kills. Lack of evidence of bird die-offs under these conditions does not provide solid evidence that they aren't occurring.

Bird collisions with radar equipment, particularly towers, can have significant impacts on birds. Estimated annual bird kills from collisions with communication towers (radio, television, cellular, and microwave) range from four- to five-million, both from direct collisions with the towers themselves and with guy wires. Tall radar towers, i.e., those above 199 feet MSL (mean sea level), are of particular concern. The greatest impact occurring from towers illuminated at night with solid or pulsating incandescent red lights. In addition, the potential for tower collisions significantly increases at night under cloudy or otherwise low visibility conditions.

Because of these impacts, the MDA should follow the FWS's "Interim Guidelines For Recommendations On Communications Tower Siting, Construction, Operation, and Decommissioning - 2000," for both existing and proposed radar towers. These guidelines should be referenced in the DPEIS as applying to radar equipment. They also should be applied to Re-Radiation Towers discussed in the second paragraph on page 4-77.

Section 4.1.1.5 Sensors - Laser Sensors

Page 4-73: Under the portion titled "Biological Resources," we have similar concerns for potential impacts on migratory birds from laser sensors as those stated above for radar equipment. This is particularly true for the use of land and sea-based lasers and in situations where large flocks may be present. Although the lasers may not directly hit birds or other wildlife on the ground, impacts to birds in the air could be significant. We recommend that these potential impacts be described.

Regarding the Nominal Ocular Hazard Distance, the DPEIS concludes that impacts to wildlife from a space-based laser sensor would be insignificant because it is unlikely that the laser would be directed towards the Earth's surface and, if it were, distortion from atmospheric conditions would reduce the radiance level. It further concludes that the Earth's surface would likely be beyond the Nominal Ocular Hazard Distance. This conclusion is not well supported. We recommend that the DPEIS identify how "likely" it is that the Earth's surface would not be beyond this specified distance.

Section 4.1.1.9 Support Assets - Infrastructure

Page 4-89 to 4-90: In reference to the first paragraph under "Biological Resources," we note that the construction of infrastructure, depending upon its extent, can significantly increase surface runoff. This can negatively impact surrounding habitats, particularly wetlands and other sensitive habitats. Impacts to fish, wildlife, and plants from pollutants could be more than temporary depending upon the pollutant and length of exposure. Depending upon the species in the project area, construction could have a larger area of disturbance than 50-feet, particularly for nesting bird species. We recommend that this section describe these possible impacts.

We recommend that the second paragraph indicate that site preparation and installation could negatively impact waterbirds utilizing the shore environment, particularly during breeding season.

In the third paragraph, we recommend that the description of behavioral responses to construction include nest abandonment and alteration of migration routes of larger mammals.

We recommend that the fifth paragraph list compliance with the Marine Mammal Protection Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act as required, where applicable. These regulatory references should also be inserted in the portion titled "Biological Resources" under Section 4.1.1.10 Support Assets - Test Assets.

Section 4.1.2.3 Biological Resources

Page 4-105: Under "Integrated Ground Tests," we believe that the conclusion of insignificant impacts is not sufficiently justified or supported. This section lacks information regarding the size and orientation of the operating radar sensors. It also does not describe the anticipated increased number of these operating radar sensors.

Section 4.4 Adverse Environmental Effects That Cannot Be Avoided

Page 4-133: As stated above, we believe that statements of no significant impact are not sufficiently justified or supported. This section indicates Best Management Practices would be implemented to mitigate adverse effects. However, the DPEIS does not provide sufficient information regarding what these measures might be or what would be recommended. In addition, the conclusion that "those [effects] that could not be avoided should not result in a significant impact to the environment" could be viewed as arbitrary since those effects are insufficiently described.

Appendix H Biome Descriptions

Page H-106: We suggest expanding the discussion of "environmentally sensitive habitat" for the savanna biome. Currently, the discussion consists only of the following two sentences: "National parks and reserves have been established to preserve and protect threatened vegetative

and wildlife species in the Savanna Biome. There are several National Wildlife Refuges along the Gulf Coast."

Technical Comments and Suggested Corrections:

Appendix G Applicable Legal Requirements

Page G-10:

- Under the heading United States, in the first line and after the phrase "The Endangered Species Act of 1973" add, "as amended."
- After the phrase "requires all Federal," delete "departments and" so the line reads "requires all Federal agencies to seek."
- In the second line, delete the word "species" after "endangered."
- In the third line, after the phrase "The Secretary of the Interior was directed," insert "by the Endangered Species Act."
- In the fourth line, after the phrase "Endangered species" replace "designation" with "listing."
- In the second paragraph, last line, delete "an adequate" and insert "integrated"; delete the phrase "in place at the sites" and replace it with "determined to be of benefit to the species", so the line reads … "from critical habitat designations if an integrated natural resource management plan is determined to be of benefit to the species."

Appendix H Biome Descriptions

Page H-7:

- The scientific name of the northern sea otter is *Enhydra lutris*, not *Eumetopias jubatus*.

Page H-39:

- In a discussion of the deciduous forest biome in the northeastern States, red spruce and balsam fir forest types are listed. We note that spruce and fir are evergreen conifers, and forests dominated by them are not generally considered components of a deciduous forest biome. We also note that the preceding description of the taiga biome on pages H-16 through H-29 does not refer to balsam fir, its most prevalent tree species.
- Tropical and subtropical moist broadleaf forests are described as components of the biome; as the text notes, these forests are "dominated by semi-evergreen and evergreen tree species" and thus may be out of place in discussion of a deciduous forest biome.

- A list of examples of "threatened and endangered vegetation [sic]" in this biome includes three species from the eastern and southern U.S. and a species of moss endemic to evergreen (not deciduous) forest on the island of Madeira, which may not be the best grouping of examples to illustrate listed species in the "inland deciduous forest biome."

Page H-40:

- The discussion of wildlife of the deciduous forest biome indicates that the Florida panther "…inhabit[s] the lower coastal plains and flatlands of the middle portion of this biome." The Florida panther is found only in peninsular Florida, which would not be considered the middle portion of this biome. We suggest making this clear or deleting reference to the Florida panther is this statement.

Page H-41:

- A list of threatened and endangered wildlife includes the American black bear as if it were listed range wide; however, it is the Louisiana subspecies (*Ursus americanus luteolus*) that is actually listed as Federally threatened. *Ursus americanus* is listed as threatened due to "similarity of appearance (T (S/A))" throughout the historic range of the Louisiana black bear, which includes Louisiana, Texas, and Mississippi and is, therefore, subject to a special rule as outlined in 50 CFR 17.40(i). The black bear is not federally listed throughout the remainder of its range.
- The species *Achatinella mustelina* is attributed to hammocks in the Everglades; however, it is a snail endemic to tropical evergreen forests in Hawaii.
- The West Indian manatee is incorrectly given the scientific name of an African species (*Trichechus senegalensis*). It is correctly identified as *Trichechus manatus* in Exhibit H-6 on page H-42.

Page H-42:

- The scientific name of the leatherback sea turtle is *Dermochelys coriacea*, the DPEIS incorrectly identifies its scientific name as *Ammospiza caudacuta*.

Page H-43:

- Gorillas are incorrectly listed as inhabitants of East Asian tropical and subtropical moist forest.

Page H-90:

- *Ostrya virginiana* is given as the scientific name of the ironwood introduced on Pacific islands. However, this is a species of eastern North America; it is likely the author had in mind a species of *Casuarina*, also commonly known as ironwood.

DC_M0275

Page H-93:

- *Esox lucius*, the northern pike, is attributed to offshore areas near the Pacific Missile Range on Kauai; however, this species is not found in the waters around the Hawaiian Islands. It is likely the author had a different species in mind.

Page H-104:

- In a discussion of the savanna biome, the harpy eagle is listed as one of its "common bird species." However, this eagle is an extremely rare bird of deep forest habitats.

We appreciate the opportunity to provide these comments. Should you have any questions please do not hesitate to c... V...

Sincerely,

Willie R. Taylor
Director
Office of Environmental
Policy and Compliance

DC_M0276

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

November 17, 2004

Missile Defense Agency
Ballistic Missile Defense System PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Mr. Lehner:

In accordance with our responsibilities under Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the Environmental Protection Agency (EPA) has reviewed the Missile Defense Agency's (MDA) Ballistic Missile Defense System (BMDS) Draft Programmatic Environmental Impact Statement (DPEIS) (CEQ # 040438).

The DPEIS identifies, evaluates and documents, at the programmatic level, the potential environmental impacts of activities associated with the development, testing, deployment, and planning for the eventual decommissioning of the BMDS. It considers the current technology components, support assets, and programs that make up the proposed BMDS as well as the development and application of new technologies.

EPA commends the efforts that MDA has commenced in producing such a comprehensive and well organized document. We also appreciate your efforts in utilizing the extensive environmental analysis that is available for many of the existing components of the proposed BMDS. Based on our review of the DPEIS, we have rated the document as LO - Lack of Objections (see attached "Summary of EPA Rating System"). Although EPA has no objections to the proposed action, there are a few issues that should be clarified.

DC_M0276

1) General Comments:

a. To assess the impacts of implementing the proposed BMDS, the DPEIS characterized the existing condition of the affected environment in the locations where various BMDS implementation activities are proposed to occur. MDA has determined that activities associated with the proposed BMDS might occur in locations around the world. Therefore, the affected environment has been considered in terms of global biomes, broad ocean areas, and the atmosphere. This has resulted in the DPEIS being very conceptual and general in nature. EPA understands that once potential BMDS locations are determined, more detailed site-specific documents will be prepared. Through the discussions on the "block approach" or the "block development process", the DPEIS has given clear indications of when follow-on NEPA analysis will occur. We agree with this approach. However, while the documents give representative examples of past, current, or proposed locations where proposed activities may occur within each biome, EPA recommends that the EIS discuss the criteria that MDA will use in making future decisions for site-specific locations.

b. The resource areas considered in this analysis are those resources that MDA believes can potentially be affected by implementing the proposed BMDS. EPA agrees that some resource areas are site-specific or local in nature and, therefore, cannot be effectively analyzed in this type of programmatic document and that the potential impacts on these resources are more appropriately discussed in subsequent site-specific documentation tiered from this PEIS. However, EPA recommends that the final document discuss the existence of multiple species habitat conservation planning efforts that are proximate to DoD lands and the potential impacts of debris on marine and aquatic ecosystems.

c. As suggested by CEQ regulations, MDA has taken advantage of the extensive environmental analyses that already exist for many of the existing components of the proposed BMDS by incorporating these materials into the DPEIS by reference. However, some of these documents are greater than 10 years old. The PEIS should confirm the validity of the information in these documents.

2) Perchlorate Comment: Because there have been differing interpretations of the science associated with the impact on human health from low level exposure to perchlorate and in the interest of resolving scientific questions, EPA, the Department of Defense, the Department of Energy, and the National Aeronautics and Space Administration - members of a broader Interagency Working Group on Perchlorate led by the Office of Science and Technology Policy - have referred scientific issues and EPA's 2002 Draft Health Assessment on Perchlorate to the National Academy of Science (NAS) for review. NAS is currently conducting a study to determine the best science and model to use for determining the health impacts and standards for perchlorate. A report on this study is expected to be completed by the end of 2004. EPA recommends that the results of the report be incorporated into the FPEIS.

DC_M0276

We appreciate the opportunity to review this DPEIS. We also look forward to reviewing the FPEIS related to this project. The staff contact for the review is '
can

Sincerely,

for

Anne Norton Miller
Director
Office of Federal Activities

Enclosure: Summary of Rating Definitions

DC_M0276

SUMMARY OF EPA RATING SYSTEM

Rating the Environmental Impact of the Action

- **LO (Lack of Objections)** The review has not identified any potential environmental impacts requiring substantive changes to the preferred alternative. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposed action.
- **EC (Environmental Concerns)** The review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact.
- **EO (Environmental Objections)** The review has identified significant environmental impacts that should be avoided in order to adequately protect the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). The basis for environmental objections can include situations:
    1. *Where an action might violate or be inconsistent with achievement or maintenance of a national environmental standard;*
    2. *Where the Federal agency violates its own substantive environmental requirements that relate to EPA's areas of jurisdiction or expertise;*
    3. *Where there is a violation of an EPA policy declaration;*
    4. *Where there are no applicable standards or where applicable standards will not be violated but there is potential for significant environmental degradation that could be corrected by project modification or other feasible alternatives; or*
    5. *Where proceeding with the proposed action would set a precedent for future actions that collectively could result in significant environmental impacts.*
- **EU (Environmentally Unsatisfactory)** The review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposed action must not proceed as proposed. The basis for an environmentally unsatisfactory determination consists of identification of environmentally objectionable impacts as defined above and one or more of the following conditions:
    1. *The potential violation of or inconsistency with a national environmental standard is substantive and/or will occur on a long-term basis;*
    2. *There are no applicable standards but the severity, duration, or geographical scope of the impacts associated with the proposed action warrant special attention; or*
    3. *The potential environmental impacts resulting from the proposed action are of national importance because of the threat to national environmental resources or to environmental policies.*

Adequacy of the Impact Statement

- **Category 1 (Adequate)** The draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.
- **Category 2 (Insufficient Information)** The draft EIS does not contain sufficient information to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the proposal. The identified additional information, data, analyses, or discussion should be included in the final EIS.
- **Category 3 (Inadequate)** The draft EIS does not adequately assess the potentially significant environmental impacts of the proposal, or the reviewer has identified new, reasonably available, alternatives, that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. The identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. This rating indicates EPA's belief that the draft EIS does not meet the purposes of NEPA and/or the Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS.

DC_M0924

DC_M7806

October 15, 2004

Rick Lehner
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Mr. Rick Lehner,

I am writing today to support the "No Action" alternative to deploying a missile defense system. The United States should not deploy a missile defense system unless it will improve the overall ecological, political, and security environment. On all three grounds, the proposed system fails.

Deployment of the Bush administration's proposed missile defense system threatens the global environment. It will increase the likelihood of a nuclear catastrophe by impelling Russia to maintain a larger nuclear arsenal on high alert than it otherwise would, and by driving China to build and deploy a larger arsenal than it otherwise would. The impact of a nuclear war, either accidental or intentional, would dwarf any other environmental nightmare scenario one can envision.

Moreover, the system does nothing to improve our security environment. It has yet to be tested in realistic conditions and would be ineffective against a real attack.

Deployment should be halted until the Programmatic Environmental Impact Statement is finished and the system succeeds in realistic testing.

It is also my understanding that the deployment is being made without the radar system because it is faulty. How, might I ask will a missile be guided?

Sincerely,

James Roberts

DC_M7903

October 14, 2004

Rick Lehner
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Mr. Rick Lehner,

I am writing today to support the "No Action" alternative to deploying a missile defense system. My perspective is that of a long time resident of Interior Alaska familiar with the Fort Greely area where one of the missle sites is currently under development. Unfortunately, the selection of this site was not adequately evaluated in relation to the environmental sensitivity of this area. Inadequate consideration was given to the fact that the site sits on top of the flowage of a unique aquifer that flows through the glacial outwash gravels from the Alaska Range mountains to the south, under Fort Greely, and emerges as springs that feed the Delta Clearwater River and lake system. Because of the upwelling water of the Delta Clearwater system it is one of the most productive salmon spawning complex and young salmon rearing area on the entire Yukon-Tanana River system. Any significant leakage or spill of contaminants, inclusive of fuels, and radioactively contaminated water or other materials would have the potential for devastation to both the commercial and subsistence fisheries of the Yukon River aned Bering Sea through direct affects on the fish, as well as the thousands of people dependent upon the fish for their nutrition, health, and economy. Additional studies need to be done to assess this potential threat to the Alaskan environment and its people and to assess the possible need for mitigative planning, spill contigency development, and testing for background leakage levels from the post World War II use of Fort Greely as a biological and chemical warfare testing site. The United States should not deploy a missile defense system unless it will improve the overall ecological, political, and security environment. On all three grounds, the proposed system fails.

Deployment of the Bush administration's proposed missile defense system threatens the global environment. It will increase the likelihood of a nuclear catastrophe by impelling Russia to maintain a larger nuclear arsenal on high alert than it otherwise would, and by driving China to build and deploy a larger arsenal than it otherwise would. The impact of a nuclear war, either accidental or intentional, would dwarf any other environmental nightmare scenario one can envision.

Moreover, the system does nothing to improve our security environment. It has yet to be tested in realistic conditions and would be ineffective against a real attack.

Any decision for deployment should be delayed, at least until the Programmatic Environmental Impact Statement is finished and the system testing is completed.

Sincerely,

DC_O0002

Missile Defense Agency
BMDS PEIS
Comment Form

Name: Angy Chambers (POC)
Organization: 45 CES/CEV

Address1:
Address2:

Comments:

From 45 SW/JA (Capt. Elizabeth Patrolia),

Pages 4-84 and 4-90 -The sentence reads, " Should the impacts affect a threatened or an endangered species or its habitat, essential fish habitat, jurisdictional wetlands, or another regulated resource then in addition to analysis under NEPA and other applicable laws (Clean Water Act, Endangered Species Act), regulatory agency consultation would be required."

Although this is a true statement, we believe it can be phrased more concisely. The language as written suggests that section 7 consultation under the Endangered Species act will be obtained when and if during the course of our actions we impact a threatened or endangered species. 50 C.F.R. 402.10 (a) states, "...The conference is designed to assist the Federal agency and any applicant in identifying and resolving potential conflicts at an early stage in the planning process."

This statement in the code leads us to the conclusion that we should attempt to consult prior to adverse affects on endangered species when known in advance. We suggest adding this additional sentence to follow what was quoted in the first paragraph, "The appropriate federal agency must be consulted under section 7 of the Endangered Species Act when site specific analysis indicates the continued existence of a threatened or endangered species is likely to be jeopardized."

From Brian Barfus (Environmental Support Contract),

CCAFS has tremendous infrastructure to support this project and many organizations to provide various environmental services such as hazardous waste disposal for such a project. It is not possible to predict the impacts on this facility until we get a better idea as to what activities will take place at CCAFS. Will there be any new facilities constructed? Can present organizations provide the required services to support the new activities and associated support facilities for this project? We need this kind of information to properly evaluate the environmental impacts of this project at CCAFS.

From Angy Chambers (45 CES/CEV),

No comments at this time. Further documentation would be required in order to assess impacts to natural/cultural resources at Cape Canaveral AFS.

1

DC_O0002

Submit comment form via mail to:
MDA BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Submit comment form via fax to:
MDA BMDS PEIS
1 (877) 851-5451 (toll-free)

2

DC_PHO0007

Good evening everyone. Thank you for the opportunity to have citizens' comments. I think we've said that the environment is much broader than what this statement calls for. The environment is a social and cultural environment that we need to take into consideration as we consider building such a new and costly provocative system.

The National Intelligence Estimate of 2001 for the Bush Administration says, and I quote, An attack on U.S. territories is more likely to be -- we are more likely to be attacked by countries or terrorists by using ships, trucks, airplanes or other means, rather than long-range ballistic missiles.

We're still in the era of the Cold War in thinking about these missiles and this program to create this artificial and flawed umbrella for the people of this country. What are the effects on other countries of this provacative system? It is thought likely that China will increase its production of nuclear weapons to overwhelm this system, which is very easily overwhelmed by decoys and numbers. This system, as we now know it, is meant to ideally knock out a very few incoming missiles, not at all the kind of attack that possibly could occur. It is flawed in that respect.

The Pentagon itself in an analysis called the Ballistic Missile Defense System, a Case Study Against Rushing Forward on a Missile System. The Pentagon itself said that. And yet we're -- we have spent a hundred billion dollars. We're planning to spend 83 billion more over the next ten years and we have nothing to show for it except neglected communities, depleted healthcare systems and actual environmental neglect of the real environments that we all daily live in.

This proposal that we're asked to address tonight does not contain a real No Option Alternative not to build the system, to abandon it. That is what I think most of the people in the United States and the world would affirm. This system's impact on traditional arms control and disarmament efforts would be profound. We've already vitiated the Anti-Ballistic Missile Treaty under this Administration. We're preparing to resume nuclear weapons testing at the Nevada test site. We're building a whole series of new nuclear weapons, the mini nukes and bunker buzzards.

We're prepared to fight preemptive wars and yet this antiquated system that is going to cost you and I and our fellow Americans the treasures of our society that are already depleted by the Iraq war and other weapons spending, we're asked to do this. And I say we must abandon this program and utilize our resources in more constructive ways and practicing the ways of diplomacy negotiations and building alliances, instead of acting unilaterally, which is what this program does. Thank you.

DC_PHO0009

Hi. I came here from Salinas to speak on this. And in Salinas they're proposing closing all of our public libraries. Why? Because they don't have enough money. Well, where is the money going? I propose that 1.3 trillion dollars for Star Wars is a good example of where the money is going. Closing all of the public libraries completely in a town that is 66 percent Hispanic American, in a town that produces 80 percent of the lettuce you eat.

Let's take a look at what the program is. And I'll address it environmentally. I have copies of my statements if anybody wants it. Here you go. Here. Pass them around. Statements from MacGregor Eddy. I'm an advisory board member of the Global Network Against Weapons and Nuclear Power in Space regarding the Programmatic Impact Statement of the PEIS Ballistic Missile System presented October 19th, Sacramento, California. One, the 515 launches which is far more than the 99 commercial launches that are proposed.

By the way, I came here expecting a fairly honest presentation of the PEIS and I was shocked at the scummy lies I heard by people I regard as honest people. It's ridiculous that the -- there is 515 launches proposed for Star Wars. That is five times the amount that would be launched under the programs that are non-Star Wars. And you can look this up for yourself. Don't trust me. Check it out.

The second thing is the PEIS is based on the Star Wars program as proposed -- and here we have a statement. Okay. This statement was made by General Henry Tray Obering. He's the head of the Missile Defense Agency. So this is not a statement from some conspiracy website. This is a statement from the head of the MDA. What did he say when he was speaking at a Homeland Security conference on a missile defense panel on October 13th in Colorado Springs, Colorado? He was asked about the THAAD, which is the Theater High Altitude Defense Missiles that are scheduled to go into production in 2005. He was asked about these. What did General -- General Henry Tray Obering say about the missiles? He said, quote, These missiles are intended to augment, not replace, the current generation of ground-based midcourse interceptors.

That is what we're talking about here tonight, ground-based midcourse interceptors. In fact, there will be a continued spiraling of the capabilities of missile network with more missiles and additional sites added to the current missiles and expansion of the Theater High Altitude Defense Missiles beyond the initial scheduled 25 missiles. Therefore -- hey, listen. Therefore, the program they're talking about includes far more missiles than the ones they're proposing.

The second thing is the PEIS does not evaluate the environmental impact of No Action Alternative; thus, does not comply to the National Environmental Policy Act. And three, the PEIS does not address the environmental impact of the response to ballistic missile defense systems by other countries. For example, China is planning to increase the number of missiles they have in direct response to our ballistic missile program. And this PE -- this Environmental Impact Report does not address the effect of testing, deployment and decommissioning of these two missiles in China, which is a direct result of our policy. And this is not included in the Environmental Impact Report.

The report -- since No Action Alternative was not considered seriously in the impact report, I say it is not an impact report at all. Therefore, it has not complied with the legal requirements; therefore, it should be stopped. Thank you.

DC_PHO0010

I'm Rod Macdonald. I'm a professional wetland scientist. I work with identifying wetland ecosystems, their components, soils, water quality, their functionality. I modify them, restore them, recreate them under occasion, so forth. So I know what I'm talking about. I'm a registered wetland scientist, which means, like a structural engineer, I'm educated. But I have a reputation to lose, if I don't get the facts right.

I guess what disturbs me is I read Science Magazine. It comes out 52 times a year. It's uncensored. You'd be surprised of the things you'll see in there. Anyway, there is a lot of discussion about missile systems that comes from the point of view of the National Academy of Science. And, of course, there is a broad range of opinions of scientists, like anyone else. It's sort of a scientific engineer-based discussion.

I want to talk about what an Environmental Impact Statement is supposed to be under the NEPA, National Environmental Quality Act. It's supposed to look at a cradle-to-grave analysis of a project. It's supposed to minimize the impact at every state, in every level, every decision within it. I really think it's a great thing to take a program like this which has a huge cumulative impact and look at it in a systematic cumulative way. That's what it says it does; but, unfortunately, it's not what it does. It provides a false set of figures upon which to compare what the real impacts would be. Instead of trying to look at where we have to go if we want to deploy the system -- I'm not willing to take a stand about whether I agree the system should or shouldn't be built. I think despite all terrorism, the possibility of a missile launched from a disguised container off of the coast is realistic and we'll never know who put it in that container but we'll need to shoot it down.

But my argument isn't with the waste of money, if it may be an overblown system or its provocative nature; but, instead, it really does not address what is going on. And the reason it doesn't is it provides -- I'll look at perchlorates. Perchlorates are important to amphibians. Amphibians are in a worldwide decrease. If you look at the report, all the report ever says is "hazardous waste will be handled and dispersed in accordance with appropriate regulations; therefore, no significant hazardous materials and hazardous waste impact will be expected."

They go through and they say this for every single thing. The vegetation and so forth won't be or "we'll do a tiered-site analysis and a certain site will be affected" but it won't. But the truth is over the decade life of the program, the global level of perchlorates may rise. Amphibians skin needs to be moist. They're very sensitive to all industrial chemicals. Seventy percent of the species are in decline right now, even in habitats that aren't disturbed. Why would we care about them? The mosquitos are coming out. We don't have hard figures. We don't have real analysis. We're told this is a half a percent. What they're disguising there is most of the chemicals are residual from former manufacturing processes. And even so, the largest contributor -- as a scientist, I'm simply telling you, the largest contributor actually is the manufacturing, testing, open detonation of old rocket motors and the whole thing.

DC_PHO0010

Just to say there would be no impact -- this is a negative deck. We've all seen negative decks. They go through and check off negative deck. Negative deck. Negative deck. This isn't an honest -- this isn't a scientific discussion. I'm aware of what NEIR is. I've dealt with them for 25 years. Thanks

DC_PHO0011

The PEIS underplays many environmental effects of the BMDS. The Ballistic Missile -- I'm sorry. The Ballistic Missile Defense System PEIS does not address several of my scoping comments to start with and does not adequately address several risks, including exposure to increased levels of toxic pollutants from a dramatic increase of missile launches.

As we know, the -- the perchlorates are used in the self-propellants in the formation of a key thyroid hormone which are critical for growth and development of fetuses and children. The PEIS proposes to allow over thirty-fold higher levels of perchlorate at 200 parts per billion than proposed by the State of California, which is six parts per billion. Thus, many rocket launches will inject chemicals including aluminum oxide, hydrogen chloride and hydrochloric acid directly into the upper atmosphere, thereby depleting the ozone. The PEIS does not address the direct injection of the chemicals high into the atmosphere.

Secondly, the BMDS PEIS underestimates the risk of health and safety of BMDS missiles accidentally shooting down civilian and/or friendly military aircraft. BMDS has failed to mention the U.S. missile systems have a history of accidentally shooting down aircraft. Consider the U.S. has seen the Pac-3 missiles, which are -- which are in the PEIS, actually shot down several U.S and allied jets -- two or three in this case of -- I'm sorry -- in two of the cases of the recent invasion of Iraq. There is also Flight TWA 800. And even though several people saw streaks going up toward it, the people that saw it were never allowed to testify. The -- the point is that the activation of the BMDS risk accidentally shooting down civilian airliners is not even considered in the BMDS. It's a risk to health and safety.

While the BMDS states that warning will be provided to enable time to clear the air space, it's highly doubtful that such time would be allowed in such an emergency. Also, the PEIS underestimates the effects of space to reach from high altitude midcourse missile intercepts in the destruction of satellites, particularly at high altitude.

Furthermore, while the PEIS considers testing the BMDS on targets of opportunity, no mention is of the space debris resulting from U.S. targets of opportunity or other nations' targets of opportunity. The environmental consequences of mini rocket launches needed to deploy and maintain space-based interceptors has not been adequately considered, nor has its environmental consequences of the fuel. They talk about having all of the -- these -- in other words, in Option 2, they have many different interceptors in space that would have a reduced environmental consequence. But there's no consideration you have to launch all of those missiles in the place to get there.

Also, will the space-based satellites use nuclear power sources? Will any BMDS interceptors use nuclear warheads? This was not clearly defined. This is unsatisfactory. The BMDS does not include a real No Action Alternative. Such an alternative does not include further development and testing and deployment of these weapon systems needs

DC_PHO0011

to be considered and included in the PEIS. The PEIS does not consider a No Action Alternative at all. In other words, something that would involve rejoining the UN and -- and many other nations of the world in order to enhance security through treaties and arms control, sovereign approaches; i.e., approaches that provided us with long-term security to date.

Also, the PEIS, has not considered any -- has not considered any radioactive follow-up from interceptive missiles. The effects of war are not excluded for the analysis of NEPA. However, the proposed BMDS action is likely to promote a worldwide weapons of mass destruction arms race and force other nations to prepare a massive retaliation against the U.S., should war ensue. Since the proposed BMDS is very likely to cause a massive arms race, the environmental consequences of a resulting war with nuclear and other weapons of mass destruction should not be ignored.

The PEIS needs to consider the environmental effects that follow up from interceptive weapons of mass destruction, as well as effects of weapons of mass destruction the BMDS fails to intercept. This needs to be considered relative to a true No Action Alternative. Thank you.

DC_PHO0013

Hi. I'm Dan Bacher, Central American Action Committee member and long-time environmental and peace activist. And I suggest an Alternative Number 4, which means scrap the entire PEIS and the whole program that they are presenting here. This is a colossal waste of taxpayers money that could be spent on just about anything else other than this and it would be productive. There is a hundred billion dollars that have been spent and another 83 billion that are planned to be spent over the ten years if this Star Wars goes into effect.

The crazy thing about this is there is no imminent threat of weapons of mass destruction or space weapons at least on Earth. I have three questions that I'd like included in the comment period of the document.

Number 1, are we afraid of the zany folks from Zetaraticuli from launching ballistic missiles at Washington, D.C.? Are we terrified of the peaceful and highly evolved inhabitants of Europa from launching WMD's at New York? Number 3, are we afraid of the wonderful civilization of the third planet from Orion launching a massive terrorist attack here on us in Sacramento? No. I don't think so. Unless the government isn't telling us something about this.

Who are we protecting ourselves against? Okay. What I think that -- a better thing than calling this all of the acronyms that have been given out here on this wonderful PowerPoint presentation, I think it could be summed up as "Lost in Space." The people that came up with the Star Wars technologies whole concept are out of their minds. This is the ultimate corporate welfare project.

You know, I -- I'd like to conclude with the fact that we -- we need to get rid of this whole Star Wars project and the PEIS and everything else and get the weapons contractors off welfare. And when I've been out demonstrating I get this stuff from people, "Why don't you get a job?" Well, I've had a job for years. You know, I've been employed the whole time. What I'd like to say to the people that are proposing Star Wars and the Missile Defense System is to get a job, weapons contractors.

DC_PHO0014

Dan is a hard act to follow. Anyway, turning some of the comments that have already been made relating back to the Environmental Impact Report, the Environmental Impact Report has to consider the chain reactions. The report on cutting down old growth Redwoods considers the effect it will have on the spotted owl. The Ballistic Missile Defense program will have effect on a lot more than just spotted owls. It's not only a likelihood, it's a certainty that other countries will react to us developing a Ballistic Missile Defense System, however flawed it might be. And they will react likely by developing more ballistic missiles to overcome the defense system. I've seen nothing in the environmental report on this system that takes into account how other countries will react.

So the effects of the more missile launches, more rocket fuel contaminates going into the water, more depletion of the ozone are not just those of the Ballistic Missile System being described here. All of the effects of the proliferation of ballistic missiles around the world must also be considered in a serious Environmental Impact Report.

Similarly, with the weaponization of space it has been mentioned that other countries are unlikely to be able to afford similar space-based interceptors. Well, the fact is, the U.S. cannot afford this system either. Nevertheless, it wouldn't take much money to send satellites into space to purposely explode and create space debris that would make the space-based interceptors ineffectual and would also make the communication satellites ineffectual and so on and so forth, basically, sabotage space for military and civilian use.

This should be considered quite seriously in an Environmental Impact Report on this system. I don't see any consideration of that. That would be a very simple way another country could stop the whole system. You know the alternative. This has been alluded to. The alternative has to be considered. The alternative of land, sea, air and space-based defense systems are being considered. The alternative of a diplomacy-based defense system is not considered. In fact, diplomacy seems to be a -- a foreign concept to the current Administration.

But as we now know, UN weapons inspections work quite well to eliminate weapons of mass destruction. And similar systems could be deployed around the world, as was deployed in Iraq, and eliminated all of the weapons of mass destruction. These might not meet the needs of Congress, the President and the likes of Dick Cheney and those with egregious economic conflicts of interest, as Dan alluded; but they would meet the needs of the American people.

Talk about showstoppers. This Ballistic Missile System is a threat to the survival of all living species on Earth. That is a very definite showstopper. Thank you.

DC_PHO0018

I'm Darien Delu. I'm connected with the Women's International League for Peace and Freedom, the United States section. It's an honor to get to speak to this body because of the other speakers who have come before me, who have covered so many of the critical points that have to be addressed in the Environmental Impact Statement. We have been presented with a document with 700 pages of inadequate information and sidestepping and general ignoring of the real issues involved. Many of these have been raised already tonight and I'll try not to be too redundant.

The -- NEPA provides for consideration of environmental impacts of the MDA proposals. The MDA PEIS finds only limited environmental consequences for the two proposed alternatives. The so-called No Action Alternative creates a straw dog against which to judge the first two alternatives of the MDA.

The focus of my comments will be two-fold. First, I call for a true No Action Alternative, as have others. For example, or specifically, an alternative that goes beyond the failure to integrate anti-ballistic missile system to an alternative that rejects the individual missile defense elements of a BMD System. Secondly, I point out the unaddressed global environmental impact of an accelerated arms race. Such acceleration, as has been repeatedly pointed out this evening, is entirely predictable as a consequence of the U.S. BMD program.

Because of the devastating impacts -- political, environmental, ecological and psychological, as well as merely environmental -- the impacts of a Ballistic Missile Defense Program of any kind, this PEIS must address a true No Action Alternative. The failure of this PEIS to include such a true No Action Alternative violates the requirements of the NEPA process. The absence of a true No Action Alternative allows the PEIS to construct a false comparison with the other alternatives underplaying the different degrees of environmental damage.

According to the PEIS, the proposed action is needed to protect the U.S. from ballistic missile threats. However, the proposal as -- as a BMDS, a Ballistic Missile Defense System in English, will result in an acceleration of the global arms race. As others have already pointed out, in the case of China, if the U.S. implements a BMDS, other countries will feel called upon to create or increase their missile-based weapons deployment systems as well as their nuclear armament in order to prevent -- in order to present themselves as credible negotiation parties with the U.S. and protect the survivability of their weapons.

As others have already pointed out, the PEIS fails to address the chilling possibilities and associated impacts of an accelerated arms race and its increased missile testing. We're not even talking about the devastation a war would cause. And what about nuclear proliferation? The PEIS does not address the many environmental impacts of the entire nuclear cycle connected to nuclear proliferation. The PEIS points out NEPA excludes

DC_PHO0018

from consideration the environmental impact of a nuclear war or any acts of war. But as human beings, we cannot exclude that in our considerations.

DC_PHO0019

Good evening. I'm Ellen Schwartz. I'm the Co-chair of the Sacramento branch of the Women's International League for Peace and Freedom. And I thank you for the opportunity to speak here. We know from Gulf War I and the War on Terror and the test results to date for the components of the BMDS that the surgical precision with which U.S. weapons are guided makes them excellent instruments for destroying embassies, wedding parties and a hotels full of journalists. In other words, you honored military gentlemen have trouble hitting your backsides with both hands. If you're -- there, is no way that a kinetic weapon -- is that what you call it? -- hitting a missile with an arrow is going to be able to actually hit any significant number of incoming alleged threatening missiles. You're going to have to use nukes in order to get a broad enough range of destruction to take out any of these alleged incoming threats from Alpha Centauri.

Are you going to test them? Are you going to talk about them in the PEIS? Are you going to talk about the environmental impact of testing nuclear weapons in the atmosphere? Or are you just going to lie in the PEIS and, you know, get it installed and say later, "Oops, we have to have nuclear warheads"? The display outside the hall finds uniformly no significant impacts from any of the phases of the BMDS. Emissions will be disbursed by the wind. It's unlikely any animals will get in the way. Of course, no satellite has ever fallen out of orbit and no rocket vehicle has ever blown up on launch so there is no danger of anything ever going wrong.

Even on your own terms without considering the environmental impact of forcing China, Korea, Iran and everybody else in the world to build their own systems to protect themselves from ours, even without considering the possibility that any of these countries including us might use these systems, the BMDS is a disaster waiting to happen. Every weapon built, sited, tested or even decommissioned is a potential disaster.

Your three alternatives assume a program that is going to be implemented whether we do whatever we say here. And the PEIS and this hearing is nothing than a legal formality. You have no true No Action Alternative; only build it together or build it a little bit at a time and don't test it together.

I'm a little offended that all you want to hear about is the environmental impact of this system; whereas the presentation talks about how we'll all be not safe if we don't build it. If the safety of our country from our alleged enemies is on the table, then so is the impact of causing a war.

What you should do in your own terms is to consider a true No Action Alternative, which is an analysis of the relative emissions of greenhouse gasses and space debris and toxic chemicals and radiation caused by either (A), blowing things up or (B), pursuing broader implementations of existing treaties, such as the Nuclear Non-proliferation Treaty and the Anti-Ballistic Missile Treaty, which would not produce any greenhouse gasses, any space debris and would not blind any animal or destroy any life on Earth. Thank you.

DC_PHO0023

First, I'd like to thank you, Colonel Graham and Mr. Bonner and Ms. Shaver and Mr. Duke for coming out here and -- and presenting your material and then hearing what the public has to share. My comments are, I hope, going to be very specific and germane to the PEIS. One of the things I want to point out is that the -- our organization I represent is the Physicians for Social Responsibility in Los Angeles. We have about 5,000 members in Southern california. And we have actually worked with Lenny Segal and I believe you've heard his oral testimony as well as written documents regarding the perchlorate and the lack of information that is present in the PEIS.

Most notably, I would like to point out that the timeline of potentially releasing the final document but two weeks after the oral testimony, as well as what anyone else could offer in writing and -- or even six weeks later into -- in the end of January of '05 strikes me that you very well may not take too seriously what we have to say. I would strongly suggest that you factor a time when you can actually take into account the things that the public are suggesting.

I would like to offer some language for other alternatives which would entail a great deal of work on your part in the MDA office but I think it is absolutely necessary. You're clearly aware of the political decisions that led to the formation of missile defenses, in general, coming out of a decision politically that deterrents were no longer sufficient. I feel that this Administration in making that determination is mistaken. But in addition to that, we haven't tethered out the differences in this document between strategic defense defenses against long-range missiles and those of an -- in a theater defenses. And all previous administrations had kept these two missile defenses segregated. And this Administration has blended the two.

And I think to the detriment because theater defenses have actually a promising future, unlike strategic defenses. Theater defenses can protect troops in the field. Theater defenses can protect cities from attack, overseas especially. And they have actually enjoyed some limited success both in the field of testing as well as in the battlefield and also enjoys bipartisan support. There is actually a realistic threat. There are short-range and medium-range missiles that could actually be fired in hostility at American targets or those allies; unlike the strategic long-range missiles which do not really have a basis in reality.

And in addition, theater defenses have a realistic success because the boost phase of a missile is relatively slow and even the descent of a short-range, medium-range missile is much slower than that of the strategic missile, which could be traveling at 10 kilometers per second, which makes it very unlikely to hit. The alternative, it may be politically impossible for you to do this, but I think you should try to have another alternative which would simply be to keep the -- this is probably the presidential candidate John Kerry's position on these matters -- would be to move ahead on theater defenses but to maintain the strategic weapons that the missile defense is -- against long-range missiles to be held

DC_PHO0023

in research and development stage. And -- and that would be my suggestion for a true alternative.

The other thing I want to bring up is in regards to in the PEIS there is some statements in the effect that some of the space-based interceptors would be placed in geosynchronous orbit, which I believe is some 24,000 kilometers from Earth. To actually get a weapon from 24,000 kilometers out to what would be a low-Earth orbit or even a lower trajectory of a missile within 20 minutes or half hour and do so accurately and to hit the missile is fantasy. And therefore I think the PEIS mischaracterizes any weapon that would be placed in geosynchronous orbit as being an anti-missile weapon. It should simply not be listed as a possibility. That would be -- well, you would be deploying an ASAT -- an anti-satellite weapon. And you should go through the process of actually fielding that before the public and have -- and take your hits for that if, indeed, you're doing that.

The same with the Airborne Laser. There is a very good probability that an Airborne Laser would never work in shooting down a missile in the boost phase and all tests indicate that. But it could be highly effective in a directed energy targeting on Earth for terrestrial targets. And you should be honest about what that weapon might also be used for. It would be helpful to actually not mask the true purposes of some of these weapons.

I believe there needs to be more hearings. The PEIS is insufficient in dealing with cumulative effects, especially in Southern California, as so many of our local contractors are working on the weapons systems. We're bearing the brunt of our environmental impacts of the laser weapon development and many of the rocket launches and the rockets that are being assembled for those launches to launch these 515 launches that may take place over the next 10 years.

I also suggest that you get testimony from the National Recognizance Office, if you have not done so. I'm sure there are considerable concerns about military recognizance assets being false -- being harmed by space debris. Last but not least, I would also suggest that you conduct a space debris analysis, as you have sited in the PEIS, that there may be intercepts as high a 400 kilometers. That either you do testing at 400 kilometers, which is ill-advised because of the debris problem, but how would you know if the weapons work unless you conduct the tests? Or you should actually assume that the weapons won't work because you cannot conduct the tests at 400 kilometers above. Thank you very much.

DC_PHO0024

So this is a show, as we have showstoppers. I'm confused. Well, actually, I -- I was confused by the glossary. It's five pages long and single spaced. And I haven't started yet. The New York Times magazine two days ago asked Wlodzimierz Cimoszewicz, Poland's Foreign Minister to the United States about Polish defense minister, Jerzy Szmajdzinski who recently announced plans to pull all 2500 Polish troops from Iraq next year. Cimoszewicz answered, "It's not true. Our minister of defense mentioned that we would like to end our mission at the end of 2005 but that is not the official position of the government." But when the Times asked Cimoszewics if he had met with the families of the 13 Polish soldiers who died in Iraq, Foreign Minister had replied, "No. I have not."

The Polish government was officially represented by the minister of defense. Which begs the question: Has the defense minister been demoted to coroner/chaplain or how many dead Poles does it take to end the U.S. war in Iraq? Furthermore, Polish Foreign Minister Cimoszewics confirmed the Times figure that 70 percent of Polish people oppose the U.S. war in Iraq. What are we afraid of? The Polish public opinion? The so-called insurgent Iraquis taking up arms against U.S. corporate mercenaries like Cal F. Brown and Root and Halaberten? Ari Fleischer's so-called Operation Iraqi Liberation? That was the original term for this attack, O-I-L. Serves to liberate the resources under those inconvenient civilians impeding corporate access.

The Cold War is over but this fact does not deter the Bush crime syndicate from heating things up. There is no peace dividend as it and any surplus saved in the 90's has been spent since the start of the millennium. The world is a decidedly more dangerous place because the Pentagon has run amuck spending half of our income taxes while mortgaging debt so far as our great grandchildren so it can build so-called "kill vehicles."

Meanwhile, the Pentagon mocks our democracy. It plans, tests, builds and imposes terrible weapons of mass destruction. The Pentagon goes through the motions pretending concern about the environment, holding meetings in far away places like Alaska, Hawaii, where 61 people appear; 15 speak forth; and 7 provide written comments representing 280 million U.S. citizens.

Even the congressional "Millionaire Boys Club" does not feign that kind of representative democracy. The Pentagon does not even care about the speaking and writing concerned citizens. Its Notice of Intent in the Federal Register states the weapons system in question will be used, quote, To defend the forces and territories of the U.S. allies and friends against all classes of ballistic missiles threats in all phases of flights. Which, I suppose, makes the people of the U.S. potential collateral damage.

I imagine the purveyors of the Pentagon portfolio are like the characters in the Beattle's satirical song entitled, "Piggies": Lying, conniving, consuming everything in sight. They never see their evil behavior inflict pain and suffering upon other beings and upon the world. And to get their attention and change their behavior, what they need is a damn

DC_PHO0024

good whacking. Of course, the song is referring to spanking but the Pentagon and spenders can measure its whacking in body counts.

Here in California we analyze public projects and hold them to the test of the California Environmental Quality Act of 1970. When the Pentagon wanted to build a biological nuclear and chemical testing, manufacturing and storage facility at McClellan, UC Davis and Rancho Saco, the community successfully challenged and stopped the bid even before it could be tested by CEQA. The community saw the proverbial writing on the wall. The plan was analyzed. We found it wanting.

The body counts. Yes. Thank you. And I talked about the California Environmental Quality Act, of which I think is great -- well, I think it's good to have an Environmental Quality Act. It's weak but nonetheless it's there. Let me pick up where I was at. Here. Anyway, the community saw the writing on the wall. The plan was analyzed and it was dropped but this -- the same is true of defending BM's. This PEIS reads like a negative declaration.

In case you have not heard, the Cold War is over. This is reason enough for the No Project Alternative CEQA style. It's time for demilitarizing the Pentagon. I'm partial to Helen Caldecott's suggestion that it be converted back to its original design as a hospital. I recommend we just skip the testing, manufacture and storage steps for these weapons systems that are referred to in this EIS and cut to the quick and decommission them all. Take out their fuses and timers and igniters and hire clever chemists to convert their horrible toxins to safe use.

Further, since adults seem to muck things up in the State Department, we should pay and support a coterie of children as ambassadors of peace and reconciliation to all countries on Earth. No more foreign aide. No more foreign debt. The kids will figure it out from there. The spanking should continue upon Pentagon contractors until they change their behaviors. Meanwhile, rescind all Pentagon weapons contracts. No more bucks for bombs. The reason why the Pentagon thinks it needs these weapons systems is because the United States of America has neither learned how not to over consume the planet's resources or stop exploiting human labor. We must become men and women of conscience who believe in and practice trust and respect for one another.

The No Project Alternative, as in CEQA spares us and our planet's ecology while allowing our energies to be spent on truly productive human endeavors. No showstoppers, eh? So this is a show. This PEIS is a non-responsive negative declaration. Thank you very much for your time.

DC_PHO0025

I'm Dr. Leonard Fisher, retired faculty member of medicine at UCLA and volunteer physician at the LA Free Clinic and a member of Physicians for Social Responsibility. I'm one of the groups that drove through the rainstorm this morning to get up here so we could express our concerns about what is going on. I'm going to limit it to the problems related to ground-based interceptors. The most tested but still woefully ill-performing technology to develop to thwart long-range ballistic missile attack is out of the midcourse interceptor.

This weapons system is designed to intercept enemy missiles in space from ground platforms in Fort Greely, Alaska, Vandenberg Air Force Base in Southern California. The chemicals used in solid rocket propellant that would be used to launch the intercept missiles, the test missiles and especially the booster rockets that place related detection communication satellites in space would all use imodium perchlorates as the oxidizing agent in the rocket fuel. The fuel would also contain highly toxic hydrazine compounds and nitrogen oxide. In the news of late, the developmental toxin perchlorate has been found in many of our nation's drinking water sources. This chemical inhibits thyroid hormone creation and release. In low doses, perchlorate is presumed to decrease the intelligence potential of a developing fetus. In cases of more severe exposure, can cause frank retardation. dditionally, once combusted and exposed to air moisture, perchlorates create hydrochloric acid, more commonly known as "acid rain."

Further, rocket launches deliver hydrochloric acid in the upper atmosphere which, in turn, chemically interact with the protective ozone layer. It is therefore fair to assume that an increase in rocket launches may correspondingly bring about additional cases of skin cancer. Rocket fuel needs to be continually replenished. The disposal of solid rocket propellant through washing out, propelling or open burning, open detonation are some of the major sources of perchlorate contamination across the country.

None of these perchlorate-related issues are adequately addressed in the PEIS. I'd like to add one further comment regarding the meetings that have been held. Southern California is bearing a disproportionate impact of missile defense development and its effects on the environment. The midcourse interceptor is being tested and deployed at Vandenberg Air Force Base in Santa Barbara County.

The Airborne Laser is being tested at Edwards Air Force Base in Los Angeles County. The space-based and Airborne Lasers are being developed by Northrop Grumman in the South Bay and San Juan Capistrano. Lockheed Martin, Boeing and Raytheon are deeply involved in developing the midcourse interceptors and other systems. At a minimum, there should be additional hearings near the areas most effected by missile defense developing. There should also be an environmental health evaluation concerning cumulative impacts for military production, testing and deployment of missile defense systems compounded on top of past military use. This evaluation should be done with an eye on disproportionate impacts on low-income communities of color. Thank you.

DC_PHO0026

Is this better? I'm Philip Coyle. I'm also from Los Angeles. The environmental process described in this PEIS is not believable or trustworthy because the statement read by Mr. Duke tonight is already not being followed. Mr. Duke said if testing failed to show the system worked, the system would not go forward. But as we know, the system is already being deployed even though it has no demonstrative capability to work under realistic conditions. To take a different example, the PEIS says and, I quote, The Airborne Laser is currently the only -- emphasize only -- proposed BMDS element with a weapon using an air platform, closed quotes. However, the PEIS does not discuss another proposed BMDS element that would use air platforms; namely, interceptors fired from aircraft.

With respect to the No Action Alternative already mentioned by others, it does not describe a scenario where no action is taken. Rather, it describes a system where the Missile Defense Agency would continue existing development and deployment unabated under the No Action Alternative. And I quote the PEIS here, Individual systems would continue to be tested but would not be subjected to system integration tests, closed quotes. This is hardly no action and allows for indeterminate missile defense program since -- to go back to quoting the PEIS, There are currently no final fixed architectures and no set operational requirements for the proposed BMDS, closed quotes.

Thus, even if MDA agreed to the No Action Alternative, it would not find its actions constrained for the foreseeable future. And, finally, with respect to space-based interceptors, the PEIS is silent about the fact that missile defense would, for the first time, weaponize space. While space is certainly militarized, it's not yet weaponized; that is, with attack weapons in space and with the chain reaction of a new arms race in space. The PEIS does not adequately address the environmental impacts of the consequences of placing strike weapons in space. Thank you.

DC_PHO0029

Thank you to everyone who has spoken so far. I think it's been -- I have learned so much and I feel like I really understand a lot more than I did when I came in. There is not very much really that I can add to a lot of the things that have been said because I don't have the particular expertise. I'm a local attorney concerned with human rights and peace. And so one thing I thought I might address is something that was alluded to by several of the speakers and that has to do with the process we're involved in here.

As an attorney, that is something we're always concerned about is process. At first when I first heard about the hearing and when I came here and saw all of the nice exhibits you had put up, my first impulse was this is really cool -- you know, this is really nice and how nice we've all been invited. But now I don't think so anymore because I'm noticing that there were only four locations at all where public testimony has been invited: Virginia, Sacramento, California, Hawaii and Alaska. That seems to me to be not nearly enough public input. That point has already been made.

I would like to talk about Exhibit ES-3, which is part of the Executive Summary. If you want to go along with me, that exhibit shows the effected environment. This is about environment that we're talking about here today. I looked at that to see what the affected environment was. All of the environment that can be affected is divided into nine biomes, as well a broad ocean area and the atmosphere. I went through that and I saw the following. I saw that we're talking about the Arctic regions, North Atlantic Ocean, Pacific Ocean, Alaska, Canada and Greenland. Then some more Arctic regions and also Alaska, deciduous forest and Eastern and North Western U.S. and Europe, Chaparral. That is California Coast, Mediterranean from the Alps to the Sahara Desert, from the Atlantic Ocean to the Caspian Sea. This is a lot of area here. And these are areas that are labeled as "affected areas." Oh, the Grasslands. That is the whole prairie of the Midwest. The desert. Oh, the arid Southwest. New Mexico, Arizona, Utah and the Rocky Mountains, as well as the Alps, Pacific Equatorial Islands, which I don't know. Maybe that is why we're going to be in Hawaii. Northern -- you've got to turn the page. Northern Australia. And then how about the broad ocean area. That has no particular latitudinal range and that's the Pacific, Atlantic and Indian Ocean. And then the really big one, the atmosphere, which is the atmosphere which envelops the entire earth. That looks to me like a global environmental impact.

And it seems to me only fair and some kind of rule that I think is codified in lots of different places that the people that are effected by legislation and -- and programs get to talk about it, get to respond. Well, that is going to be a lot more than the people in the U.S. Even if you say four hearings is enough in the U.S. -- this is a global environmental impact, this Star Wars Program. And, therefore, I'm not impressed with the hearing anymore. I think four is completely minimal. And so I would like to take the remainder of the time, if you would allow me, to make some suggestions of things that maybe other people might want to add, things that we might be able to do and do a little organizing here; which is, first of all, I think it would be entirely appropriate if you -- anybody who knows anyone and has connections, friends on legislation, which I'm a big supporter,

DC_PHO0029

lawsuits -- I think some lawsuits are called for for the reasons that were explained, which is the Environmental Impact Report is really inadequate and does not -- does not meet basic legal requirements.

I think that would be a very good thing to do. You should get ready for that and -- Colonel -- and another thing too is there are a number of people here representing different organizations, Physicians for Social Responsibility, FCL has -- there is also Friends Committee on National Legislation, different groups and so forth. Different groups. I think really we can get the word out through our emails and so forth about this.

And I'm also concerned about contacts in Europe for those like WILPF, for instance, which is an international organization or any international organization, Greenpeace, whatever, that you belong to because I think that people in Europe, Australia and so forth have a right to know about this and to have the same information that we have. And people may have other ideas. Now, just a little personal note here. My son lives in Southern Switzerland in the Canton of Tacino. He married a woman who is teaching. I'm going to let them know. I saw the Alps are in here. They're in the southern Alps. And I know that when I've gone to visit them, I can tell you those "pace" flags are hanging all over the place. People there really care about peace. They were part of a demonstration in Milan that was humongous. And I think there would be a lot of concern and there should be a lot of concern. I really think it's unfair to put a Star Wars system into place and not allow people who will be affected to weigh in on that matter.

And I guess my final suggestion would be to vote for change of Administration.

DC_PHO0032

My name is Winnie Detwieler. I'm here on behalf of Sacramento Area Peace Action and our 4,000 plus supporters, both to comment both to comment on the PEIS and register a complaint in which the manner in which the hearing has been scheduled. There's been no widespread publicity in California that we're aware of regarding this hearing today in Sacramento. Is this some sort of the stealth strategy to limit public input on such critical issues. The question is: Can the Draft PEIS be legitimate if there is not adequate notice of the document in the hearings on this matter?

What is most disturbing, however, is that the current Administration is forging ahead with components of the first two interceptors for the BMDS, making a mockery of these hearings. It's even more perplexing that the interceptors were just installed and had not been tested in the system. The tests have been continually postponed and the Pentagon's Chief Weapon Evaluator has said the interceptors may only be capable of hitting their target about 20 percent of the time.

Why is our government spending billions of dollars in risking the beginning of a nuclear arms race on a so-called missile shield with such an abysmal record? The greatest danger we face is not some intercontinental ballistic missile carrying nuclear warheads to our shores; but are reigniting nuclear arms race and motivating countries that fear us to attempt illegal acquisitions of nuclear weapons. They see the technology for our Missile Defense System can also be used offensively against them. Their defense against our military superiority would be to either produce many nuclear ballistic missiles to overwhelm our 20 percent system or to use secret delivery system weapons smuggled into our country or delivered by short-range missiles launched just off shore.

Forging ahead with the missile defense system will create terrible consequences from pollution from rocket launches, space debris and accidents within the system or involving civilians. Other groups are scheduled to testify more comprehensively on this environmental hazard. But I'm emphasizing here all people on Earth, not just Americans, face grave environmental threats from this drive to dominate the world by dominating space.

The environmental pollution may kill us slowly if we don't do it quickly with a nuclear war. But the greatest environmental impact will be to make the entire planet more dangerous to all forms of life and we Americans more vulnerable and not safer. Most Americans consider nuclear war unthinkable; but apparently our leaders in Congress do not. It is astounding to see the turn around on proliferation and new nuclear weapons in this Administration. Will threatening other nations encourage them to cooperate with a non-proliferation treaty? Will the U.S. violations of the treaty persuade other nations to embrace non-proliferation? We think not.

Similarly, the abrogation of the Anti-Ballistic Missile Treaty last year by this Administration in order to pursue this fantasy missile shield will not promote international cooperation on disarmament. We can only conclude that this rush to further

DC_PHO0032

develop and deploy this ill-conceived missile defense shield is driven by ideology and politics and fueled by the greed for profits from this costly boondoggle. That is what it is, a boondoggle. The leading scientists and Nobel Prize Laureates have condemned this as irrevocable and dangerous to global security. But this Administration rushes headlong into a hasty deployment. The term coined to characterize this drive is a "rush to failure."

In conclusion, we at Sacramento Area Peace Action condemn the Alternatives 1 and 2 with extreme threat proposed on our nation and the world. We would support the No Action Alternative if there had been a legitimate attempt at researching and weighing a true alternative of no action. Such a proposal should have encompassed a suspension of research and development, no testing and no initial deployment. It should have evaluated the cost effectiveness of vigorous pursuit of international cooperation on nuclear disarmament.

As it stands, the No Action Alternative does not meet the requirements of the National Environmental Policy Act. For this reason, we consider the Draft PEIS inadequate and insufficient for proceeding with the BMDS.

DC_PHO0037

Hello, my name is Jean Bodeau and I have no affiliation with an organization. I'm a professional geologist and engineer and I've worked as an environment consultant in Alaska for almost 20 years. I now work in health care. Some of the work I've done as a consultant is I've managed several million dollars worth of military contracts, mostly for the Air Force. I oppose the entire program on both philosophical and concrete grounds, with specific points as follows:

First, it doesn't address the real threat, i.e., terrorist with low tech devices that could come over borders, by sea, suicide bombers. I understand the Iraqi insurgents now are trying to get more weapons of mass destruction. This project, to me, seems totally divorced from the realities that we're facing as a country and takes funds away from the real threats.

Two, the sequencing on the whole program seems backward. The EIS is late and the project is premature. Furthermore, the technology doesn't appear to work, yet it is already being deployed.

Three, NEPA does not seem, to me, to be a big enough vehicle to evaluate the program. It should include international input because the implications of this project are global. And I noticed on your map out there Antarctica is not included on the map. I'm sure you looked at it but.....

Fourth, the PEIS, with all due respect, I know a lot of work went into it, is -- in my opinion it's crap. I've worked on these things quite a bit and I know that you can manipulate your data, manipulate your analyses to come out with exactly the results you desire. And I think that's what's been done here. It ignores or glosses over potential concerns and it put many other assessments off to future assessment to the site-specific assessments, the tiered impact -- or the tiered assessments that you mentioned.

I noticed on the summary and in the documents, I've looked through those. I got them in the mail and I appreciate those being sent out in advance. There are a huge number no significant impacts listed. And I think that this issue is a big enough and hugely important issue that it deserves more than a cursory analysis of the environment impacts.

I have some more specific concerns, things that the PEIS does not adequately address. Number one, exposure to increased levels of toxic pollutants from a dramatic increase in missile launches. Liquid propellants containing hydrozene, nitrogen tetroxides and other compounds that are highly toxic. In addition, ammonium perchlorate, which is used in solid propellants, it blocks the formation of key thyroid elements that are critical for growth and development, especially in fetuses and children, and this was not considered. Another concern is that the risk to health and safety of DMD missile accidentally shooting down civilian and friendly military aircraft was not considered.

Third, it neglected to look at space debris from high altitude midcourse missile intercepts or destruction of satellites, and it really glossed over potential impacts of debris falling to

DC_PHO0037

earth. It just wrote them off as being burned up in the atmosphere. Another concern is that it didn't really look at the many rocket launches that are needed to test and deploy and maintain the space interceptors.

Five of the specific points, the program could contribute to the proliferation to the weapons of mass destruction and an arms race in space. The response of other nations to the BMDS has not been considered.

Six, radioactive fallout from intercepted missiles has not been considered. The effects of war are normally excluded from analysis by NEPA; however, this proposed BMDS action is very likely to provoke a worldwide WMV arms race and force other nations to prepare to launch a massive retaliation against the U.S. should war ensue. And I believe that radioactive fallout needs to be looked at and not written off as a no significant impact.

Seven, also missing is an assessment of impacts to the environment, human health and welfare and future generations, which would result from the monstrous financial burden of this program and taking resources away from other critical aspects of our nation.

And, last, the BMDS PEIS does not really include a No Action Alternative. Your No Action Alternative does not include the option of not deploying any of these, there's just dropping the program right now. And I think that we need to have a true No Action Alternative considered as part of this.

I am going to submit additional written comments. Thank you for the opportunity.

DC_PHO0038

Hi. Thanks for having me. My name is Steve Cleary, I'm the Executive Director for the Alaska Public Interest Research Group, my acronym is AKPIRG. That's another acronym for everybody tonight. I, like Jean, am in favor of the No Action Alternative, but would also like a real No Action Alternative, which would save us tens to hundreds of billions of dollars if we didn't deploy the system.

I remember from last time, part of about the radar, somebody from Valdez was worried about that it was going to set off airbags in cars, set off fire extinguishers, some kind of weird effects of the radar, but I didn't see any mention of that in there and I didn't get a chance to read the whole thing. I just read the executive summary. So I would like to hear more about that.

But I think a lot of us are concerned about the integration of all these systems when all the systems aren't here. We hear about the sea-based radar that's going to be swung around and come on up and be sitting outside by Shemya, but we have five missiles in the ground, maybe six by now, and we're going to start deploying that by September, but yet this isn't due until -- you know, the Record of Decision isn't going to be until February, so the integration of the system doesn't seem to have happened, yet it all seems to be going forward and this Programmatic EIS doesn't seem to have a whole lot of effect on that.

So, again, I am here tonight to speak in favor of the No Action Alternative. I do also believe that deployment of the missile defense would spur a global arms race and cause nations to devote resources, simply because we are, to this weaponization of space.

I'm also concerned that we'll be exporting it to non-U.S.A. locations, Canada, United Kingdom and other places who might see us as a world superpower and want to, you know, receive our favors and so they would acquiesce to this system. Specific to Alaska, I have a lot of questions about the Kodiak Launch Complex. I'm really concerned about the aborted launch that happened at Kodiak, I believe it was two years ago November and Kodiak itself is a significant enough population center to be concerned about it, but if we start launching missiles from Fort Greeley, which is near Fairbanks, near Delta Junction, that have to be aborted, there's significant population centers there, not to mention the TransAlaska Pipeline.

Something that was mentioned in the presentation and in the PEIS, it talks about a robust testing program. It mentioned in the PEIS that the test are going to dictate which further things happen. We haven't seen a realistic test yet and that concerns us here in Alaska, particularly when, you know, like I said, an aborted launch could have such a disaster effect on our state.

It's unclear from the PEIS, and I'm looking at Section 2.242, whether or not the Kodiak Launch Complex is going to be a launch test and defensive operational asset or if it's going to launch things into orbit, or if it's just a test center. So it's confusing for the folks on Kodiak and for us here in Alaska what is actually going to happen out on the island.

DC_PHO0038

It talks about a safety zone that would be established around the laser during activation. This is also in the PEIS, Pages 250 to 254. There's a lot of small plane traffic and a lot of small boat traffic around Kodiak and other places in Alaska. It has us concerned about the laser and its effects on our economy and on the human resources, or humans, I should say, of Alaska.

The hydrozenes that Jean mentioned were the same things that I believe came from when the space shuttle crashed and landed in Texas and there was a very large mobilization to get people not to touch those things. And if that's the same chemical that's going up with each of these launches and potentially coming back down, then those will be grave consequences indeed. A lot of the missile defense system has been sold up here in Alaska for the economic benefits. And I know the Programmatic EIS also takes in social and economic benefits and I could think of a lot better ways for us to spend these hundreds of billions of dollars that will eventually be spent on this system that isn't going to work and is also addressing the least likely treat.

So I thank you for the opportunity to speak in favor of the No Action Alternative. Thanks.

DC_PHO0039

Yes, hello. My name is Greg Garcia, I'm a member of Alaskans for Peace and Justice, as well as No Nukes North. There's just a few brief things I'd like to say about this. I mostly want to comment on it as a policy issue. I realize that, you know, the purpose of this is to take testimony about the actual environmental impact of this and I'm not really all that knowledgeable. I've looked at a lot of the materials about it, about the environmental aspects and, frankly, you know, I'm not probably qualified to interpret a lot of the things that are said there.

However, I do definitely oppose the space-based weapons platform that are mentioned in Alternative 2. Certainly, you know, be opposed to putting weapons in space. I'd like to see something quite a bit less than the No Action Alternative, I'd really like to see something rolled back in a way and dismantling and using these resources, the financial resources that were wasted on this on much more pressing needs in this country.

As many people have mentioned, it does protect us from what's the least likely attack scenario. There's way too many other things going on that are threats where the resources that are being expended here could be used. For example, roughly four percent of the cargo containers coming into the United States from foreign countries are inspected in anyway, and that's mostly just inspecting the paperwork, not even actually doing an actual physical inspection. And we could certainly create a lot of jobs that way, as well as by building this system. So it doesn't seem like a very good cost benefit there.

I feel that this system makes us less safe. In one way by leading to an increased arms race as we have pulled out of the 1972 ABM treaty. I think that was a mistake. By pulling out of that treaty I think we've stimulated China to increase its production of intercontinental ballistic missiles and possibly the spin off there is that India and Pakistan may be increasing their weapons as well in order to have a defense against China.

The idea to dominate space seems to be at the heart of this, that's fairly, clearly spelled out in United Space Command documents and this seems to be kind of a component of that. And it would seem to me that the desire to dominate space is just a new era of colonialism. In conclusion, I feel that this entire system is based on corporate welfare, that the legislative process that takes place in Washington, D.C. seems to be dominated by huge multinational corporations that want to build the system and so they have managed to lobby and provide the funding for the campaigns for the Congress people, Senators and Representatives who have approved for this program to take place, so that they get to become even more fabulously wealthy than they are now by building a system that, frankly, doesn't work. Thank you.

DC_PHO0044

MICHAEL JONES: I have a few comments to make about deficiencies in this, and some of these were deficiencies in previous analyses.

There's no examination of treaty restriction on target launches in this EIS, no quantitative information on the liabilities of rocket boosters. There's some inconsistencies and confusion about cumulative impacts. This EIS estimates 515 launches in a ten-year period, the previous 2003 ground-based missile defense extended test range EIS estimated only 100 in a ten-year period.

There's an egregious error in Exhibit 4-11 on page 4-102. First of all, there's an addition error in the table. The more serious error is that total emissions for the interceptor are given as 115 kilograms, whereas the 2003 EIS for the ground-based interceptor gave the first stage emissions as 15,000 kilograms. So what's given in this EIS is a factor of 100 too small.

Probably the most serious problem is that this document is largely irrelevant.

As the summary in Section 1.2 indicates, environmental analyses have been done for most of the components already. Notable exceptions are sea-based midcourse defense and space weapons, which to my knowledge have not been analyzed.

R&D and testing of most of the components is well underway and decisions have mostly been made

DC_PHO0044

about these systems, including even decisions about the initial deployment of the ground-based midcourse defense and the sea-based midcourse defense.

The No Action Alternative is not seriously considered. It is claimed not to be at the direction of Congress, presumably the 1999 Missile Defense Act. This Act states U.S. policy is to deploy as soon as is technologically possible an effective NMD system, but the EIS has no discussion about NMD effectiveness and whether that criteria is satisfied.

Finally, the spiral development approach seems to preclude any meaningful assessment. The PEIS could make an useful contribution by analyzing how to judge the effectiveness of the missile defense with no specified architecture and no operational requirements.

Thank you.

DC_PHO0045

ELAYNE POOL: I have a letter that's been signed by 36 people and myself and I would like to read that to you, please.

We support a real No Action Alternative to the deployment of a missiles defense system. This means no further testing, development or deployment.

Deployment of such a system threatens a new nuclear arms race, puts the global environment at risk, and does not improve the security of the United States.

Deployment of a missile defense system will increase the likelihood of a nuclear catastrophe. It impels Russia to maintain a larger nuclear arsenal on high alert than it otherwise would.

Deployment also drives China to deploy a larger arsenal. The impact of a nuclear war, whether accidental or intentional, would dwarf any other environmental nightmare one can envision.

Moreover, the system does not improve our security. So far it has yet to be tested in realistic conditions and would be ineffective against an attack.

While in the future the capabilities of this system can be expanded at great expense, these developments are likely to be made useless by the newly improved weapons and countermeasures of potential adversaries.

Finally, the $10 billion a year being spent on missile defense should be spent on measures that are more effective and environmentally sound. One example is the program to secure stockpiles of nuclear weapons material in the former Soviet Union and other countries.

The testing, development, and deployment of the missile defense system should be halted, given that the system leads to environmental harm and potentially to environmental devastation and does so without improving the security of the United States.

Finally, I'd like to read a statement, and I wonder if you know who said it. These words certainly apply to this costly system that is untested and will endanger mankind further.

"Every gun that is made, every warship launched, every rocket fired, signifies in the final sense, a theft from those who hunger and are not fed, those who are cold and are not clothed.

"The world in arms is not spending money

alone. It is spending the sweat of its laborers, the genius of its scientists, the hopes of its children.

"This is not a way of life at all, in any true sense. Under the cloud of threatening war, it is humanity hanging from a cross of iron."

That was said by Dwight Eisenhower, Five Star General of the U.S. Army and the United States President.

DC_PHO0046

KYLE KAJIHIRO: Aloha. I am Kyle Kajihiro.

Thank you for this opportunity to testify. I am representing the American Friends Service Committee this evening, Hawaii area program, and we're opposed to the Ballistic Missile Defense System completely.

I think that you have inadequate alternatives. You only have three alternatives and there ought to be a fourth one which includes not deploying, developing the Ballistic Missile Defense System, and actually reducing the scope of existing programs.

That should be considered as a real alternative for considering what is really in the interest of the United States and the world in terms of building a real security environment.

I want to first just go back to the question of the process being flawed so it can get on the record.

Again, I think that these processes have typically discouraged public participation. Whether that's by design or just by negligence, I think that it needs to be noted that there haven't been adequate efforts to reach out to the public, to provide accessible venues and opportunities for people to testify.

As I said earlier, as Terri Kekoolani said earlier, Hawaiian translation is essential, the native

Hawaiian language, Olelo Hawaii, is one of the official languages of Hawaii, and that should be honored in these proceedings so that when Hawaiian words are expressed, they are captured correctly and not noted as inaudible or unintelligible, which is often the case.

Second, the question of native Hawaiian culture being an oral tradition, it's very important that you provide opportunities for people to give live testimony where they can look you in the eye and express what they are feeling.

When you say that often written testimony or e-mail testimony is adequate, you effectively discriminate against a whole group of people who are actually one of the groups that are disadvantaged and should be considered as part of the environmental justice analysis of your Environmental Impact Statement.

The missile defense program we believe violates international treaties and is destabilizing in this global environment. As others have said, it will increase the likelihood of nuclear catastrophe by creating nuclear rivalries and forcing other countries to build up their arsenal.

In July 2001 the Russian foreign ministry spokesperson, Alexander Yakovenko reacted very angrily to the U.S. missile defense tests over the pacific. He warned that the missile defense contributes to a situation which "threatens all international treaties in the sphere of nuclear disarmament and nonproliferation which are based on the 1972 Anti-Ballistic Missile Treaty."

On June 13, 2002, George W. Bush unilaterally and without the vote of Congress withdrew the United States from the ABM Treaty.

So I think that if the United States is going to be a leader of the world in terms of establishing policy for peace and democracy, it needs to demonstrate that by its own actions, and instead it's only demonstrated a policy of aggression.

The nuclear posture is now to consider the possible use of limited nuclear strikes. That's a very dangerous step from past nuclear doctrine, and combined with the missile defense system is seen as a threat to many countries around the world.

So I don't think you can separate the missile defense system from the rest of the nuclear doctrine. It has to be considered together. And in that light, missile defense is an offensive weapon, as others have said, to establish U.S. full-spectrum dominance.

So the Programmatic EIS fails to analyze how the proposed BMDS system will affect the international security environment, how will it impact international laws and treaties such as prohibitions on the weaponization of space. And that's one of the explicit options for the Ballistic Missile Defense

System. So that goes against established agreements to keep space for peace.

I want to also speak about the opportunity costs. As someone testified earlier, what we spend on missile defense and other military spending is stealing from the dreams of our children, the potentials of our community.

I want to give you an example of how this would affect us here in the Hawaii, according to the National Priorities Project. Taxpayers in Hawaii will pay 33.1 million for ballistic missile defense in fiscal year 2005.

For the same amount of money, the following could be provided: 11,269 people receiving health care, or 4,426 Head Start places for children, or 17,466 children receiving health care, or 150 affordable housing units, or four new elementary schools, or 9,556 scholarships for university students, or 571 music and arts teachers.

So I say that that needs to be considered. The opportunity costs of ballistic missile defense is one of the impacts that we have to deal with and our children have to deal with, and it needs to be considered in your Environmental Impact Statement, and I didn't see it listed there.

The cumulative impacts analysis I think was very flawed. You said earlier that you would only consider similar types of global actions in comparing

what the cumulative impacts would be, but I think that's a way of effectively ignoring the combined effects of many, many local impacts that occur when you have these programs in many forms around the world. So I think you need to consider all those analyses, the local studies that are being done, that have been done, past, present and future.

And this also includes historical impacts related to colonialism. As others have expressed about the Marshall Islands, the U.S. program there has been devastating for that community. The same is true here in Hawaii for native Hawaiians; the 111 years that the U.S. military has invaded and destroyed Hawaiian land, culture, or denied people the ability to practice. Those also have to be considered as part of the cumulative impacts.

And this gets to the environment justice analysis, which is also flawed and inadequate.

There is an adverse and significant impact on native peoples here in Hawaii, in Greenland, Enewetak in the Marshall Islands, and in other places, Alaska and so forth, and you did not look at how this program has a disparate effect on those peoples, their culture, their resources, and actually their survival. So please consider those.

And, in closing, I urge you to scrap the program. We oppose the ballistic missile defense, it's dangerous, it's wasteful, and the world will be much better off without it. Thank you.

(Applause.)

To add a little levity here to this program: It's been documented that the program is -- the missile defense system is easily fooled by decoys which resemble these mylar balloons in space, and because there's been so much, I think, misinformation or incorrect information about what the program actually is, we wanted to present you with this testimony that sort of documents some of the effects.

DC_PHO0047

ELMA COLEMAN: I'm from the Marshall Islands.

(Applause.)

MR. BONNER: Yes, absolutely.

ELMA COLEMAN: (Speaking Marshallese.)

51 years since the nuclear Bravo exposed the people of Marshall Islands to nuclear fallout.

(Speaking Marshallese.)

The people did not know what was happening. They didn't know how to deal with the nuclear fallout.

(Speaking Marshallese.)

Are they aware of what would they do if there's any accident with the missile testing?

(Speaking Marshallese.)

Conduct one hearing in the Marshall Islands. After all, that's where the missile testing is taking place.

(Applause.)

How come I'm reading here that the request was given to have the hearing posed or made on Kauai, Maui, and the Marshall Islands, and it was refused? These are the most affected places that are going to be most impacted.

(Speaking Marshallese.)

I don't think that's fair.

DC_PHO0047

(Speaking Marshallese.)

Or at least reassure the people that there's not going to be any accident happening. But we cannot say that there's not going to be any accident. There's no guaranty. No matter what, there's no guaranty. And if something happens, what are the people going to do?

(Speaking Marshallese.)

You know, I'm not sure what kind of chemical you use or you put in a missile testing or in the warhead when you intercept it in space, but all over the years that you have been doing the testing between Kwajalein and Vandenberg, has there been any environmental study of all the debris that has fallen down into the ocean to find out how contaminated the area is and how far spread the contamination is? Has there been anything done like that? And have the people been aware of what has been done or has not been done?

DC_PHO0048

MARTI TOWNSEND: Aloha kakou. My name is Marti. I have a few points to make. The first are mostly legal, because I hope to God this EIS is put through litigation.

First, notice and public hearing were inadequate. Although it's true that NEPA doesn't require them to hold a public hearing, it does require that the notice be on par with the extent of the program. And as they've clearly shown on their beautiful screen, this is supposed to have worldwide effect, yet we're only having, what, thirty of us here? I mean, this is affecting not only all of Hawaii, but all of the pacific and all of the entire world, and where was this hearing noticed in? Was it noticed on TV? Where did you guys hear about it? Word of mouth. I don't think notice was sufficient in this case, especially given the extent of this project.

In addition, as everyone has stated, there should be more hearings held. The three on the continent and the one here are just not sufficient.

In addition, the alternatives analysis is also inadequate. NEPA requires the alternatives to be considered, including the No Action Alternative, as has already been stated. That is sorely inadequate. But, in addition, you'll notice from reading the two alternatives, they're simply variations on a theme, they're one and the same thing.

DC_PHO0048

And the reason for this, the reason why this is justified is because they're getting off on a technicality, because they stated that the purpose of this program or this project is to implement a Ballistic Missile Defense System. It's misleading, because really what this project is supposed to do, like the overriding principle, is to provide for the defense of the United States.

If you're going to provide for the defense of the United States, you need to talk about what are some real practical things that we should do or that Americans should do to protect themselves, and that includes, you know, not going over to other countries and blowing them up. We're actually talking about real diplomacy.

Unfortunately, this EIS doesn't do that, so, therefore, it's inadequate. I'm hoping that through litigation the technicality, like, can really narrowly define the purpose so that you don't have to do an extensive alternatives analysis, will end with this PEIS.

Also, the cumulative impact analysis is also inadequate. NEPA requires that past, present, and future activities that may incrementally add up to accumulative impact on an area be assessed, but this PEIS is flawed for several reasons. First, it doesn't really consider past projects in the cumulative impact analysis. It says something to the effect of, well, there are things that had gone through NEPA assessment before and so we're not considering those now.

This is obviously logically flawed. I mean, the EISs that we've gone through before, had any of them ever dreamed that there would be a missile defense thing shot from space? I mean, let's look at the Striker IS. We're all familiar with that. Does that mention at all anywhere ballistic missiles? No.

Okay. So clearly relying on a NEPA document published before this day is not going to give us an adequate analysis of whether it's a cumulative impact. In fact, there's a heck of a lot going on here caused by the military that never went through NEPA analysis.

Let's talk about use of Agent Orange on Oahu, okay? There's lots that needs to be assessed here, and to just cop out and say, well, there was once a NEPA document done, when we never even dreamed of shooting missiles from space, that's just not going to cut it.

In addition, they also put this really interesting limitation on it that I've never seen before in an EIS, and I've read quite a few myself. It says, well, because this has a national and international nature to the impact of the ballistic missiles, they were only going to consider national/ international cumulative impacts. That means only something that affects the entire continent, only if

DC_PHO0048

it affects the entire world. So we're not going to look at the unique situation of Hawaii. And what we are having to go through is the increasing militarization of Hawaii, and that's not sufficient.

I mean, to really consider the cumulative impacts of this PEIS, we need to talk about things that are in the areas that are likely to be affected and likely to be caused harm.

In addition, the PEIS -- I guess I covered that point. Okay.

So the two main points are that past analysis is needed, we need to look at previous things that have been done in Hawaii and across the country or across the United States that have caused impacts, and then also the effect of not just national/ international impacts, but also of local impacts.

The rest of what I have to say is really like a wake-up call for people. Like I said, there's only what, thirty of us, maybe forty? This thing is huge. We need to not let them take advantage of our trust, take advantage of our naivety. We need to get out there and talk to every person you know about this. This is huge. The only way that we're going to counteract this is not through these public hearings -- they are a great way to educate ourselves and connect with each other -- but what we need to do is talk to your Congress people, talk to your neighbors, vote, demonstrate, write letters to the editor,

DC_PHO0048

educate people about what they want to do.

Crap is going to fall from the sky. It's going to set on fire and it's going to land on the ground. They're going to be shooting hazardous materials from space. And CERCLA is mentioned once in the EIS. CERCLA is the hazardous waste law. Want to know where it's mentioned? In the table of contents, that's it. It's only mentioned in that list where they say, these are what all the abbreviations are. It's not anywhere else in the document.

So we need to organize. They really are playing on our trust and our ignorance about this process. They say stuff like, well, there's no unavoidable adverse impacts. I think Marty said something to the effect there's no, like, showstopper environmental impacts. Well, that's because they are relying on a thing called best management practices.

Best management practices says that given whatever project you're involved in, you use the industry standard to make sure that you are abiding by whatever everybody else is doing. So if you're running a power plant, you look at what other power plants are doing and make sure you are doing the best thing environmentally for that.

Well, let's see. Who else is shooting missiles from space? Don't know. There's only one. Okay. So best management practices is whatever they

DC_PHO0048

want them to be.

So there are going to be unavoidable adverse impacts. We can't let them string us along like that. They use these words and these technical terms and people don't know what they mean. This stuff is just filled with technical jargon and we're forced to read 500 pages and make an informed decision about something.

They are using this process to sort of tell people who don't think we have the time to get involved because we're too busy being employed and trying to raise a family, they use this process to cover up the fact that we aren't really making an informed decision, that people are being taken advantage of, and the law is being tweaked and used to their advantage to disempower us.

So although they may meet technical requirements of NEPA, we need to make people aware of the fact that they are not meeting the real requirements of NEPA and we aren't making an informed decision. Thank you.

DC_PHO0049

JULIA ESTRELLA: Good evening. My name is Julia Estrella and I serve on the National Committee of the United Church of Christ which deals with justice for Micronesians. It is with that hat on that I testify before your committee tonight.

As a member of the Micronesian Pronouncement Implementation Committee of the United Church of Christ, I have become aware of how the United States tested 67 nuclear bombs in the Marshall Islands from 1946 to 1958.

Now the United States' missile plan includes missile launches from Vandenberg Air Force in California to the lagoons of the Marshall Islands.

I am not a scientist, although my husband was a physicist, and therefore I do not understand all the scientific terminology that they use in the EIS. In fact, as I was listening to all three of you make your presentation, I felt like I was an alien from another planet, as though -- I mean, we were totally in a different stratosphere as far as I was concerned. I felt pretty overwhelmed by your presentation and, actually, I began to feel like how the Marshallese folk must have felt when the military approached them and asked them to give up Bikini. I felt like you were saying this is good for mankind, trust us, we know what we're doing, and feeling overwhelmed. You know, I felt like I was being fooled. I felt like the decisions were already being made. How can you say no

DC_PHW0008

when probably the decisions are already made to move in this direction?

Anyway, I feel that I was glad to hear the previous speakers all talk about cumulative effects, because I think that is one of the weakest areas of your EIS. The cumulative effects on the Marshallese people, for example, who have already been exposed to so much nuclear poison and now you want to add more toxic waste into their lagoons. And the cumulation, the additive factors, I think you have not even touched on how this is going to impact a group of people that have already suffered enough for us Americans.

So I think that if we're going to shoot at all, we should be shooting these missiles on the coast of Washington, D.C. I think that would be more fair in terms of cumulative effects on a group of people who have already taken too much of our nuclear and our toxic waste into the lagoons.

Also, I feel that instead of spending billions on an expanded missile defense program, I, like Kyle from AFSC, feel we should spend those billions on the needs of the people.

I work with people who live in public housing, as an organizer, and I see the people on a day-to-day basis who don't have enough food to eat, enough supplies for schools, who are on a survival basis. And here we're speaking about spending all

DC_PHO0049

these billions of dollars for what? You know, to me it's such a big waste of money, a big boondoggle. And who is benefitting from it? All the big defense contractors like Rayon and all these multinational corporations. These are big bucks for the military contractors.

It's not fair, it's not just, and I think we need to realize that. Even in the EIS, we need to state something more clearly about the social impacts and what it does to ordinary people who do not benefit from these kinds of programs. The rich are already getting richer. Why put more money into the pockets of these defense contractors?

Then, finally, I wanted to say that in your EIS I think you're misleading all of us by putting No Action as a third alternative. I think you need to be more honest and state specifically that No Action means to keep on testing as is without the integration.

I think that some of the people here felt like No Action meant that you were going to start dismantling the missile defense system, which, of course, should have been stated as another alternative, which you didn't even give us a chance to put down.

At first I was going to put No Action, and then I read where it says continue testing as is. And so please do not mislead us. Please state what you're really meaning when you say that's a third

DC_PHO0049

alternative. And please give us another alternative which says stop Star Wars, dismantle the missile defense system, start helping the people who really need the help, and let's bring peace instead of more destruction. Because as you were talking, you talked about destroy this and intervene here, and we don't need more destruction. So in the EIS please focus on other than destruction.

Thank you.

RON FUJIYOSHI: My name is Ronald Susumo Fujiyoshi. I come here as a member of U.S. Japan Committee for Racial Justice. I also served as a missionary of the United Church of Christ for 29 years. Twenty of the years were in Asia. And after that, part of the time was in the pacific.

A friend of mine, Dr. Kosuki Koyama wrote a book called "Water Buffalo Theology," and one of the chapters of the book was called "Gun and Ointment." He said that western imperialism has gone and colonized the world, and in many cases the missionaries were the ointment that went along with the gun. And since I was a missionary, I wanted to state very clearly that we need to cut the ties of the missionaries, the ointment that goes with the gun, and to state very clearly that we oppose any gun.

So that's part of the reason why I am here today. I think the EIS or the Draft EIS that I read is just a shibai. "Shibai" in Japanese is something like a show, just a show or a play or a deception. You know, all of the nice PR stuff that is written and says there's no impact, we know there's an impact because we know Marshallese people are dying of cancer. We know that the Department of Energy is cutting back the funds that are monitoring the Marshallese from the atolls of Rongelap and Utrik because of the expense and the war in Iraq.

These are the ones who were used as guinea

DC_PHO0050

pigs in the 67 nuclear and atomic tests. The cumulative effect of the 67 nuclear and atomic tests were 7,000 times the impact of the Hiroshima A bomb. You can't imagine what 7,000 times Hiroshima is.

Seiji talked about coming from Hiroshima, so he has seen firsthand the effect of just one A bomb on Hiroshima, and so it's beyond the scope of us to imagine what 7,000 times that would be.

I went to the Marshall Islands maybe about five times when I spent time there, and the last time I went was on March 1st of last year, which was the 50th anniversary of the Bravo test, and we were there with the survivors and heard their stories of that one Bravo test, which was the first U.S. hydrogen bomb tested. And so we heard the stories of what happened in the tests. And to me it's very hard for the Marshallese people to believe the U.S. military, especially in cases like the EIS, because, as Elma explained, if you looked at the video called "Half Life," you would see that there was a U.S. Commodore Wyett who went and spoke to the Bikini Marshall Islanders after they came out of church on Sunday and he made a statement that you can see for yourself in here that they're going to harness this destructive nuclear force for the good of mankind, and he asked them, will you give permission to move off the island so we can do this for the sake of all mankind. And their response was something like, well, if it is the

DC_PHO0050

will of God, we will do it. And so he made the statement, and I can't forget his statement, well, if it is the will of God, it must be good.

You know, and that kind of a shibai or deception has gone down through the ages.

Many of you know that in 1972 Secretary of State Henry Kissinger confirmed U.S. thinking that American military interests must prevail over the self-determination of the Micronesian people when he casually remarked: "There are only 9,000 people there. Who gives a damn?" This was quoted by former Secretary of Interior Hickel.

So I think if you are Marshallese, are you going to believe an EIS statement that says no impact? I think it's very hard to convince them that there is.

I think those of us who are from Asian or Pacific background, we have a theology that all life is related. What is related is a harmony of life, so that what you do to one thing, affects everything else. But it's only a western kind of thinking that compartmentalizes everything and says, this spot will have no impact, this spot will have no impact, this spot will have no significant impact, this spot won't have, and then they go around the whole thing and say, therefore, there's no significant impact. Well, we know that's erroneous, because the whole understanding of how everything is interrelated is different from that. And I think we need to point that out to the

DC_PHO0050

people here.

We had Joanne Whipplejuwski (phonetic) of the PST (phonetic) who was the managing editor of the Nation Magazine, went over to the Marshalls and did an in-depth story. And she went to Roy Nomura (phonetic) where some of the top U.S. military scientists are stationed. It's way in a secluded area and many of them are brilliant people because they are tracking the missiles. And they said that this is like a bullet striking a bullet. It's impossible to do. It's impossible to do.

And so what they do actually is they put homing devices in the missiles so that they can have a chance of hitting the missiles. If they didn't have that, there would be no way they're going to do this. So here they're spending billions of dollars on Star Wars when the chances of success are so minute that it's wasting of money.

I think we should be using the money not no make war, but to build friends. And I think what it has to do with, places like the Marshall Islands, is to care for those who are affected by the 67 nuclear and atomic tests, and that's how you keep from having war. I think you build friends.

MR. BONNER: Could you finish up, Mr. Fujiyoshi, or come back?

RON FUJIYOSHI: Okay. I think what is happening is there's no transparency. So much of the things are done in secret that we don't know what is

DC_PHO0050

really going on.

I was arrested twice on Kauai, PMRF, when we tried to oppose the missiles being fired from Kauai to Kwajalein. Why? Because pacific people are now firing on pacific people. And so it's being fired from a burial site on Kauai. And one of the things we found out in one of the times we got arrested is that foreign, other countries, are using missiles to test their own missiles, too. And what do they use in the payload, that was secret. We couldn't find out what was it.

So all of the things that we're doing, we're trying to guess, because we don't know. They're asking us to believe them when there's no transparency. And we need to find out what is really going on.

For example, I read all of the material out there. I don't even see the word "depleted uranium." And depleted uranium is so crucial even right now, what is happening in Iraq or elsewhere, you know, people, even our own soldiers that went in Iraq in the first war, you know, were affected by that. I went to Vieques, and we know the effect of depleted uranium upon the people there.

So if they're not even mentioning depleted uranium in the material on here, then what else are they keeping from us? I think we have a hard time believing that what is being done is on good faith.

DC_PHO0050

Finally, I think if it's true that the Missile Defense Agency refused to have public meetings on Kauai where PMRF is and in the Marshall Islands, to me that's a very deep flaw. That's something that needs to be corrected. So I support stopping of Star Wars. Thank you.

DC_PHO0051
TERRI KEKOOLANI: Aloha kakou. Kala mai ia'u.

I'm going to turn my back to you folks. I want to talk to these guys.

I just want to make a few comments. First of all, the first comment I want to make has to do with the process. It is very deeply flawed. If what you are planning goes through, then obviously all islands will be impacted. Therefore, to properly inform our people here in Hawaii, you must have all people from all islands being fully informed, which would include the Big Island, Maui, Molokai, Lanai, Ni'ihau, and Kauai.

And it's amazing to me that you don't have a meeting scheduled in Kauai with almost half of an island impacted by the missile range facility there.

Also, just alone coming on Oahu, you're having a meeting in a very small hotel, in a small room. The capacity of the room is sixty people. And so what it looks like is that you're kind of hiding, and that you are not looking for a way to actually get a lot of people to participate in this process.

So what you're doing is actually minimizing the input of people, but you sure are maximizing the hardware that's going into this plan of yours. So I think this is a very, very, big flaw.

Also I would like to say that I just returned from a visit on the island of Ka-ho'olawe and I mentioned to people who have been visiting from

DC_PHO0051

Kauai on the island that this hearing was taking place here on Oahu, and they didn't know about it. I don't know if you guys know how much it costs to get from Kauai to Oahu, but it takes some money, and our people don't have that kind of money. So it says something about you. It says something about how you folks think, that you don't have our people included in this process.

The second thing that I would like to talk about is five minutes. How long did it take you to put this study together? You all only give us five minutes to comment. I don't understand that.

The other thing is, that's not island style. It takes us maybe kind of like a couple of hours just to say hello, just to get to know you. Like who are you, where you from, why are you here, what's on your mind, what do you want to do? What is going to happen with the plans that you are going to do to us? How is it going to impact us? That takes a long time. I mean, come on.

The other thing is, and people have already commented that you don't have any person here that can translate our language. And I'm glad Ms. Coleman spoke to you in Marshallese. You need to do your homework. Before you come to the islands, you should know what the people speak.

Then I just want to continue with just a few more comments. My name is Terri Kekoolani. I'm a member of Ohana Koa, a Nuclear Free and Independent

Pacific. So on behalf of Ohana Koa I would like to say that we are absolutely against Star Wars, and that means that we would like to see the ending of all testing, development, and deployment of a Ballistic Missile Defense System.

Deployment of the Star Wars program threatens a new nuclear arms race, puts the global environment at risk, and undermines the security of the United States as well, and undermines the security of all people.

Also, Star Wars fuels the nuclear arms race. Deployment will increase the likelihood of a nuclear catastrophe. BMDS greatly increases tensions between the world's nuclear powers.

On June 13th, 2002, George W. Bush unilaterally and without a vote of Congress withdrew the United States from the Anti-Ballistic Missile Treaty, once a cornerstone of arms control. We denounced that unilateral action.

Also, Ohana Koa believes that Star Wars will have a significant adverse impact on native Hawaiians, our Marshall Island brothers and sisters, the Enewetaks, and other indigenous peoples; and that the Programmatic Environmental Impact Statement fails to consider these impacts.

Hawaiian burials and sacred sites are desecrated by the missile launches and Star Wars facilities, while cultural practices and subsistence

DC_PHO0051

access rights are denied due to base security measures.

That is already taking place right now on Kauai. You folks have missile launching pads over there on top of an ancient burial ground. It's called Nohili. It is a crime. It's a crime.

And also there are now people being denied access to beach fronts that have traditionally always been accessible by our people.

So, anyway, on behalf of Ohana Koa, a Nuclear Free and Independent Pacific, we are totally against the Star Wars and want to make that very clear. Mahalo.

IKAIKA HUSSEY: Aloha kakou.

(Speaking in Hawaiian.)

In addition to my own opposition to the proposed ballistic defense system, I come here with words from people who were not offered the opportunity to testify this evening because there was no hearing on the island where they reside and where the impacts will take place.

I'd like to begin with offering the testimony of Mr. Jumble (phonetic) Kalaniole Fu who is a fisherman, commercial fisherman, in a family-owned business on the island of Kauai. He experiences on a regular basis the militarization of his island. He witnesses the missiles leaving Pole Hale. He witnesses the missiles flying up out of the ocean.

He is told that he can't fish in certain areas because of military work that's being done.

He's also very concerned because he's seen it for so long. He talks about 18 years of the people of Kauai constantly being told and being exposed to the Star Wars program to the point where they have become desensitized to it.

He's concerned about the effects that it has on his family. He's spoken to me about the fact that there is no research being conducted to ascertain health effects on the people of Kauai, about the propellants and all those things.

He is also very concerned simply because

DC_PHO0058

of the very dangerous things that we're talking about here. We're talking about missiles. A missile has no function but to be a weapon, unless you put a person into it and they're going to explore outer space. Even in that case there's a probability that there's imperial notions at hand. But what we're talking about here are very dangerous things, and he is concerned about the possible dangers that might come upon him and his family and his people on Kauai.

He has seen missiles that misfired or missed their target and destroyed or -- apparently a missile hit another boat, another American vessel. And he doesn't want to see that happen either to the American military or to his own family. So that was his concern.

I also would like to relate the testimony of Mr. Wilfred who e-mailed me from Canada, and obviously there's no hearing in Canada, but he is very concerned because he knows that the proposed American military expansion, the full-spectrum dominance that we're talking about here, he is concerned about the effects that will have on him and his people in Canada.

He is concerned that it will spark a new arms race. He also mentioned to me that 70 percent of the people in Canada, of people polled in Canada, opposed the Ballistic Missile Defense System, so if that's an indication.

Since 1893, and actually before then, America and the greed of America and also the greed of other European countries, we've experienced that greed through military incursion consistently. American businessmen, European businessmen who wanted to set up shop in Hawaii and sell sandalwood and do whaling, and sell sugar and pineapples, the way that they were able to fulfill their avarice was by calling on the military of their countries to come and support them in their desire for Hawaiian land.

All the way through 1848 to the Mahele and then past the Mahele to 1893 we've had constant military invasions from the outside, people wanting our land for their purposes.

Since 1893 American military has only procreated in Hawaii. It's ironic, I know. And the guns that were pointed at the palace have multiplied, and now we're talking about missiles. And I can't bear the thought of my family and my family's land being part of anyone's desire for empire.

I have no desire for empire personally. I have no desire for dominating anyone. So I can't even fathom the idea of full-spectrum dominance. It seems absolutely inhumane, and I don't think that it is something that you folks or the people of America, people of the United States of America have innate to them. I don't believe that there's something that's genetic about Americans that says that they will try to promulgate empire. So I can only hope for the

emergence of humanity in the United States, and the toppling of a regime that will only promote dominance of other peoples.

(Applause.)

Finally, I would like also to present the testimony of 1,330 people who signed petitions opposing the expansion of military in Hawaii. And these people need to be included in the process. They need to be notified of the Record of Decision. Thank you.

DC_PHO0059

DR. FRED DODGE: Aloha kakou.

AUDIENCE: Aloha.

DR. FRED DODGE: My name is Fred Dodge and I'm a physician, a family practitioner. I'm happy to see two other family practitioners testifying today. We take seriously our role in trying to use preventive medicine in treating communities. I'm also a member of PSR, Physicians for Social Responsibility, and IPPNW stands for International Physicians for the Prevention of Nuclear War, and I also am a member of other organizations. I'm not here representing any of them officially. I speak for myself.

I want to add my voice to those who said that the process is flawed. You really need to hold hearings on Kauai, other places also, but especially Kauai where the Pacific Missile Range Facility is located, who are really greatly impacted by this. And I, too, have friends on Kauai who didn't know about it and want the opportunity to testify.

The Ballistic Missile Defense System, let's just call it Star Wars, everybody seems to know it by Star Wars, is really a part of our warfare state. A lot of people criticize the welfare state mentality, but we really have more of a warfare state mentality now more than ever.

(Applause.)

I think to those who have examined this whole system, it really has -- I mean, it's put

forth as a defensive system, but it really has a great deal of offensive capabilities, and is certainly seen that way by other nuclear powers, especially Russia and China.

I believe it to be dangerous to humans and other living things, and, therefore, I'm certainly against it.

I also question the conclusions of the PEIS in that alternatives that have been mentioned in the past aren't included. I won't go into that except I support those. The lack of detail on cumulative effects is a major defect. And I think the lack of environmental and racial justice needs to be addressed more fully certainly.

And after saying all this, believing it, I agree with Ron Fujiyoshi that it's shibai, this whole thing is something you just sort of go through, because it's going to get approved. But yet we must speak out.

Ghandi has said you have to speak truth to power, and certainly you guys have the power or you represent the government with the power, but we must speak out.

It seems to me that instead of threats from missiles, there's a lot more threats from the suitcase A bombs the U.S. had and then Russia developed the backpack. These are portable A bombs. The horrific thing about it is that the sources that I have read and listened to and so on say that a lot of

DC_PHO0059

these are not accounted for in Russia during the changeover, they're missing. Where are they? I mean, they're the things that can be brought into the U.S.

I don't know how many people are aware of the fact that about a month after 9/11 the U.S. received reports that one of these portable A bombs was somewhere in New York City.

Fortunately it turned out that this was not an accurate report, like many of our intelligence, it was not correct, but it's interesting to note that Mayor Guilliano was not notified of this at the time and was extremely angry when he found out that this had happened. And apparently there was no way, if that were to happen, to find it. That's a real threat, much more so.

The other thing that I want to mention is that all the information that I've read, mostly from independent scientists, says that the Star Wars project is very likely to fail. Originally the PSR, the Physicians for Social Responsibility, had taken up on that there was -- originally they said there would be six percent chance that a missile could get through, especially the multiple warhead type, and so they gave every member of Congress an umbrella with holes in the umbrella amounting to 6 percent of the umbrella surface. It won't keep you dry.

It's also extremely wasteful, and I think that's been addressed here today. It's bound to

DC_PHO0059

escalate the arms race.

I had a letter from the late Patsy Mink, representative from Hawaii, and I'll quote what she told me at the time. This is already three years ago. But she said: The National Missile Defense System has the potential to destabilize our relationship with other nuclear powers and will violate the Anti-Ballistic Missile Treaty, which was then in effect. And, as people have stated, our present president has withdrawn us. And certainly we question whether that withdrawal by the president, without congressional support, is legal.

She goes on to say: We should not deploy a system if we don't know whether it will work, which violates our treaty obligations and escalates deployment of nuclear weapons by potential adversaries. In other words, they see it as offense and they're going to be building up. And other people have stated the same thing.

So where are we at? In my opinion, we don't need it. The world certainly doesn't need it. The project should be abandoned. We could save billions. We could even use it for some human needs, such as 45 million people who don't have health insurance in the United States, for instance. This is where I come from.

I also was going to quote President Eisenhower, but that's been so eloquently quoted earlier.

DC_PHO0059

I'll just say that if there's any way possible to do some of those other alternatives, at least put this on hold, if not scrap it, I think that would be the way to go. Thank you very much.

(Applause.)

DC_PHW0001

BALLISTIC MISSILE DEFENSE SYSTEM
DRAFT PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

COMMENTS SUBMITTED ON BEHALF OF THE LAWYERS ALLIANCE FOR WORLD SECURITY, OCTOBER 14, 2004

One October 13, 2003 the Lawyers Alliance for World Security (LAWS) and the Physiciains for Social Responsibility (PSR) filed comments on the draft Environmental Assessment and Finding of No Significant Impact (FONSI) for the Ground-Based Midcourse Defense (GMD) Initial Defensive Operations Capability (IDOC) at Vandenberg Air Force Base. The thrust of the LAWS/PSR comments was that the Vandenberg EA did not satisfy the requirements of NEPA on several grounds, hence the limited conclusions drawn in the EA were arbitrary. In an October 24, 2003 letter responding to the LAWS/PSR comments, Mr. Jerry Hubbard, of the MDA Ground-Based Midcourse Defense Joint Program Office in Huntsville, AL stated (1) that many of the issues raised by LAWS/PSR would be analyzed in the PEIS; (2) MDA received unanimous concurrence and approvals from the pertinent regulatory agencies, and (3) "this project is not controversial." The basis for the latter statement was that MDA received only one other comment critical of the Vandenberg EA.

Mr. Hubbard's letter went on to state that – "The VAFB IDOC is a vital national project that will enable the United States to protect its citizens from potential adversaries. Although I cannot elaborate fully regarding these threats and the IDOC capability dur to the highly classified nature of the information, the VAFB IDOC will provide a critical defensive capability for the country that does not currently exist. Its timely completion fulfills President Bush's mandate to achieve an initial defensive capability by September 30, 2004 to provide a vital protection for the nation."

A. The NEPA Standard

In considering whether an agency's action is arbitrary and capricious, a reviewing court must consider whether the agency has taken the requisite "hard look" at the environmental consequences of the proposed action, carefully reviewing the record to ascertain whether the agency decision is founded on a reasoned evaluation of all the relevant factors. The Ninth Circuit in Greenpeace Action v. Franklin, 14 F.3d 1324 (9th Cir. 1982) pointed out that when determining whether a proposal will "significantly" effect the human environment, the agency must consider both the context (e.g. society as a whole, national, the affected region, etc.) and intensity (i.e., the severity of the impact). In evaluating intensity, the Court went on, consid-eration must be given to the degree to which the effects on the quality of the human environment are likely to be highly controversial; the degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks, and whether the action is related to other actions with cumulatively significant impacts. Significance cannot be avoided by terming an action temporary, or by breaking it down into small component parts.

Here, MDA has ignored the highly controversial nature of the missile defense program; has, over the years, issued a series of separate environmental analyses on smaller parts of the entire system, so as to avoid the cumulative impact test, and the nature of the proposed layered integrated BMDS program described in this PEIS is so substantially different from earlier iterations that any reliance on many of those earlier environmental analyses is misplaced. They simply will not pass muster. And, as the Ninth Circuit instructed another agency in a case involving a controversial proposal, "… the term 'controversial' refers to cases where a substantial dispute exists as to (the) size,nature, or effect of the major federal action rather than to the existence of opposition to a use." Foundation for North American Wild Sheep v. United States Department of Agriculture, 681 F.2d 1172 (9th Cir. 1982).

The assertion that the missile defense system described in the PEIS will defend the United States now, or by year-end 2004, or really anytime soon, is patently absurd. The system being deployed has no demonstrated capability against a real attack and is missing most of itsmajor elements, including(1) the X-Band radar; (2) the satellite constellations SBIRS-High and SBIRS-Low (the latter now called STSS), and (3) adequate discrimination capability by its exo-atmospheric kill vehicle interceptor, the EKV, which is also missing. The inescapable conclusion is that the Administration is deploying a system that doesn't work and hasn't been adequately tested.

As envisaged by the Administration, the system is to eventually include two satellites (one in high orbit, one in low) to assist in the early detection of missile launches, track missiles and help guide interceptors to their targets. Both satellites have fallen years behind schedule, so until the new radar arrives, the interceptors will have to rely in large part on radar systems that were developed in the 1960s and 1970s. The most important system, in the Aleutians,hasnot been tested for its new role, and, because of the way it is positioned, it would not be able to detect a North Korean launch aimed at Hawaii. Ten interceptors were scheduled to be in place, but currently there are only five or six, and no one knows whether they can hit anything, because they have not yet been tested against targets.

Yet another controversial aspect of the program is its budget. The missile defense budget has doubled in the past four years, and the appropriations for next year is more than ten billion dollars -- about the same as the Army's entire R & D budget, twice the budget of the Bureau of Customs and Border Protection in the Department of Homeland Security, and nearly twice the department's allocation for the Coast Guard. The MDA estimates that the program will cost fifty-three billion dollars through 2009, but it has grossly underestimated costs in the past.

The PEIS at 2-68 states that the alternative of canceling the development of all ballistic missile defense capability development and testing does not meet the need for the proposed action; does not meet the direction of the President and the U.S. Congress, and therefore "will not be analyzed further." One alternative not even mentioned in the PEIS would be to cut the spending in half, to allow the testing of a system that would eventually work against potential adversaries such as North Korea or Iran. Another would be to look at the realistic likelihood that if the US is ever confronted by a nation such as North Korea or Iran with a tested ICBM,

the option of military necessity would be to destroy such an enemy ICBM on its launchpad with precision-guided missiles if an attack seemed imminent. Yet another reason the discarded cancellation option has merit, at least for further analysis, is the statement submitted to the President by forty-nine retired generals and admirals who asked the President to put off the deployment and to transfer the funds to the securing of nuclear facilities and the protection of American ports and borders against the far more immediate dangers of Al Qaeda, rather than pursue a system that may never work against a system that doesn't now exist.

As the former Pentagon weapons evaluator, Philip Coyle, was quoted in the Washington Post on September 29, 2004 lead article on the missile defense program, the idea of deploying while testing – the Administration's current plan – is like building a picket fence, one picket at a time, over several years. As Mr. Coyle pointed out, until the whole thing is complete, such a fence is not much use.

B. The MDA Has Failed to Meet the NEPA Requirement for Considering a Range of Alternatives

The PEIS is defective to the extent that it fails to meet the CEQ guidance on the range of alternatives agencies must consider. Here, the MDA has failed to propose a real no action alternative, and the so-called no action alternative set out at PEIS 2-67 is not a true no action alternative because under it all the individual components of the system would continue to be tested to determine the adequacy of their stand-alone capabilities. Such an alternative could easily have been Alternative 3, but the MDA should also have clearly set out a real no action alternative so that the public could comment on it, instead of being caught in the Catch-22 this PEIS poses. It is difficult not to conclude that the agency's choice of alternatives was dictated by the end result it desired. While there may be portions of the CEQ guidance where reasonable people may differ, surely this is not one of them. And LAWS submits that a reviewing court would find the range of alternatives set out in the PEIS inadequate, in view of all the circumstances.

C. National Security.

The U.S. Supreme Court in Weinberger v. Catholic Action of Hawaii, 454 U.S 139 (1981) held that a NEPA impact statement was not required on the proposed use of facilities to store nuclear weapons. Later cases, however, have elaborated on the restrictions adopted by the Court in Weinberger, and in 1988 the Ninth Circuit noted that NEPA does not have a national defense exception, and that Catholic Action had implicitly rejected this defense. No Gwen Alliance, Inc. v Aldridge, 855 F. 2d 1380 (9th Cir. 1988) Romer v Carlucci, 847 F.2d 445 (8th Cir. 1988) held that federal defense legislation determined the scope of environmental analaysis under NEPA on the proposed deployment of MX missiles to missile silos, and that review of the impact statement on the deployment for compliance with NEPA was justiciable. In other words, using the current vernacular, relying on national security as a shield to preclude an adequate NEPA analysis is not a "slam dunk"defense.

D. Previous Litigation.

On August 28, 2001, the Natural Resources Defense Council, PSR and several other plaintiffs filed a complaint under NEPA against the Secretary of Defense, the Director of the BMDO, and the U.S. Department of Defense for failing to prepare adequate tiered environmental impact statements in view of the massive changes in the program announced by General Kadish in July 2001. The August 2001 Record of Decision, 66 Fed. Reg. 42848, that purportedly implements the NMD Deployment EIS affirms these fundamental changes. "Since the NMD EIS was completed, the Ballistic Missile Defense architecture has evolved into a multi-layered approach that does not distinguish between national and theater threats."

As the plaintiffs noted at p. 19 of the complaint, " There are myriad environmental impacts associated with the activities associated with the new BMD program. These include major impacts from construction of new facilities and testing programs at site in Alaska, Colorado, Hawaii, the Marshall Islands, California, and other possible locations; disruption of unique and pristine ecosystems from activities such as laying communications cable and test launches, which in some cases, like the Kodiak Launch Facility, are located in largely untouched environment that harbors endangered or threatened species; significant deposition of space debris from numerous planned interception tests in low earth orbit, where it can collide with and cripple existing and future satellites; and depositions in the atmosphere of large quantities of ozone-depleting chemicals from the numerous rocket launches required to test and deploy elements of the proposed system."

The lawsuit was subsequently settled, but the fact that it had been filed and that it mentioned space debris focused on a very significant aspect of the proposed program.

E. Space Debris.

LAWS endorses and incorporates by reference the excellent discussion of space debris in the statement prepared by Theresa Hitchins, CDI Vice President, entitled "Missile Defense Agency Fails to Adequately Address Dangers of Orbital Debris to Spacecraft, People,and Objects in Space, the Air, and on the Ground." As Ms.Hitchins makes clear, the PEIS fails to adequately analyze and discuss the possible dangers of debris in space. If the missile defense program has an Achilles heel, this is it. It is inexcusable for the MDA not to have undertaken or provided adequate scientific review of the physics involved in debris creation and re-entry, as well as of the multiple scenarios for missile defense intercepts. The dangers to people, and to objects in the air and on the ground are real, yet the PEIS blithely ignores such dangers. Depending upon the missile trajectory, debris could also be a threat to Canadian citizens, aircraft and ground facilities. As Ms. Hitchens notes, all trajectories to the continental US from North Korea pass over both Canada and Russia, so that both nations are potentially at risk from boost-phase shortfall.

As LAWS and PSR pointed out in their Vandenberg EA comments, "The issues are too important, and the priority accorded this program would suggest to a reviewing court that rather than risk extended delays inherent in legal challenges to the sufficiency of this (PEIS), the MDA would be well advised to take the time and make the effort to prepare a comprehensive (PEIS) that fully meets all the legal requirements of NEPA." That is still good advice. While the PEIS is an improvement in some respects, it remains fatally flawed. LAWS and PSR and others will spell out these fatal flaws in the written comments that are due November 17,2004.

Respectfully submitted,

Leonor Tomero, President
Philip A. Fleming, Past President
John B. Rhinelander, Past President

October 14, 2004

Written comment on draft Ballistic Missile Defense System (BMDS) Programmatic Environmental Impact Statement (PEIS)

By Victoria Samson
Research Analyst, Center for Defense Information

October 14, 2004

The draft Ballistic Missile Defense System (BMDS) Programmatic Environmental Impact Statement (PEIS), dated Sept. 1, 2004, is supposed to give an objective and thorough assessment of the effects various missile defense architectures would have on the environment. However, it has obviously been shaped to give credibility to the Bush administration's continued assertions that the only way the United States can be protected from an ICBM attack is with a heavily tiered system. The draft PEIS dismisses any real concerns about harmful negative consequences from developing such a system and, in doing so, invalidates itself and its conclusions.

To begin with, the so-called "No-action alternative" examined in this document is misleadingly named. It does not detail a scenario where no action is taken. Rather, it describes a system where "the MDA [Missile Defense Agency] would continue existing development and testing of discrete systems as stand-alone missile defense capabilities. Individual systems would continue to be tested but would not be subjected to system integration tests." (p. ES-8) This is hardly no action and allows for an indeterminate amount of missile defense development, since "There are currently no final or fixed architectures and no set operational requirements for the proposed BMDS." (p. 1-9) The way this draft PEIS is structured, even if MDA was limited to the No-action alternative, it would not find its actions very much constrained.

Alternative 2, which includes the usage of space-based interceptors (SBIs), is questionable for many reasons. It looks at the effect of using space-based interceptors in lieu of terrestrial-based ones; however, the BMDS that is repeatedly envisioned by MDA and Pentagon officials is one where targets would be engaged at all stages in their flight, from all types of launch platforms. To look only at the usage of an SBI is to willfully ignore the concept of operations that has been used to justify this massive defense system. The American Physical Society, in its boost-phase intercept study released in July 2003, estimated that a constellation of at least 1000 SBIs would be required to provide a minimal defense against liquid-fuelled ICBMs. Granted, testing would be of a much lesser nature than a complete constellation, but at some point presumably the system would be tested at some fraction of its full strength. This draft PEIS does not take into consideration that possibility.

This draft PEIS also does not look at what would be required to develop a space-based test bed, dismissing the concept as being "too speculative to be analyzed in this PEIS." (p. 2-29) It does not say when such a concept would be analyzed. Finally, this document admits, "If Alternative 2 were selected, additional environmental analysis could be needed as the technologies intended to be used became more defined and robust." (p. 4-

116) But again, that is what this document is supposed to do: examine the environmental effects of the proposed action. By sweeping it under the nebulous responsibility of future studies, it relieves the MDA of liability of negative consequences stemming from SBIs.

Nowhere is this dismissive attitude indicated more clearly than in how the draft PEIS treats debris, orbital and otherwise. Orbital debris is listed as a resource consideration "because of the likelihood of orbital debris occurring from various launch and testing activities and its potential for impact to health and safety and the environment." (p. ES-12) Yet in every case that orbital debris is detailed as resulting from the proposed actions, it is written off as a non-threat to space assets or the terrestrial environment. It is claimed that the orbital debris from booster failure, for example, would be on-orbit for too little time to create damage, and that it would burn up upon re-entry, but even if it didn't, the likelihood of damage is small. (p. ES-21) This same justification is repeated ad nauseum throughout the document. The draft PEIS does admit that the International Space Station (ISS) may be affected by orbital debris, but again downgrades the threat, saying that the ISS could merely do collision avoidance to ensure its safety. (p. ES-39) This no doubt comes as surprise to our partners in the ISS who were unaware that we were planning on weapons systems that very well could destroy our joint effort unless valuable fuel was used to effect a collision avoidance strategy.

This dismissal of the threat of orbital debris to space assets contradicts statements made elsewhere in the draft PEIS. The document discloses that "little advance warning could be given to clear air space" if an SBI had an uncontrolled reentry. (p. 4-121) And, with a nod to the unpredictable, the document says, "Objects reentering may skip off the Earth's atmosphere, similar to a stone skipping across a pond, causing them to impact much farther away than originally predicted." (p. 4-122) Despite this, the document still clings stubbornly to the conclusion that orbital debris would have no significant impact.

The draft PEIS fails to fully address the effects of other types of debris – rocket fragments, fuel, and so forth. Again, it barely scratches the surface of potential harmful consequences that could plausibly result from the alternatives listed, and again, it immediately dismisses the few consequences that are divulged. Debris that could fall into the ocean "would become diluted and would cease to be of concern." (p. 4-51) Debris that survived reentry is not to be worried about, as it would fall into a pre-established footprint, and even if it didn't, "Debris is more likely to terminate in water than on land because water covers 75 percent of the Earth's surface." (p. 4-119) Debris from spills or intercepts in the air is assumed to dissipate before it hit the ground. (p. 4-24)

Yet this is making a real leap of faith in how these actions would affect the environment, and doing so in a manner that precludes any real assessment of what sort of consequences could occur. The treatment of the Airborne Laser (ABL) is indicative of this attitude. The draft PEIS says that should the ABL be not able to land at "an appropriate location," its fuel and laser chemicals may have to be jettisoned, but this would be at a minimum altitude of 15,000 feet and thus "would be diluted in the atmosphere." (p. 4-24) And if there was an accidental fire on the ABL, "the liquid and solid laser chemicals would be

consumed or contained." (p. 4-34) These laser chemicals include hydrogen peroxide, ammonia, chlorine, helium, and iodine, according to the document. (p. 4-24) No explanation is given as to what would happen should the ABL jettison its chemicals at a lower altitude than 15,000 feet, nor how exactly the fire would contain all chemicals. The draft PEIS makes these reassuring statements with no solid evidence to back them up.

Another issue that is raised and not explored fully is the testing and deployment of missile defense systems abroad, or OCONUS as it is referred to here. The document asserts, "MDA may also develop test beds in other areas such as the Atlantic Ocean, Gulf of Mexico, or outside the continental U.S. to support testing of BMDS components in those areas." (p. 2-28) But it does not say how this would occur, only that "Because NEPA and other environmental laws generally do not apply to OCONUS activities, various EOs and other DoD directives and instructions have been implemented." (p. 4-111) However, nothing specific has been given on how these laws were implemented; rather, the draft PEIS directs the reader to Appendix G, which is a long listing of international treaties and does not explicitly state how the missile defense systems fit into these commitments. Given how unpopular missile defense is amongst the Canadian, British, and Greenlandic publics – the three countries that are the nearest to being incorporated into the BMDS – this should be explained further.

Finally, the alternatives considered but not carried forward are deliberately chosen to showcase the BMDS systems that the Bush administration has been pushing for in the best light possible. The first one is to cancel development of BMD capabilities, which is explained as being an alternative that "would rely upon diplomatic and military measures to deter missile threats against the U.S." (p. 2-68) This is exactly what has kept the United States safe from attack to date, and yet it is summarily dismissed out of hand. The other alternative is to focus on a single- or two-platform BMDS. But, per MDA threat assessments that are not given but merely referred to, it has decided that "an effective missile defense should include components based on at least the land, sea, and air," so a more limited missile defense system simply would not do. (p. 2-68)

This draft PEIS does not fully examine the actual consequences that could very well result from developing and testing a tiered missile defense system. By deliberately rejecting any and all negative effects, it goes against what is legally required of the NEPA process.

Ballistic Missile Defense System
Draft Programmatic Environmental Impact Statement

Missile Defense Agency Fails to Adequately Address Dangers of Orbital Debris to Objects and People in Space, in the Air and on the Ground

Comments Submitted to the Department of Defense Missile Defense Agency

Theresa Hitchens
Vice President and Director of Space Security
Center for Defense Information

Introduction

On Sept. 1, 2004, the Pentagon's Missile Defense Agency (MDA) released its legally required Draft Programmatic Environmental Impact Statement (PEIS) on the testing and employment of its future ballistic missile defense system. The PEIS, however, dramatically fails to address the potential dangers (both to space-based objects and those on the Earth) from space debris that MDA admits will be created by testing or use of ballistic missile interceptors. The PEIS states (p. ES-33): "Proposed BMDS space-based sensor activities would be expected to produce small quantities of debris, primarily explosive bolts and small pieces of hardware. It may be possible for debris from an exoatmospheric intercept to become orbital debris. However, because the majority of the BMDS activities would occur in Low Earth Orbit where debris would gradually drop into successively lower orbits and eventually reenter the atmosphere, the debris would not be a permanent hazard to orbiting spacecraft. As BMDS testing becomes more realistic, there is a potential for an increased amount of debris reaching and remaining on orbit. A large portion of this debris would likely not remain on orbit for more than one revolution, and eventually all of the debris would be expected to de-orbit."

While these statements are perhaps true, they also serve to downplay the possible dangers of debris. The overall assumption in the PEIS that there is a low-level of risk is not supportable, due to the failure of MDA to undertake or provide adequate scientific review of the physics involved in debris creation and reentry, as well as of the multiple scenarios for missile defense intercepts. The following is an overview of the major inadequacies in the PEIS treatment of issues related to orbital debris.

The Dangers to Spacecraft from Orbital Debris

The PEIS fails to adequately address space as an environment that will be impacted by interceptor testing, deployment and usage.

It is a universally accepted fact that space is an environment that belongs to all humankind and thus must be protected. For example, harm to the space environment prohibited by both the 1967 Treaty on Principles Governing the Activities of States in the Exploration and Use of Outer Space, including the Moon and Other Celestial Bodies (known as the Outer Space Treaty) and the 1977 Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques (know as the Environmental Modification Convention). It is also universally recognized that the space environment is in danger, becoming ever more polluted by orbiting junk left over from human activities in space. Space debris is the inevitable consequence of the global uses of space every single space launch will create some amount and form of debris, just as every kind of public transport on Earth creates some amount and form of pollution. Examples of space debris include: satellites that no longer function; spent and jettisoned rocket bodies; lens caps, bolts, and "exhaust products" from solid rocket motors and small particles such as paint flakes and bits of insulation from day-to-day erosion of orbital objects.

Already, there are ongoing efforts at the UN level to develop universally accepted practices to mitigate the creation of new space debris by space-faring powers; NASA is a key leader in this effort. "It's a classic environmental problem," according to Nicholas L. Johnson, chief scientist and program manager at the Orbital Debris Program Office at NASA's Johnson Space Center in Houston. "If you don't do anything about this for the next 10 or 20 years, then it's too late."

Space debris is dangerous because of its potential to collide with and damage satellites and/or spacecraft. Even tiny pieces of debris can cause destruction. Debris is so dangerous because objects in orbit move at extremely high speeds (about 10 kilometers per second in Low Earth Orbit) and so relative velocities and the energy generated at impact can be very large. The damage that would be caused by a collision in space depends on a number of factors, such as the size of the debris, the size and design of the spacecraft hit, and at what angle the two objects collide. Indeed, the PEIS itself admits that space debris created by missile defense activities (particularly multiple interceptor launches) could present a threat to the International Space Station and other objects in Low Earth Orbit (LEO).

The PEIS severely understates the potential threats to satellites and spacecraft from orbital debris caused by ground-based midcourse interceptor tests, deployment and usage, due to a failure by MDA to conduct adequate scientific review of the likely scenarios for interceptor impact and debris creation.

Ground-based interceptors will create debris in LEO if they impact their targets (Intercontinental Ballistic Missiles [ICBMs] fired at the United States) in the so-called

mid-course phase, when they are outside the Earth's atmosphere. In this phase, the ICBM will be either rising into LEO, at the peak of its trajectory, or starting to descend back through space into the atmosphere. The PEIS states, "The amount of orbital debris could increase from …Ground-based Midcourse Defense … . Such increases in orbital debris would be temporary, as studies indicate that objects in orbit between 200 and 399 kilometers (123 to 248 miles) reenter the atmosphere within a few months."

This statement, however, is somewhat misleading. Up to now, MDA has been configuring ground-based, mid-course intercept tests so as to avoid debris creation, conducting tests at low altitudes and slow speeds, with both interceptor and target on a downward trajectory, so debris created will rapidly reenter the atmosphere. In the last successful test in October 2002, the interceptor hit the target at an altitude in excess of 210 kilometers (140 miles) above the Earth, at a speed of about half of what would be required in a real-life scenario. Realistic testing and employment of a ground-based mid-course system would require intercepts at higher altitudes orbit of around 300+ kilometers and extremely high speeds, and would more likely take place with both the interceptor and the target flying in an upward trajectory – facts of physics that would lead to the creation of more debris and likely result in debris being flung into a higher orbital plane than the altitude of the intercept itself. If the debris ends up orbiting at higher than 399 kilometers, it could remain in space for years. There is no evidence that the PEIS takes into account this latter possibility.

Even if the debris remains in space only for a "few months" it would still pose a potential threat to space assets in its orbital pathway, including perhaps, as the PEIS itself admits, the International Space Station (ISS). While, as the PEIS notes, the ISS can be (and has been in the past) moved to avoid potential collision with space debris, this is not a simple task and takes time. Indeed, the PEIS couches its language on threats to the ISS by saying only that it "may be possible" for the ISS to perform collision avoidance to get out the way of any "large debris" created. Further, many other satellites in LEO lack the ability to maneuver at all to avoid debris – a fact that the PEIS fails to mention.

Finally, the PEIS contradicts itself somewhat on the issue of debris risk by stating (on p. 4-132) that since the "debris created is expected to be small" and collision avoidance strategies could be used, there are "no significant impacts expected to the ISS." While it is debatable whether the debris would indeed be "small" – as the PEIS provides no actual modeling to predict the size of debris created by a ground-based midcourse intercept the fact is that small debris could actually be *more* dangerous to the ISS and other spacecraft in LEO. That is because current debris tracking systems cannot track debris smaller than 10 centimeters in diameter (about the size of a softball) adequately enough to allow planning of collision avoidance maneuvers. Debris between 10 cm and 1 cm in diameter (a bit larger than a marble) will penetrate and damage most spacecraft (as the PEIS admits on p. 4-131) and could possible destroy space assets depending on where debris strikes the spacecraft. It also should be noted that the orbital plane between 300 and 400 kilometers is already one of the bands of space most polluted with this size of debris.

The PEIS completely fails to support its claim that there would be no significant impact to spacecraft from the use of Space-Based Interceptors (SBIs) for either boost-phase intercept (as an ICBM is rising into the upper atmosphere) or midcourse intercept, due to the inability of the MDA to provide data required for necessary scientific review.

Given the inadequate articulation by MDA of the SBI concept and the lack of sufficient scientific coverage of space debris in this PEIS, it is impossible for the PEIS to make *any* claims about potential debris production from SBI tests, deployment or usage other than that the creation of debris is a certitude. The PEIS states (p. 4-118), "Using interceptors from a space-based platform would create orbital debris, from successfully intercepting a threat missile and causing it to break up or from the break up of any unsuccessful interceptor or space platform." It further notes (p. 4-118) that SBIs would travel through space after launch, and thus potentially endanger other satellites it their path. It does not, however, mention the fact that launching an SBI constellation into either LEO or GEO would also have debris impacts that might be significant.

The dangers of the debris created, however, can not be scientifically analyzed because the configuration of the SBIs themselves (i.e., their size, mass and speed) has yet to be revealed by MDA; neither has the architecture for their deployment (how many SBIs on orbit and at what altitude) or usage (how many SBIs would be fired at an incoming target) been publicly determined. As noted above, the potential for debris creation depends on a number of factors including the mass of the two objects, the speed of the impact, the altitude of the impact, and the angle of impact. With none of the specific parameters identified for a SBI system by MDA (including in this PEIS), these factors are impossible to model.

Second, even if "best guesses" about a SBI configuration are used based on previously proposed and internal MDA designs, the PEIS fails to take into account the issues mentioned above regarding altitude, size and persistence of debris created by midcourse intercepts, and likely dangers to spacecraft from it.

Third, and perhaps the most egregious inadequacy in the PEIS review of the SBI option, proposals for a SBI network postulate between 500 and several thousand interceptors in LEO each of which would be filled with a large amount of highly-volatile rocket fuel. Thus, the SBIs themselves would be in potential danger of colliding with space debris already on orbit. Such collisions could result in the explosion of the SBI. In fact, current orbital debris mitigation regulations in the United States and elsewhere, as a first-order priority, require space operators to vent any excess fuel from booster rockets used in launching satellites in order to avoid on-orbit explosions, which are proven to create vast amounts of wide-spread debris. The SBIs would also be constantly bombarded by smaller debris that could comprise their integrity. The PEIS completely ignores the possibility of SBIs being damaged by debris. And while the PEIS suggests the possibility that some SBIs also might be based in GEO, there is no effort to address the even more serious threats this architecture would pose to spacecraft. An SBI traveling toward the Earth from GEO would have many more opportunities to collide with other spacecraft as it passed

through subsequently lower orbital altitudes. Also as GEO is already highly crowded with satellites (mostly for commercial communications and broadcast), the threat of debris creation by a network of new, explosive SBIs based in that orbital band could be high. Neither of these potential threats is modeled in the PEIS.

Indeed, the PEIS itself states (p. 4-116) that "additional environmental analysis could be needed as the technologies intended to be used became more defined and robust." Even more worrisome, an article in the Sept. 13 edition of *Space News* ("Space-Based Interceptor Could Pose Debris Threat") reveals that MDA has not even held detailed discussions about the potential for damaging debris from space-based interceptors with NASA's Orbital Debris Program Office.

The Dangers to People, and Objects in the Air and on the Ground

The PEIS makes blanket statements about the lack of danger to aircraft, terrestrial objects and people from space debris created by midcourse intercept activities reentering the atmosphere that cannot be supported in the absence of further scientific review.

Space debris can also be a danger to people and things on the ground, as some space junk will inevitably de-orbit, drop through the atmosphere and land. Although such landfalls are rare, they do happen when very large space objects de-orbit. For example, large pieces of Skylab fell over Western Australia in July 1979; in April 2000 pieces of a Delta 2 second stage rocket fell over Cape Town, South Africa. In the latter case, more than 700 pounds of debris hit the ground, including a nearly intact fuel tank. The Delta rocket had been used to lift a satellite to Geosynchronous Orbit (some 36,000 kilometers) in 1996. A nearly identical event happened in January 1997, when a Delta 2 second stage hit the ground in Georgetown, Texas. One of the pieces of debris from that landfall was a 264 kilogram (580 pound) stainless-steel fuel tank identical to the once recovered in South Africa. That tank came about 50 yards away from a house, and also nearly missed a highway.

The PEIS states on a number of occasions that any debris reentering the atmosphere from a midcourse intercept (by either ground-based or space-based interceptors) event would likely be "small" and thus "burn up" before impacting the ground. Considering that a Delta 2 second stage is a good bit smaller than either an ICBM or the current design of the ground-based midcourse interceptor, that statement is debatable. Nor is it supported by the PEIS itself, which simply does not provide the scientific analysis needed to determine the size of debris created by a midcourse intercept or the possibility of it making landfall intact.

For example, in the case of a booster malfunction or a miss by an interceptor successfully launched from the ground, large pieces of debris likely would fall back to Earth. There is little evidence given in the PEIS to back its contrary assertion that debris would be small and limited in its "footprint." Even in the case of a successful intercept, there is no data provided by the PEIS about the likely size and altitude of debris, data that is required to predict whether or not pieces would make landfall intact.

As the size, mass and speed of any SBI remains undetermined by MDA, it is impossible for the MDA at this time claim that there would be little risk of landfall by debris. However, the possibility of an SBI missing its target and reentering the atmosphere is worrisome, and should be further reviewed using reentry modeling based on several SBI configuration options – modeling that has not been provided by the PEIS.

The PEIS (p. 4-70) also states that "even if an object does survive reentry, only one third of the Earth's surface is land area, and only a small portion of this land area is densely populated. The chance of hitting a populated land area upon reentry would be small." While this is a statement of fact, it does not take into account the trajectory of likely missile tests or intercepts over the Earth. Where reentry might happen is dependent on from where the target missile is launched as well as from where the interceptor is launched, and at what point in their individual trajectories impact is made. The PEIS fails to provide specific data about likely intercept scenarios required to model possible reentry points. For example, there is some question about MDA's ability to do intercept tests from Ft. Greely, the first location for the new ground-based midcourse interceptors, because of concerns about endangering people and the environment. Finally, the PEIS itself admits (p. 4-122) that "Objects reentering may skip off the Earth's atmosphere, similar to a stone skipping across a pond, causing them to impact much farther away than originally predicted."

The PEIS fails to adequately review the likelihood of risks to both aircraft and objects and people on the ground from debris created by space-based boost-phase intercept activities.

In the case of a SBI launch designed to hit an ICBM in its boost phase, it is currently (as with a midcourse design) impossible to predict with reliability the potential for debris to make landfall intact due to the lack of data about the configuration of SBIs. That said, however, a miss likely would result in major ground impact. That is because by any design, an SBI *must* be able to survive reentry of the atmosphere so as to hit the target ICBM before it *exits* the atmosphere. This issue is not addressed by the PEIS at all – and represents a fact that seems to run directly counter to the PEIS's assertion (p. 4-121) that, "Upon reentry, the majority of the space-based interceptor and its platform would burn due to the intense friction and heat created during reentry through the Earth's atmosphere."

Finally, the PEIS admits that any accident (such as a communications failure caused by a defect or jamming) that caused an SBI to reenter the Earth's atmosphere in an uncontrolled manner could create a danger to aircraft in flight. It states (p. 4-121), "Given the difficulty in predicting that path of uncontrolled reentering space-based interceptors and their associated platforms, little advanced warning could be given to clear airspace." It then goes on to assert that most objects break up upon reentry and the impacts to airspace would not likely be significant – an assertion for which no scientific backup is

provided, especially given the fact that SBIs designed for boost-phase intercept would by their nature be required to reenter at least the upper atmosphere intact. Further, even smaller pieces of white-hot debris could severely damage an aircraft in flight.

CENTER FOR PUBLIC ENVIRONMENTAL OVERSIGHT
c/o PSC, 278-A Hope Street, Mountain View, CA 94041
Voice: 650-961-8918 or 650-969-1545 Fax: 650-961-8918 <lsiegel@cpeo.org> http://www.cpeo.org

PERCHLORATE AND THE PROPOSED BALLISTIC MISSILE DEFENSE SYSTEM: COMMENTS ON THE PROGRAMMATIC ENVIRONMENTAL IMPACT STATEMENT

Lenny Siegel
October, 2004

Executive Summary

The Programmatic Environmental Impact Statement (PEIS) for the Ballistic Missile Defense System (BMDS) not only does an inadequate job of addressing the environmental impact of solid rocket propellant associated with this program, but it seems to ignore the purpose of the National Environmental Policy Act (NEPA). That is, rather than consider how to minimize negative environmental impacts in the design of a program, through "cradle to grave analysis," it uses the environmental document to justify decisions that have already been made.

Furthermore, the PEIS lacks a genuine "No Action Alternative," even though NEPA requires that such an alternative serve a baseline against which to compare the environmental impacts of the other alternatives. In particular, a No Action Alternative that posits little or no use of rocket propellant is essential if the program's proponents are to minimize releases of pollutants—particularly solid rocket propellant and its byproducts—into our nation's water supplies, air, or the upper atmosphere, either by selecting a program alternative or agreeing to binding mitigation measures.

Solid rocket propellant that contains ammonium perchlorate as an oxidizer is designed to generate large quantities of hydrogen chloride, which reacts with moisture in the atmosphere to create hydrochloric acid—that is, acid precipitation. The PEIS should consider how the missile defense program might develop and test alternate launch technologies that are not so environmentally destructive.

When rockets are launched into the upper atmosphere, they directly deliver hydrogen chloride to the ozone layer, exposing human, other animals, and other biota to the harmful, persistent effects of ultraviolet-B radiation (UVB). Rocket launches are among the largest causes of ozone depletion, and the persistence of such substances from other sources is no excuse for additional pollution. The BMDS program should at the very least evaluate the mitigation of such seriously harmful environmental consequences through the development and deployment of alternative solid rocket propellants.

Perchlorate, primarily from the manufacturing, testing, aborted launches, maintenance, and decommissioning of solid rocket motors, is polluting the drinking water of more than twenty million people and may be endangering natural ecosystems from Cape Canaveral to the Marshall Islands. The PEIS understates the risks of exposure, and it fails to provide data on the quantities of solid rocket propellant likely to be produced, used, released, and disposed by the BMDS. The PEIS should consider the environmental consequences of various disposal strategies so the BMDS program can develop the technology or capacity to address its waste or consider the use of alternative launch technologies or strategies to minimize either the waste or the negative environmental impacts.

Conclusion

To ensure maximum environmental protection and reduce known, widespread human health risks from the use and disposal of solid rocket propellant, the Programmatic Environmental Impact Systems for the Ballistic Missile Defense System should compare the proposed alternatives against a genuine No Action Alternative. At a minimum it should::

1. **Provide more detailed estimates of perchlorate waste likely to be generated by system development, testing, deployment, maintenance, and decommissioning *and* acknowledge emerging regulatory standards for perchlorate exposure.**

2. **Consider in detail the management practices—launch protocols, treatment technologies, etc.—necessary to mitigate the significant environmental impacts, including increased depletion of the stratospheric ozone layer and the likely release of perchlorate into groundwater, surface water, and soil.**

3. **Evaluate alternative launch technologies not based upon ammonium perchlorate.**

Based upon such additional environment review, which I believe is mandated by any fair reading of the National Environmental Policy Act and its implementing regulations, Program Managers should use the information generated to help evaluate all alternatives and to mandate actions to minimize or mitigate the serious environmental consequences associated with such a large and continuing use of solid rocket propellant. Such steps are necessary to protect the American people, the ostensible purpose of the Ballistic Missile Defense System.

Introduction

I have been asked, by Physicians for Social Responsibility-Los Angeles, to review the draft Programmatic Environmental Impact Statement (PEIS) for the Ballistic Missile Defense System (BMDS), with a focus on the environmental impact of solid rocket propellant associated with this program. I find not only that the PEIS does an inadequate job of addressing these impacts, but like many other environmental reviews it seems to ignore the purpose of the National Environmental Policy Act (NEPA). That is, rather than consider how to minimize negative environmental impacts in the design of a program, through "cradle to grave analysis," it uses the environmental document to justify decisions that have already been made.

The PEIS lacks a genuine, "No Action Alternative," as required under NEPA. It rejects evaluation of the alternative, "Cancel Development of Ballistic Missile Defense Capabilities," because it "does not meet the purpose of or need for the proposed action ..." (page 2-68). This approach misunderstands how NEPA works. It is acceptable to evaluate and reject a No Action Alternative because it doesn't meet the purpose of a program, but the environmental impacts of that alternative must be considered as a baseline against which to compare the environmental impacts of the other alternatives.

In particular, a No Action Alternative that posits little or no use of rocket propellant is essential if the program's proponents are to minimize releases of pollutants into our nation's water supplies, air, or the upper atmosphere, either by selecting a program alternative or agreeing to binding mitigation measures.

The bulk of my analysis focuses on the manufacture, use, and disposal of solid rocket propellant containing ammonium perchlorate, because that is the propellant to be most widely used by the Ballistic Missile Defense program. However, liquid propellants, such as the hypergolic propellant containing hydrazine compounds and nitrogen tetroxide, are highly toxic, and the PEIS should consider how to minimize their environmental, health, and safety impacts as well.

At least by number, the 515 projected BMDS launches over the decade beginning this year dwarfs the 99 other projected government launches and the 77 estimated U.S. commercial launched anticipated over the same time period. The environmental review of such a large system, to be developed over a period of many years and potentially deployed for decades, provides an opportunity to reconsider the technologies that our country uses for launching rockets. The draft Programmatic Environmental Impact Statement ignores that opportunity.

Air Emissions

Solid rocket propellant that contains ammonium perchlorate as an oxidizer is designed to generate large quantities of hydrogen chloride. That is, hydrogen chloride is not generated as a product of incomplete combustion of when a system leaks. Rather, it is released as the normal combustion product of the reaction of aluminum and ammonium perchlorate. Then, hydrogen chloride reacts with moisture in the atmosphere to create hydrochloric acid—that is, acid precipitation. The PEIS briefly recognizes this:

> In biomes where rain is a frequent occurrence, launches with solid boosters have an increased likelihood of contributing to acid rain, thereby increasing the amount of HCl deposited in regional surface waters. In areas with low velocity of surface and groundwater movement and relatively shallow ground water table it is possible that deposition of acidic water may impact water resources. The potential for and extent of impact would need to be examined in site-specific environmental analysis. (page 4-60)

Waiting for site-specific analysis in the indefinite future condemns project sites to acid precipitation. There is no hint of how such an environmental impact might be mitigated. The proper analysis, at this stage, is to consider how the missile defense program might develop and test alternate launch technologies that are not so environmentally destructive. That is, the best solution is not likely be site-specific, so the PEIS itself should evaluate this impact.

The PEIS suggests that aluminum oxide, the other major combustion product of solid propellant, is non-toxic. (page 4-60) However, there is some evidence that aluminum in acid environments is toxic to fish.[1] The PEIS should review the literature and reconsider its conclusion based upon the weight of evidence.

Ozone Depletion

Furthermore, when rockets are launched into the upper atmosphere, they directly deliver hydrogen chloride to the ozone layer that protects the Earth against the harmful, persistent effects of ultraviolet-B radiation (UVB). The hydrogen chloride breaks down, releasing chloride ions that trigger catalytic reactions in which one chlorine atom can destroy over 100,000 ozone molecules. I call the delivery of chloride, in the form of rocket exhaust, to the upper atmosphere: "Free-basing the ozone layer."

Increased exposure to ultraviolet radiation causes universal damage to both human health and the natural environment. "... UVB causes nonmelanoma skin cancer and plays a major role in malignant melanoma development. In addition, UVB has been linked to cataracts.... Physiological and developmental processes of plants are affected by UVB radiation.... Scientists have demonstrated a direct reduction in phytoplankton production due to ozone depletion-related increases in UVB.... Solar UVB radiation has been found to cause damage to early developmental stages of fish, shrimp, crab, amphibians and other animals...."[2]

Once again, the PEIS acknowledges this environmental impact, but it plays it down: "The cumulative impact on stratospheric ozone depletion from launches would be far below and

[1]See, for example, Baker & Schofield, "Aluminum Toxicity to Fish in Acidic Waters," *Water, Air, and Soil Pollution*, 1987, cited in Heinz J. Mueller, Chief, Environmental Policy Section, Federal Activities Branch, U.S. EPA Region 4, "Environmental Assessment (EA) and Finding for No Significant Impact (FONSI) for the Proposed Titan IV Upgrade Program, Cape Canaveral Air Force Station (CCAFS) and Kennedy Space Center (KSC), FL," letter to Captain Anthony E. Fontana, III, Environmental Planning Division, Regional Civil Engineer, Eastern Region, Department of the Air Force, March 28, 1990.
[2]"The Effects of Ozone Depletion: The Connection Between Ozone Depletion and UVB Radiation," U.S. EPA, June 21, 2004. http://www.epa.gov/ozone/science/effects.html

indistinguishable from the effects caused by other natural and man-made causes." (page 4-114). I appreciate the data presented in Appendix I, but the conclusion reached by the authors is implausible.

The PEIS estimates that proposed BMDS launches from 2004 through 2014 would release approximately 1,350,000 kilograms (3,000,000 pounds) of chlorine, primarily in the form of hydrogen chloride, in the stratosphere. Annually, that would be 135,000 kilograms (300,000 pounds). In comparison, official U.S. EPA data estimates annual (2001) U.S. emissions of most destructive industrial ozone-depleting chemicals to total about 50,000,000 kilograms (110,000,000 pounds).[3] Compensating for the chlorine share of the industrial molecules, this means that the potential BMDS launch impact represents about .4% (.004) of the U.S. contribution to ozone depletion.

However, the industrial "emissions" are actually the residuals of production and use of chemical which have been phased out, under the Clean Air Act Amendments of 1990 and a series of international protocols. That is, these substances are already in the environment; nothing can be done to put them back in the bottle. Thus, each year stratospheric releases of rocket fuel exhaust become a larger fraction of the problem, as fewer industrial ozone-depleters are manufactured.

More important, the fractional contribution of rocket-launches to ozone depletion does not make it desirable. It is as large as all but the largest industrial releasers, before the phase-out took effect, and orders of magnitude larger than the releases from a home refrigerator or a car air conditioning system. Our environmental laws and policies do not excuse pollution simply because there are other, larger sources. That is, if I were a repairer of air conditioning systems, I could not—and should not—release chlorine-containing refrigerants into the atmosphere simply because a Titan or Delta launch vehicle emits much more chlorine.

For those unfamiliar with the working of our environmental laws, an analogy in criminal law might be instructive. We don't legalize shoplifting simply because some people conduct million-dollar armored car heists. We may tailor our response to the crime, but we don't say it's acceptable.

Similarly, with the release of ozone-depleting compounds to the atmosphere, we as a society might decide that we shouldn't abruptly end space launches that depend upon solid rocket propellant. Instead, we might set a goal for the deployment of alternatively fueled rockets. The PEIS considers no such goal, despite the urgent need to mitigate global ozone depletion.

The Defense Department, NASA, and others have conducted research on propellants designed to achieve the thrust of ammonium-perchlorate-based fuels without the environmental hazards, but these efforts are poorly funded, and there appears to be no urgency. The BMDS program should at the very least, in its PEIS, evaluate the mitigation of seriously harmful envi-

[3]"Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2001," EPA 430-R-03-004, April, 2003. http://yosemite.epa.gov/oar/globalwarming.nsf/content/ResourceCenterPublicationsGHGEmissionsUSEmissionsInventory2003.html. Note that these numbers overstate the actual chlorine mass in these emissions, but they exclude less destructive substitute compounds.

ronmental consequences through the development and deployment of alternative solid rocket propellants.

Perchlorate Releases

In 1990, when I wrote my report, "No Free Launch,"[4] I focused on the exhaust emissions from solid rocket motors. For the past several years, however, another environmental catastrophe, the pollution of our nation's drinking water with perchlorate, has emerged as a comparable challenge. As many as 20 million people are today drinking water containing perchlorate from rocket fuel production, and hundreds of wells have been taken out of service to avoid further public exposure.

Even in low concentrations, perchlorate in drinking water and food poses a threat to public health, particularly for newborns and other young children. U.S. EPA explains:

> Perchlorate interferes with iodide uptake into the thyroid gland. Because iodide is an essential component of thyroid hormones, perchlorate disrupts how the thyroid functions. In adults, the thyroid helps to regulate metabolism. In children, the thyroid plays a major role in proper development in addition to metabolism. Impairment of thyroid function in expectant mothers may impact the fetus and newborn and result in effects including changes in behavior, delayed development and decreased learning capability. Changes in thyroid hormone levels may also result in thyroid gland tumors. EPA's draft analysis of perchlorate toxicity is that perchlorate's disruption of iodide uptake is the key event leading to changes in development or tumor formation.[5]

Rocket fuel wastes, from manufacturing, testing, training, maintenance, and decommissioning are a significant environmental hazard. This is a front page news story from California to Massachusetts, but it is barely mentioned in the PEIS.

Where it is mentioned, the authors understate the risks of exposure:

> It is now known that perchlorate's direct effects on the human body are limited to the thyroid gland, and only if ingested at very high levels for a prolonged period of time (typically years). Peer-reviewed studies suggest that perchlorate in drinking water below 200 parts per billion has no measurable effect on human health. These findings provide reason to believe that low levels of perchlorate (below 200 parts per billion) also have no measurable effect on pregnant women or fetuses. (Council on Water Quality, 2003) Currently there are no Federal drinking water standards for perchlorate. (4-56)[6]

[4]Lenny Siegel, "No Free Launch: The Toxic Impact of America's Space Programs," National Toxics Campaign Fund, August 1, 1990.
[5]"Perchlorate: Frequently Asked Questions," U.S. EPA, August 5, 2004. http://www.epa.gov/safewater/ccl/perchlorate.html
[6]Note: The cleverly named Council on Water Quality is an association of companies that have released perchlorate pollution into the environment, not a government agency or an unbiased observer.

The reason that there is no federal drinking water standard for perchlorate is that the Defense Department objected to EPA studies that suggested a standard of one part per billion (ppb). Meanwhile, regulatory agencies are using levels far below the 200 ppb asserted in the PEIS. On the way to establishing its own legal standard, California has adopted a Public Health Goal of 6 ppb.[7] In May, 2004, Massachusetts identified a reference dose for perchlorate that would correspond to a 1 ppb drinking water exposure limit. It too is close to promulgating a binding standard.[8] And while U.S. EPA will not promulgate a standard until after the National Academy of Sciences has completed its review, in the interim it has instructed its personnel to use an action level range of 4 to 18 ppb.[9]

The PEIS should offer estimates of the quantities of solid rocket fuel that will be manufactured for the BMDS, not just for testing, but for missiles that will be deployed and hopefully never be launched. From that figure, it can estimate the quantities of manufacturing waste—propellant flakes, chips, and wastewater—likely to be generated. The PEIS estimates that the BMDS program will launch 413 solid-propellant rockets, containing from under 500 kilograms (1,102 pounds) to 60,000 kilograms (132,277 pounds) of solid propellant each. About 70% of that propellant, by weight, will consist of ammonium perchlorate. But nowhere does it estimate what quantity of propellant will be contained in deployed missiles, or even how many missiles will be part of that system. Without that information there is no way to project the amount of propellant waste likely to be generated by the program.

Propellant Disposal

Disposal of missile propellant, for both refurbishing and decommissioning, is a significant financial and environmental cost. NEPA provides the opportunity to weigh those costs before system acquisition, so technological choices that minimize such costs can be considered. The Government Accountability Office (formerly the General Accounting Office) wrote:

> DOD regularly disposes of missiles and has an amount for disposal costs included in its annual budget request. Thus, because it is known at the time of acquisition that costs will be incurred for missile disposal, the probability criterion for recording a liability is met. The Congress has also recognized that disposal costs will be incurred and has emphasized the importance of accumulating and considering this information. For example, the National Defense Authorization Act for Fiscal Year 1995 requires the Secretary of Defense to determine, as early in the acquisition process as feasible, the life-cycle environmental costs for major defense acquisitions programs, including the materi-

[7]"Frequently Asked Questions (FAQs) About the Public Health Goal for Perchlorate," California Office of Environmental Health Hazard Assessment (OEHHA), March 11, 2004.
http://www.oehha.ca.gov/public_info/facts/perchloratefacts.html
[8]"Perchlorate: Toxicological Profile And Health Assessment," Massachusetts Department of Environmental Protection, Office of Research And Standards, Final Draft, May, 2004.
http://www.mass.gov/dep/ors/files/perchlor.pdf.
[9]Marianne Lamont Horinko, Assistant Administrator, "Memorandum: Status of EPA's Interim Assessment Guidance for Perchlorate," U.S. EPA, January 22, 2003.
http://www.safedrinkingwater.com/community/2003/021203perchlorate_memo.pdf

> als to be used and methods of disposal. The life-cycle cost estimates are required before proceeding with the major acquisition.[10]

Solid rocket fuel, when deployed in missile systems, does not last indefinitely. It has a shelf life. Both strategic and tactical missiles must be de-fueled and re-fueled or replaced periodically. By 2009, the Army will need to demilitarize over 102,000 Tube-launched, Optically-tracked, Wire-Guided (TOW) tactical anti-tank missiles, and by 2015 over 306,000 Multiple Launch Rocket System (MLRS) rockets will also require demilitarization. These weapons contain over 45,000,000 pounds of ammonium perchlorate, as well as nearly 1,200,000 pounds of RDX and HMX, two other energetic contaminants.[11]

Other missiles become obsolete and require replacement. The Navy reportedly destroyed more than 350 Poseidon Sea-Launch Ballistic Missile second stage motors, each containing 17,000 pounds of solid propellant—about 6,000,000 pounds total—at Hill Air Force Base in Utah, and it is scheduled to be about a third of the way into the destruction of 800 larger Trident I rocket motors.[12]

GAO did not separate disposal requirements for refurbishing from disposal for decommissioning. In 1998, it tabulated over 574,000 missiles and 5,871 large solid rocket motors in the Defense Department inventory, most of which would require disposal.[13]

Yet the PEIS appears not to address the environmental aspects of missile maintenance and it gives only cursory mention to decommissioning:

> Decommissioning of missiles would first require the removal and proper disposal of liquid, solid, or hybrid (liquid and solid combination) propellants from the booster(s). Where possible, propellants would be recovered and reused. Aging motors that contain flaws would likely be decommissioned using open detonation.... Solid rocket propellant would be removed for reclamation or burning in a controlled environment, such as an incinerator. Where practicable, incineration or closed burning of rocket propellant would be performed. Most of the acid and particulates ejected during the burn would be collected in plume scrubber water. This water would be treated for acceptance by a publicly owned (or federally owned) water treatment works in accordance with a National Pollutant Discharge Elimination System (HPDES) permit. (p. 4-16)

Once again, the PEIS authors don't seem to be reading the newspapers. The disposal of solid rocket propellant through "hog-out" (washing out the propellant) or open burning/open detonation are some of the major sources of perchlorate contamination across the country. The

[10]"Financial Management: DOD's Liability for Missile Disposal Can Be Estimated," U.S. General Accounting Office, GAO/AIMD-98-50R, January 7, 1998, page 6.
[11]"Reusing and Disposing of Missile Munitions: Phase 2," U.S. Army Audit Agency, AA 02-145, February 25, 2002, pages 20-21.
[12]"Hill AFB to Destroy 800 Trident Motors, Project Expected to Last 17 Years," *Defense Cleanup*, June 19, 1998, page 4.
[13]"Financial Management," page. 8.

PEIS should note how much propellant will be used, how often it will be necessary to dispose, and what the environmental impacts of each disposal or treatment method are likely to be. Such information is necessary, not just to estimate the life-cycle costs of the program, but also to figure out in advance how to reduce financial costs and environmental impacts through system redesign or ongoing mitigation activities. That's the purpose of the NEPA process.

To its credit, the Defense Department has developed better technologies for treating and recycling solid rocket propellant. For example, the Army Aviation and Missile Command's Research, Development, and Engineering Center uses super-critical ammonia to process and reclaim the ammonium perchlorate from solid propellant. The Hawthorne Army Depot, Nevada, has installed a prototype biodegradation system processing wastewater containing ammonium perchlorate.[14]

However, the Defense Department does not currently have the capacity to dispose of its current missile demilitarization and disposal inventory by any method, let alone the dispose of solid-propellant in an environmentally sound manner.

- Thermal treatment can release dioxins into the atmosphere. Even at very low concentrations, these compounds are a global, persistent threat to public health.
- Open burning and detonation often releases perchlorate into soil and groundwater.
- Recycling means that significant quantities of perchlorate are likely to be used in construction and mining. However, evidence is emerging—from Westford, Massachusetts, for example—that such uses may be generating unacceptable levels of pollution, as well.[15]
- Treatment systems installed to date lack the capacity to treat all the solid or liquid wastes likely to be generated by BMDS manufacture, maintenance, and decommissioning.

Overall, the PEIS puts off consideration of the challenge of waste decommissioning, stating, "The environmental impacts associated with decommissioning of specific components would be more appropriately addressed in subsequent tiered environmental analysis..." (ES-20)

This is unacceptable. It can only lead to "end-of-pipe" solutions, even though the Defense Department's own environmental managers and specialists agree that environmental protection should be integrated into acquisition and even research and development. The 2001 Munitions Action Plan, for example, states:

> The current emphasis in acquisition of munitions of all types (air delivered, ground launched, and sea launched) is on improving accuracy, reliability and increasing distances between firing or launch points and targets (i.e., so-called standoff ranges). At the same time, the public and regulatory bodies are rais-

[14]"Joint Demilitarization Technology Program," Department of Defense, October, 2003.
http://www.dtic.mil/biosys/org/demil_rept2003_final.pdf
[15]Carrie Simmons, "DEP: Westford 'Responsible' for Water Clean-Up," *Westford Eagle* (Massachusetts), September 30, 2004.

> ing concerns about explosives safety and the environmental effects of munitions. The DoD is also becoming more aware of the cleanup and environmental compliance costs associated with training, testing, demilitarization, and unexploded ordnance (UXO) responses.
>
> These developments have highlighted the need for DoD to address environmental and safety concerns, and costs, throughout the munitions life cycle. This cycle starts from the technology development and design phase to the end-state of use, UXO and munitions constituents cleanup on ranges, or demilitarization. Addressing these concerns early in the life cycle (during requirements definition and acquisition) has the potential to significantly reduce costs and avoid problems later.[16]

That is, if the review of the potential environmental impacts of a system such as the BMDS finds the potential for significant negative environmental impacts, then those designing the system, selecting programmatic alternatives, and managing its testing and deployment should continuously evaluate ways to minimize those impacts, from the beginning.

The PEIS should consider the environmental consequences of various disposal strategies so the BMDS program can develop the technology or capacity to address its waste or consider the use of alternative launch technologies or strategies to minimize either the waste or the negative environmental impacts.

Perchlorate Debris

The PEIS raises and then dismisses the potential environmental impacts from perchlorate debris from launch failure. Presumably the same issues arise if a missile is intercepted before burning all its fuel. It states:

> During flight termination or catastrophic missile failure of solid propellant boosters, pieces of unburned propellant could be dispersed over an ocean area of up to several hundred kilometers. Once in the water, ammonium perchlorate could slowly leach out and would be toxic to plants and animals. In freshwater at 20° C (68° F), it is likely to take over a year for the perchlorate contained in solid propellant to leach out into the water. (Lang et al, 2000, as referenced in U.S. Army Space and Missile Defense Command, 2003) Lower water temperatures and more saline waters would likely slow the leaching of perchlorate from the solid propellant into the water. Over this time, the perchlorate would be diluted in the water and would not reach significant concentrations. (U.S. Army Space and Missile Defense Command, 2003) (page 4-51)

The PEIS authors apparently not followed carefully the research of the Aerospace Corporations team, headed by V.I. Lang, mentioned in their text. This group, which has been

[16]*Munitions Action Plan: Maintaining Readiness through Environmental Stewardship and Enhancement of Explosives Safety in the Life Cycle Management of Munitions,* U.S. Department of Defense Operational and Environmental Executive Steering Committee for Munitions (OEESCM), November, 2001, page 16.

studying perchlorate releases from launch operations for the Air Force, concluded in their most recent report:

> As illustrated by our hypothetical case study, risks associated with the inadvertent release of perchlorate from accidental launch failures must be managed on a case by case basis because of the complexity of variables that can affect the release rate from propellants, and because each launch location has unique environmental characteristics. The same type of approach can be used to assess the risk of perchlorate releases from other operations where sold propellant may be dispersed.
>
> We recommend that a systematic approach to assessing potential impacts be used in the initial planning stages of a launch program, for example, in the AF Environmental Impact Analysis Process, which complies with the National Environmental Policy Act (NEPA). Regulatory agencies may require such analyses be performed prior to new launch programs. In this report, we have presented one type of step-wise approach to assessing perchlorate releases for a typical launch scenario.
>
> Initial studies performed by the University of Alaska on fish exposed to solid propellant in water samples, and in particular on fish exposed to perchlorate in water, indicate the potential for significant biological effects. Studies are also under way to determine the effect of released perchlorate on soil and plant species.[17]

The Army should follow the advice of the Air Force contractors and conduct site-specific analysis of the impact of perchlorate debris on any freshwater lake that might receive perchlorate debris as well as confined oceans waters, such as within the Marshall Islands, where repeated releases of perchlorate could damage sensitive ecosystems or essential food supplies. It should also work with NASA and the Air Force to ground-truth models on perchlorate releases by conducting actual water, soil, and sediment sampling for perchlorate at major launch facilities such as Cape Canaveral and Vandenberg Air Force Base.

Conclusion

To ensure maximum environmental protection and reduce known, widespread human health risks from the use and disposal of solid rocket propellant if the Ballistic Missile Defense System moves forward, the Programmatic Environmental Impact Systems for the Ballistic Missile Defense System should compare the proposed alternatives against a genuine No Action Alternative. At a minimum, to comply with the National Environmental Policy Act, it should::

[17] V.I. Lang et al, "Assessment of Perchlorate Releases in Launch Operations III," The Aerospace Corporation (No. TR-2003(1306)-2, prepared for the Air Force Space Command Space and Missile Systems Center (SMC-TR-04-11), September 18, 2003, page 27. This and other valuable Air Force/Aerospace Corporation studies on the likely environmental impacts of space launches may be found at http://ax.losangeles.af.mil/axf/studies/studypage.htm.

1. **Provide more detailed estimates of perchlorate waste likely to be generated by system development, testing, deployment, maintenance, and decommissioning *and* acknowledge emerging regulatory standards for perchlorate exposure.**

2. **Consider in detail the management practices—launch protocols, treatment technologies, etc.—necessary to mitigate the significant environmental impacts, including increased depletion of the stratospheric ozone layer and the likely release of perchlorate into groundwater, surface water, and soil.**

3. **Evaluate alternative launch technologies not based upon ammonium perchlorate.**

Based upon such additional environment review, which I believe is mandated by any fair reading of the National Environmental Policy Act and its implementing regulations, Program Managers should use the information generated to help evaluate all alternatives and to mandate actions to minimize or mitigate the serious environmental consequences associated with such a large and continuing use of solid rocket propellant. Such steps are necessary to protect the American people, the ostensible purpose of the Ballistic Missile Defense System.

Sacramento Area Peace Action
909 – 12th Street, Suite 118 Sacramento, CA 95814
(916) 448-7157 – www.sacpeace.org

Oct. 19, 2004

Missile Defense Agency, c/o ICF Consulting

Re: Ballistic Missile Defense System.
Draft Programmatic Environmental Impact System

I am here on behalf of Sacramento Area Peace Action and our 4,000 supporters, both to comment on the PEIS, and to register a complaint with the manner in which this hearing was scheduled. There has been no widespread publicity in California that we are aware of regarding this hearing today in Sacramento. Is this some sort of stealth strategy to limit public input on this crucial issue? We question if a Draft PEIS can be legitimate if there is not adequate notice of the document and the hearings on this matter.

What is most disturbing, however, is that the current administration is forging ahead with deployment of the first two interceptors for the BMDS, at Ft. Greely, Alaska, making a mockery of these hearings. And it is even more perplexing that the interceptors that were just installed have not yet been tested in this system! The tests have been continually postponed, and the Pentagon's chief weapons evaluator has said these interceptors may only be capable of hitting their targets about 20% of the time!

Why is our government spending billions of dollars and risking the beginning of a new nuclear arms race on a so-called missile shield with such an abysmal record?

The greatest danger we face is not from intercontinental ballistic missiles carrying nuclear warheads to our shores, but of re-igniting the nuclear arms race and motivating countries that fear us to attempt illegal acquisitions of nuclear weapons. They see that the technology for a missile defense system can also be used offensively against them. Their defense against our military superiority would be to either produce many nuclear ballistic missiles, to overwhelm our TWENTY-PERCENT system, or to use secret delivery systems – weapons smuggled into our country or delivered by short-range missiles launched just offshore.

Forging ahead with the Missile Defense System will also create terrible consequences: pollution from rocket launches, space debris, and accidents within the system or involving civilians. Other groups are scheduled to testify more comprehensively on these environmental hazards. But I am emphasizing here that all people on earth, not just Americans, face grave environmental threats from this drive to dominate the world by dominating space. The environmental pollution may kill us slowly, if we don't do it quickly with a nuclear war.

Thus the greatest environmental impact of the MDS will be to make our entire planet more dangerous to all forms of life, and we Americans are more vulnerable, not safer.

Most Americans consider a nuclear war unthinkable, but apparently our leaders and Congress do not. It is astounding to see the turnaround on proliferation and new nuclear weapons in this administration. Will threatening other nations encourage them to cooperate with the Non-Proliferation Treaty? Will the U.S. violations of the Treaty persuade other nations to embrace non-proliferation? We think not.

Similarly, the abrogation of the Anti-Ballistic Missile Treaty last year by this administration, in order to pursue this fantasy "missile shield" will not promote international cooperation on disarmament.

We can only conclude that this rush to further develop and deploy this ill-conceived "missile defense" shield is driven by ideology and politics, and fueled by the greed for profits from this costly boondoggle. That is what it is, a boondoggle. The leading scientists and Nobel Prize laureates have condemned this as unworkable and dangerous to global security, but this administration rushes headlong into a hasty deployment. The term coined to characterize this drive is "a rush to failure."

In conclusion, we at Sacramento Area Peace Action condemn the alternatives 1 and 2, with the extreme threat they pose to our nation and the world.

We would support the "No Action Alternative," if there had been a legitimate attempt at researching and weighing a true alternative of "no action." Such a proposal should have encompassed a suspension of research and development, no testing, and no initial deployment. It should have evaluated the cost-effectiveness of vigorous pursuit of international cooperation on nuclear disarmament. As it stands, the "No Action Alternative" does not meet the requirements of the National Environmental Policy Act.

For this reason, we consider this draft PEIS inadequate and insufficient for proceeding with the BMDS.

For the Board of Directors,

Winnie Detwiler

Winnie Detwiler

DC_PHW0006

Statement from MacGregor Eddy, advisory board member Global Network Against Weapons and Nuclear Power in Space Regarding the Programmatic Impact Statement (PEIS) for the Ballistic Missile Defense System (BMDS) Oct. 19, 2004 Sacramento California.

1. The 515 projected BMDS launches that are evaluated by the PEIS do not include the intended expansion of the BMDS program, and thus does not meet criteria of the National Environmental Policy Act (NEPA). This intended expansion was described on October 13 by General Henry "Trey" Obering the director of the Missile Defense Agency (MDA). Speaking at the Homeland Security Conference in Colorado Springs General Obering was asked about the new Theater High-Altitude Area Defense (THAAD) missiles scheduled to move into production in late 2005. In response General Obering stated they will ***"augment, not replace, the current generation of ground-based midcourse interceptors. In fact, there will be a continued spiraling up of capabilities in both missile networks, with more missiles and additional sites being added for the current missiles, and an expansion of THAAD beyond the initial scheduled 25 missiles"***

2. The PEIS does not evaluate the environmental impact of the ***no action*** alternative, and thus does not comply with the intent of the National Environmental Policy Act. Without this evaluation there is no way to compare the environmental impact of the program to the impact of the ***no action*** alternative, and thus violates both the letter and the spirit of NEPA.

3. The PEIS does not address the environmental impact of the response to BMDS by other countries. For example, China is planning to increase the number of missiles they have in direct response to the BMDS deployment. The development, testing, deployment and de-commissioning of these missiles in China will impact the global biome.

MacGregor Eddy

DC_PHW0008

Women's International League for Peace and Freedom
United States Section
1213 Race Street, Philadelphia PA 19107-1691
(215) 563-7110 • Fax: (215) 563-5527 • Email: wilpf@wilpf.org
Website: www.wilpf.org

FIRST INTERNATIONAL PRESIDENT
Jane Addams
Nobel Peace Prize 1931

FIRST INTERNATIONAL SECRETARY
Emily Greene Balch
Nobel Peace Prize 1946

U.S. SECTION CO-PRESIDENT
Sandy Silver

EXECUTIVE DIRECTOR
Mary Day Kent

INTERNATIONAL OFFICE
Centre International
1 rue de Varembé
1211 Geneva 20
Switzerland
41-22-919-70-80
41-22-919-70-81 (fax)
info@iprolink.ch
www.wilpf.int.ch

SPONSORS
Julia Alvarez
Elise Boulding
Vinie Burrows
Rep. John Conyers, Jr.
Blanche Wiesen Cook
Frances Farenthold
Dolores Huerta
Yolanda King
Barbara Kingsolver
Elizabeth McAlister
Holly Near
Grace Paley
Suzanne Pharr
Betty Reardon
Sonia Sanchez
Alice Walker

October 19, 2004

Missile Defense Agency BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Friends,

Women's International League for Peace and Freedom (WILPF) submits the following initial comment on the current draft Programmatic Environmental Impact Statement of the Missile Defense Agency.

WILPF is a ninety year old non-governmental organization that has worked tirelessly since its inception to put an end to war. WILPF has supported the development of international institutions and international law, and non-violent methods of conflict resolution that together can facilitate the co-existence of diverse nations and peoples on this planet.

We hope the comments of ourselves, and of others who oppose the militarization of space, will be considered seriously, and that both environmental concerns and concerns for the future of our human race will lead to suspension of this ill-advised and destabilizing missile defense program.

The MDA draft PEIS seeks to answer to detrimental environmental effects of three alternative development plans for Ballistic Missile Defense. We have found the answers disturbingly incomplete. We have also carefully considered all three alternatives presented and have concluded that it would be dangerous – and indeed disastrous -- for the future of our nation to proceed with any of them. It is impossible to comment on all the details in the 701 page document in this short space, but we expect to submit several supplementary comment papers on a few of the many issues of deep concern to us.

First, we are convinced that Alternative 2, which includes development of space based interceptors, is completely unacceptable. We will submit additional comments on both the issue of debris from experiments with space based weapons and on the development of laser weapons. We have other concerns re Alternative 2 that you will perhaps argue are beyond the scope of this PEIS, but that makes them no less important. One is the creation of orbiting debris in space which will remain there

DC_PHW0008

as a threat to future space exploration. The second of these is that space based laser interceptors will be a first step toward the more ambitious program of space weaponization already developed by the Pentagon and the Space Command, and presented in detail in the November, 2003 *U.S. Air Force Transformation Flight Plan*. This is a direction in which no civilized nation should proceed!

We believe that Alternative 1, which does not include space based weapons, and Alternative 3, which is unclear on this point, are also unacceptable, even from a solely environmental viewpoint. We are concerned about the adverse effects in all of the resource areas discussed in the MDA PEIS including hazardous waste, legal restraints, decommissioning of the weapons systems, destruction of the ozone layer, global warming and rocket fuel pollution of our water and river systems. We are preparing supplemental comments on at least some of these concerns.

We also wonder why this expensive and almost certainly unachievable missile defense program has been developed in the first place. It does not answer to probable threats to our national security in the present or in the coming decade. It will do nothing to prevent terrorist attacks, and there is now no hostile country or group with the capability of firing inter-continental ballistic missiles at the United States. Missile defense seems rather to be preparation for future confrontation with the only two countries really capable of threatening our current military domination or challenging us with nuclear attack. Neither of them – China or Russia – is currently an enemy, but this aggressive program may well push them into organizing allies and forces against our own threat of global – and planetary -- domination.

With this in mind, we will submit an additional comment on what we consider to be the only feasible alternative approach to protection of our land and peoples from intercontinental ballistic missiles, from the ravages of nuclear, biological or chemical warfare – or, indeed, from either attacks by small bands of terrorists or from what we have come to call "conventional warfare" (e.g. our own recent "shock and awe" attack on Baghdad).

This Alternative 4 would include a return to the United Nations disarmament treaty process (which the current Administration is regrettably blocking), and assumption of a lead role in the continual development of enforceable and universally applied international law consistent with both the UN Charter and the Universal Declaration of Human Rights. The United States would re-enter that process as the most powerful and most militarized nation in the world and would have no substantial military rivals. This is a rare and critical moment in history and the choice is ours: the United States can lead the way toward a world freed from war with sustainable development and human rights for all – or this nation can drag the human race backward with it into a world ruled by war, military domination and the threat (or use) of weapons more powerful than any known before.

For us in the WILPF there is no question about which route is preferable. We are convinced that continuing with any of these three BMD programs will make the step-by-step process of nuclear disarmament impossible, make war on earth and in space inevitable, and seriously threaten human existence and the entire fragile web of life on our unique and precious planet. We urge all those in the Pentagon, the Missile Defense Agency and in the aerospace corporations to join us in choosing life over death and step-by-step peace building over further destruction of this planet and its fragile web of life

Sincerely,

Sandy Silver, President
United States Section

DC_PHW0009

Public Comment Form
Public Hearing for the BMDS PEIS
Sacramento, CA – October 19, 2004

Dear Participant:

We want to hear from you. If you have comments on the Draft Ballistic Missile Defense System (BMDS) Programmatic Environmental Impact Statement (PEIS), please use the reverse side of this form to bring them to our attention. If more space is needed, please feel free to attach additional pages. For additional information on the BMDS PEIS please visit our web site at

http://www.acq.osd.mil/mda/peis/html/home.html

If you would like to be notified when the Final PEIS is available, request a hardcopy of the Executive Summary or CD-ROM of the entire document, please check the appropriate lines on the form below and verify the accuracy of your address. When you have completed your comments, you may either leave this form with a person at the registration table, or mail, fax or e-mail this form by November 17, 2004 to

MDA BMDS PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031
Toll-free fax: (877) 851-5451
E-mail: mda.bmds.peis@icfconsulting.com

Please Print

Name	Mr.__ Mrs.__ Ms.__ [illegible]
Organization	[illegible]
Mailing Address	[illegible]
Phone Number	
E-mail Address	
Notification of PEIS Availability	Yes __ No __ Hardcopy of Executive Summary ✓ CD-ROM of Final PEIS ✓

[illegible]

K-250

Comment

1) THE PEIS APPEARS TO BE BIASED TOWARDS MINIMIZING THE ENVIRONMENTAL IMPACT OF THE BMDS. THERE IS AN INHERENT CONFLICT OF INTEREST IN THIS REPORT BEING WRITTEN BY THE MDA, WHICH HAS A STAKE IN THE BMDS PROJECT PROCEEDING. AN INDEPENDENT ENVIRONMENTAL IMPACT REPORT SHOULD BE COMMISSIONED BY A NON-PARTISAN PANEL OF SCIENTISTS WITH EXPERTISE IN THE FIELD.

2) THE PEIS IGNORES THE VIRTUAL CERTAINTY THAT OTHER COUNTRIES WILL RESPOND TO THE BMDS BY INCREASING THEIR OWN ICBM ARSENALS. THE ENVIRONMENTAL IMPACT OF A WORLDWIDE INCREASE IN ICBM'S SHOULD BE CONSIDERED, INCLUDING THE INCREASED POSSIBILITY OF ACCIDENTAL ~~[illegible]~~ MISSILE LAUNCHES, POTENTIALLY RESULTING IN ACCIDENTAL NUCLEAR WAR.

3) THE PEIS DOES NOT CONSIDER THE POSSIBILITY THAT THE DEVELOPMENT / DEPLOYMENT OF SPACE BASED WEAPONS BY THE U.S. IS LIKELY TO STIMULATE SIMILAR PROGRAMS BY OTHER COUNTRIES AND INCREASE THE CHANCE OF ACCIDENTAL OR PURPOSEFUL DETONATIONS IN SPACE, RENDERING SPACE UNUSABLE FOR CIVILIAN PURPOSES.

4) THE "NO ACTION ALTERNATIVE" IS NOT TRULY DESCRIBED. [illegible] THE ALTERNATIVE OF THE WORLDWIDE ELIMINATION OF ICBM'S THROUGH DIPLOMATIC MEANS & INTERNATIONAL COOPERATION, INCLUDING VERIFIABLE [illegible] OF [illegible] ARMS INSPECTIONS

K.4.2 Responses to In Scope Comments

Exhibits K-2 (*Responses to Comments – BMDS and Components*), K-3 (*Responses to Comments – Environmental Impacts*), K-4 (*Responses to Comments – Miscellaneous*), and K-5 (*Responses to Comments – Proposed Action and Alternatives*) contain responses to various comments. Each exhibit outlines the issue topic, comment number, excerpt text, and MDA's response. Please note that some comment excerpts address the same issue and to reduce the redundancy in the table, the appropriate response is printed only once and the remaining comment responses for that issue refer to that response. Note that comment text was extracted verbatim from the submitted comments.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
BMDS and Components	E0162-8	6) The PEIS contains a short discussion of future laser weapon systems (page F-7) and the Tactical High Energy Laser (page F-9). It notes that testing of a laser demonstrator began in 2000. The PEIS should review these tests and testing plans for other high-power laser weapons and other directed-energy weapons. An article in the 18 Dec. 2002 Jane's Defence Weekly indicated that a megawatt-class free-electron laser could be tested at PMRF in two to three years.	As indicated Section F of the PEIS discusses those advanced systems that MDA is monitoring for maturation of technology and potential application and integration into the BMDS. The PEIS describes the proposed BMDS components and testing activities in sufficient detail to facilitate a programmatic analysis of the potential impacts. The PEIS is intended to serve as a tiering document for future site- and component-specific analyses. If future plans identify specific locations that are required to support laser activation tests, they would be considered in subsequent tiered NEPA analyses.
BMDS	E0030-1	8) Unless the offensive missiles are sensed on launch and destroyed during boost, the dirty bomb effects will rain on the targets anyway; and the proposed system is not designed to intercept during boost.	The BMDS is envisioned to be capable of defending against all classes of threat ballistic missiles in all phases of flight (i.e., boost, midcourse, and terminal). Currently configured or planned BMDS elements that would defend in the boost phase include the Airborne Laser (ABL) and Kinetic Energy Interceptor (KEI).
BMDS	E0162-7	5) The PEIS has no discussion of the unresolved safety issues involving Strategic Target System and THAAD launches at PMRF which I noted in my scoping comments (second comment on page B-15). No detailed hazard	There are inherent risks with any missile testing activity; however, protection of life and property, on and off range, is the prime concern of Range/Mission Safety personnel. The Range Commanders' Council (RCC)

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		areas have been shown for Strategic Target System launches at azimuths other than 280 degrees. Similarly, no diagrams showing the THAAD hazard area were given in the 2002 THAAD EA and no detailed analysis was cited to justify the reduction in the hazard area radius from 20,000 feet in the 1998 PMRF EIS to 10,000 feet in the THAAD EA. There can be no meaningful public evaluation of the risks of such launches without this information.	Common Risk Critieria for National Test Ranges (RCC 321-02) sets the requirements for minimally acceptable risk criteria for occupational and non-occuptational personnel, test facilities and nonmilitary assets during range testing operations. Under RCC 321-02, individuals of the general public shall not be exposed to a probability of fatality greater than 1 in 10 million for any single mission and 1 in 1 million an an annual basis. Range safety personnel also apply launch window criteria that consider various weather and climatic conditions as appropriate. However, this PEIS is intended to provide a programmatic analysis of the potential impacts associated with the development, testing, deployment, and decommissioning of the BMDS. The PEIS is not a site or component-specific environmental analysis, and therefore does not provide specific information about particular components or their operation at various facilities.
BMDS	E0162-10	8) In 2002 the Defense Dept. announced that it would classify details about missile defense tests that had previously been public information. How can the public and independent technical analysts assess the impacts of tests and judge the effectiveness of BMDS components if this information is unavailable? Similarly, how can one estimate the impacts of entirely secret programs?	The PEIS provides sufficient technical information on the BMDS to enable both the technical analyst and a member of the general public to conduct a programmatic analysis of the environmental impacts potentially associated with the development, testing, deployment, and decommissioning of the BMDS. For specific technical information please see Volume 1 and Volume 2 - Appendices D, E, and F of the PEIS. The BMDS components, functions and activities are adequately explained and evaluated in the PEIS, but specific test results measuring system effectiveness are not necessary

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
			for assessing the potential environmental impacts of implementing the BMDS.
BMDS	E0162-15	13) The example test scenario on page 2-13 involves use of the Cobra Dane radar. However, the August 2003 GAO report GAO-03-600 noted that there were no plans to test this radar using BMDS targets. Are such tests now planned in the next ten years?	The reference in Section 2 to the use of the COBRA DANE radar is an example test scenario and is not meant to refer to a specific test scenario. However, since the publication of the Draft PEIS, the COBRA DANE radar did participate in tracking BMDS target missiles in September 2005. The PEIS provides a programmatic review of the proposed BMDS and is not intended to address the potential environmental impacts of specific tests. Specific test scenarios can only be analyzed in subsequent environmental documentation, as appropriate. It also should be noted that the GAO report was published in 2003 and therefore may not contain the most up-to-date information regarding current plams for using or including BMDS assets in specific tests.
BMDS	E0162-16	14) The details of integrated flight test events are characterized as "only conceptual at this time" on page 2-50. Some test scenarios examined in the 2003 GMD ETR EIS had jet routes between Hawaii and the West Coast crossing the target and interceptor debris areas. What details about these tests will be made available for public evaluation?	The test scenarios examined in the 2003 Ground-Based Midcourse Defense Extended Test Range (GMD ETR) EIS, as well as those discussed on page 2-50, are representative of the range of potential test scenarios envisioned by MDA test planners and show that coordination with the Federal Aviation Administration (FAA) and other agencies would be required because air traffic potentially could be affected by target and interceptor debris. This PEIS process affords the public the opportunity to provide input on the types of environmental impacts potentially associated with testing various components and integrated system testing. This PEIS is not a site or component-specific environmental

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
			analysis, and therefore does not provide specific information about particular components or their operation at various facilities. As specific test requirements become known, site/test-specific NEPA analyses will be prepared, appropriately tiered from this PEIS. If range or air traffic safety concerns arise regarding specific tests, MDA would identify airspace activities that need to be coordinated with the FAA to issue Notices to Airmen (NOTAMs) prior to those specific tests.
BMDS	E0162-17	Section D.2 has a brief discussion of land-based and sea-based Kinetic Energy Interceptors (KEI) for use as possible components of a boost-phase defense. It should be noted that a study of possible boost-phase defenses -- including surface-based and space- based KEI -- found that they would have limited capability against liquid-fueled ICBMs and were unlikely to be practical against solid-fueled ICBMs. This study was done by an American Physical Society study group and was released in July 2003. It is available at www.aps.org/public_affairs/popa/reports/nmdO3.cfm	These comments have been noted for the record. The PEIS does not address DoD threat assessment policy-making or the technological feasibility of missile defense system design.
BMDS	E0319-4	6. Include detailed information on High-Powered Microwaves ('Directed Energy') will be used as part of the BMDS and the environmental hazards associated with their transmission into the atmosphere and ionosphere (include human Electromagnetic Radiation (EMR) hazards)	The commenter's concerns are unfounded. No electromagnetic (EM) phased array or microwave radars are currently located at Kodiak Launch Complex (KLC). Additionally, no radars or radios located at KLC approach a power output in the range of 1.9 megawatts (MW). The existing radars include very high and ultra high frequency (UHF) radars with power outages ranging between 0.5 MW to 1 MW.
BMDS	E0319-13	The Draft PEIS did not give enough detail on the variations of BMDS 'Directed Energy' weapon systems in	See previous response.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		Appendix F-'Advanced Systems' (e.g. high-powered microwaves), or proposed ground-based test locations. All proposed plans should be included in the PEIS for directed energy weapons. A high-power 'electromagnetic' phased array radar network is located on Kodiak Island, Alaska, but the MDA has refused to acknowledge its existence or purpose in all previous Kodiak Launch Complex Environmental Assessments since 1999 (when the microwave system started operating). The microwave's 1.9 Mega Watts (MW) of power has the potential to be used as a BMDS weapon by turning on its high power and directing it at a target or missile, thereby disabling the target's electronics and/or 'heating' up the target and causing it to explode in flight. The U.S. Air Force has received funding for several years for its 'Directed Energy' or 'Electromagnetic Warfare' program (which includes high-powered microwave systems). It is time for the MDA to 'declassify' the program and acknowledge the Kodiak microwave and explain how it will be used in BMDS testing and the human health hazards to Kodiak Island residents from the electromagnetic radiation (EMR) when the microwave is operating.	
BMDS	E0319-17	BMDS Draft PEIS Volume 2, Page D-27-Deployment; MDA proposed plans for 2004-2005 include as many as 16 interceptors (GBI) at Fort Greeley, Alaska and 4 interceptors at Vandenberg AFB, California; However, no mention is made regarding the number of interceptors at the KLC. Why not? Are missile silos being proposed for	The GMD ETR EIS did analyze the environmental impacts of launching interceptors from KLC. As the commenter correctly states, the MDA announced in a Record of Decision (ROD) that there were currently no plans to launch interceptors from KLC. This is still the case. The information presented in Appendix D has

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		Kodiak Island? If so, how many? If not, state the launch method.	been corrected in the Final PEIS to reflect that there are currently no plans to launch interceptors from the KLC.
BMDS	E0319-26	Another area of concern that is mentioned in the Draft PEIS, is the MDA's current testing of Israel's 'Arrow Weapon System' in the United States. The October 24, 2003 'Arrow System Improvement Program (ASIP) Environmental Assessment' (EA), discusses the MDA testing of the system over a 4 year period, with "targets being launched from either the Mobile Launch Platform in the Point Mugu Sea Range or Vandenberg AFB". According to the Arrow System EA, the Arrow interceptor would intercept a "liquid-fueled target system (LFTS) that uses a main liquid fuel, an oxidizer, and an initiator fuel for vehicle motor ignition and propulsion". The EA further states: "the Arrow interceptor missile is a two-stage vehicle launched from a six-pack mobile launcher. The missile contains approximately 1,670 kilograms (3,600 pounds) of solid rocket propellant in the booster. The interceptor with the propellant has a hazard classification of 1.3 and consists of hydroxyl terminated polybutadiene (HTPB), ammonium perchlorate, and aluminum powder. The interceptor also contains an optical (infrared) seeker and a radar sensor. The payload includes a focused blast-fragmentation warhead, with a hazard classification of 1.1D. Combined, the Arrow interceptor missile with its payload has a hazard classification of 1.1." Considering the Arrow interceptor missile has a Hazard class of 1.3 ('mass fire') and the payload's warhead a Hazard class of 1.1 ('mass explosion'), the PEIS should include information on all potential ground-based hazards	The PEIS describes the proposed BMDS in sufficient detail to facilitate a programmatic analysis of the potential impacts of conducting integrated system testing. The PEIS is intended to serve as a tiering document for future site- and component-specific analyses. The Arrow System Improvement Program (ASIP) Environmental Assessment (EA) referenced by the commenter addressed the potential environmental impacts of the testing of the Arrow Weapons System Improvement Program. As future plans for testing the Arrow Weapons System are identified appropriate environmental analyses will be conducted. In addition the ASIP EA has been incorporated by reference in the Final PEIS.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		(and locations) and space-based hazards from the Arrow 'interceptor' and exploding 'warhead' that will release chemicals and add to further air and land contamination if there is a launch accident (or even if there is not an accident). Also, list the name of the warhead in the PEIS. It should have been listed in the Draft. In fiscal year 2004, the ASIP "Caravan 2 would consist of two flight tests of the enhanced Arrow Weapon System at a U.S. test range (to be determined) against a threat-representative target at approximately full range" (BMDS Draft PEIS, Volume 2, page D-46). The October 24, 2003 'Arrow Weapon System Improvement Program EA'-Alternatives to the Proposed Action- Alternatives Not Carried Forward, states: "A number of candidate test ranges were examined, in addition to the Point Mugu Sea Range. All of the candidate test ranges were analyzed for various operational and technical considerations including safety, range availability, instrumentation, operational cost, and logistical support. At the conclusion of the evaluation, only the Point Mugu Sea Range met the ASIP test program requirements". This is contradictory with the statement in the Draft PEIS (Volume 2, page D-46), which states a U.S. test range '"would be determined" for the Caravan 2 flight tests. Since the release of the ASIP EA in 2003, the BMDS PEIS should include all updated plans to launch the Arrow	

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		interceptor missile from other test launch sites/locations (e.g. Reagan Test Site, Kwajalein Atoll, Aleutian Chain, Gulf of Alaska, Poker Flats Rocket Range, Fort Greeley, or the Kodiak Launch Complex). The fact that Israel does not have land available for 'interceptor' missile testing, does not justify the MDA's decision to bring and test another country's 'experimental' war weapons into the U.S, which will contribute to the pollution of U.S. oceans, drinking waters, air and land. Nor should the MDA be helping Israel by testing weapons that will then be shipped back to Israel to be used against its enemies in its 'religious' war, in order to further the 'Israeli Terminal Missile Defense' program. The United States should be doing what it can to negotiate peace rather than promoting war via another country. The wording is not much different in the excuse the MDA gives for testing the Arrow interceptor in U.S. territory- "Commitments to Israel would not be fulfilled, and the United States would not realize any benefits to its own Terminal Missile Defense test program from participation in the ASIP" (Arrow System Improvement Program EA, October 24, 2004).	
BMDS	E0395-9	Also, the relationship between NFIRE and space-based missile defenses, alluded to in the PEIS, should be clarified.	A description of the proposed Near-Field Infrared Experiment (NFIRE) risk reduction activities as they relate to the BMDS is provided in Appendix D, Section D.2 of the PEIS. The NFIRE experiment will allow the MDA to gather additional data about operations from space-based platforms including platforms that could be used to host space-based weapons.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
BMDS	E0395-14	Except for the largely historical discussion in Section D.3, the PEIS does not adequately describe AEGIS BMD operations, the large number of missiles involved, nor the locations where testing or training with those ships and missiles will be conducted, nor the environmental impacts of operational deployment with those ships or missiles.	Aegis Ballistic Missile Defense (BMD) operations are addressed in the PEIS to the same extent as other ballistic missile defense programs. As detailed in the PEIS the individual program elements while developed individually historically are now undergoing integration testing to provide a layered BMDS capable of destroying all ranges of threat missiles in all flight phases. Specific test locations and activities are not analyzed in the PEIS; however, MDA routinely considers all test activities, including those involving Aegis BMD as player or watcher, to determine and prepare the requisite level of NEPA analysis. MDA will continue to consider the environmental impacts of its testing programs tiering from the PEIS, as appropriate.
BMDS	E0395-15	The environmental impacts of the development, testing, training, and deployment of the proposed new, high-speed, Kinetic Energy Interceptors are not adequately addressed. In particular, the number and size of these large interceptors is not described nor are the types of propellants and chemicals involved.	The KEI program is described in Appendix D, Section D.2 of the PEIS. This program was in the earliest planning stages by the MDA and the U.S. Air Force (USAF) at the time of release of the Draft PEIS. The USAF Space and Missile Systems Center addressed the NFIRE in the Orbital-Sub-Orbital Draft EA. Preparation of environmental analysis for the KEI is in the planning stages. This PEIS includes sufficient information to facilitate a programmatic analysis of the potential impacts of a KEI interceptor. This affords the public the opportunity to comment on the types of environmental impacts potentially associated with typical testing early in the development and testing process.
BMDS	E0427-9 and E0439-9	Both the PAC-3 and Aegis Cruisers are included as components of the proposed BMDS Since the PAC-3 is a relatively short range system and is not designed for intercepting ICBMs, how many PAC-3 batteries will have	Issues surrounding the effectiveness of specific BMDS components, numbers of units required to provide a tactical advantage, and tactical operation are not germane to the analysis of the potential environmental impacts of

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		to be deployed to offer full protection for the American and allied cities and military bases. Are these within range of any civilian aircraft? How will they discriminate attacking aircraft from commercial and civilian aircraft? The MDA needs to consider how many civilians and US/allied military personnel will be accidentally killed by the BMDS.	implementing the BMDS. The PEIS is intended to provide a programmatic analysis of the environmental impacts potentially associated with the development, testing, deployment, and decommissioning of the BMDS, and it provides the framework for assessing the envelope of MDA activities considering an integrated BMDS and on a cumulative basis. The PEIS does not evaluate the deployment of the PATRIOT Advanced Capability-3 (PAC-3) at specific sites in the U.S. If the PAC-3 system is deployed in the future additional analysis will be conducted, as appropriate.
BMDS	E0427-10 and E0439-10	11) The PEIS provides conflicting information on the effects of the ABL on health and safety. The PEIS does not quantitatively assess the risk of the Airborne Weapons Laser (in a Boeing 747) blinding pilots and/or other civilians, stating mainly that humans and others would be exposed to the laser beam, mainly as reflected light for less than 0.01 seconds. However the PEIS provides no data on the wattage or power of these lasers in the PEIS making it impossible to assess the dangers of such laser exposure, especially to the eyes.	We disagree with the commenter's assertion that the PEIS provides conflicting information on the effects of the ABL on health and safety. The PEIS states that the ABL lasers are ANSI Class 4 lasers, and that the high energy laser is a megawatt class laser, the beacon illuminator laser and track illuminator laser are kilowatt (kW) range lasers, and the active ranging system operates in the range of 100 watts. The PEIS also addresses the potential impact of lasers on human health and the environment and acknowledges, for example, that severe damage to the fovea could occur if focused light energy were to strike the retina, but that the damage would be less severe if the eye were pointed somewhere off to the side rather than directly at the source. But as explained in the PEIS, the ABL would be tested in airspace areas that are appropriate for this type of activity and MDA test planners would follow all applicable guidelines and regulations, such as establishing restricted areas, displaying warning signs, designating restricted areas, clearing airspace during

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
			tests, and removing reflective surfaces to ensure that the laser does not adversely harm health and safety. Thus, the PEIS describes the proposed BMDS and ABL in sufficient detail to facilitate a programmatic analysis of the potential impacts of the ABL on health and safety.
BMDS	E0427-13 and E0439-13	12) The MDA PEIS needs to consider whether boost phase BMDS interceptors could be launched erroneously, causing another country to believe it was under attack, and thereby triggering a nuclear war. The American Physical Society examined the issue of boost phase intercept, and determined that the interceptor has to be very close to the ICBM. be launched within about 15-60 seconds from the time the ICBM was launched, and have much greater accelerations than the ICBM http://www.physicstoday.org/vol-57/iss-l/p30.html (Kleppner et al. 2004). The problem of boost Phase intercept is greater for solid rockets with high accelerations than for slower accelerating liquid rockets. The further problem is that ship based interceptors are not big enough and do not have sufficient accelerations to make a boost phase intercept even from a small country like North Korea. If it did intercept, it is likely the warhead would not be destroyed by a kinetic hit-to-kill interceptor and would continue on to near its intended destination. Finally, they point out that a boost phase launch intercept of a ICBM from North Korea would likely occur over northern China, further risking causing China to think it was under attack by the US which could cause a nuclear war (Kleppner et al. 2004). The BMDS needs to consider the realities of the limitations of any	The BMDS is envisioned to be capable of defending against all classes of threat ballistic missiles in all phases of flight (i.e., boost, midcourse, and terminal). Currently configured or planned BMDS elements that would defend in the boost phase include the ABL and KEI. The ABL would be deployed to and operate in areas where boost-phase intercepts could be attempted. The PEIS describes the proposed BMDS including weapons that would defend in the boost phase, in sufficient detail to facilitate a programmatic analysis of the potential impacts. However, this PEIS does not address DoD threat assessment policy-making or the technological feasibility of missile defense design.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		BMDS relative to a real no-action alternative of working toward disarmament through arms control treaties.	
BMDS	E0427-14 and E0439-14	13) Space debris from high altitude, mid-course missile intercepts or destruction of satellites. The PEIS does mention that even tiny particles of space debris traveling at extremely high speeds in orbit can destroy space suits, rockets and satellites. While the PEIS correctly points out that debris from low orbital intercepts will decelerate once it hits the atmosphere, and thereby de-orbit. However the PEIS fails to consider the space debris from high altitude intercepts which risk producing space debris that could make space unusable for many years. While the PEIS considers testing the BMDS on "targets of opportunity", no mention is made of space debris resulting if other nations target US BMDS satellites or components in high orbit as "targets of opportunity". This must be considered since the resulting space debris could destroy objects in space, making space unusable as well as violating the 1967 space treaty.	The PEIS considers the environmental impacts including the impacts from orbital debris from increasingly realistic testing scenarios including higher altitude and higher speed intercepts. Technical Appendix L has been added to the PEIS to provide additional rationale for the determination of impacts described in the PEIS for orbital debris. For the purposes of the BMDS PEIS "targets of opportunity" are launches or tests conducted for other programs that can be used as part of a passive test of the BMDS. For example, the launch of a National Aeronautics and Space Administration (NASA) launch vehicle may be observed by BMDS sensors to test equipment. In this example scenario, the NASA launch vehicle would be a "target of opportunity." Therefore, targets of opportunity do not create space debris as part of BMDS testing activities.
BMDS	PHO0011-3	Furthermore, while the PEIS considers testing the BMDS on targets of opportunity, no mention is of the space debris resulting from U.S. targets of opportunity or other nations' targets of opportunity.	See previous response.
BMDS	E0427-15 and E0439-15	14) The environmental consequences of many rocket launches needed to deploy and maintain space- based interceptors has not been adequately considered, nor has the environmental consequences of their fuel. Will space-based satellites/interceptors use nuclear power sources? Will any BMDS interceptors ever use nuclear warheads? While nuclear tipped-interceptors are not mentioned in the PEIS, per se. In Section 2.2.1.1 the PEIS does mention	As stated in the BMDS PEIS, the launch vehicles used to insert space-based platforms into the proper orbit would likely be existing launch vehicles; therefore, the impacts of these launches would be as described for Support Assets. The PEIS states that interceptors may use non-nuclear lethality enhancers to increase the probability of a

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		the possibly of destroying a missile by using interceptors with directed blast fragmentation kill vehicles. However the PEIS, fails to reveal the nature of the blast fragmentation device, which is needed for evaluation of its environmental effects. Instead the MDA PEIS states that "the interceptors will be discussed and analyzed for environmental impacts at the booster and kill vehicle level. This will allow the MDA the flexibility to configure new interceptors based on boosters and kill vehicles analyzed in this document to address new or emerging threats." This does not allow a satisfactory evaluation of the hazards of the BMDS components. What blast fragmentation devices will be used? The PEIS needs to include the details of chemical and toxicant use and exposure.	successful intercept. The PEIS also states that because the BMDS does not include nuclear weapons, the requirements of DoD 4160.21-M-1, Appendix 4, Category XVI, Nuclear Weapons and Test Equipment do not apply. The PEIS describes the proposed BMDS including interceptors, in sufficient detail to facilitate a programmatic analysis of the potential impacts of implementing the BMDS.
BMDS	E0427-16 and E0439-16	15) Radioactive and/or biological weapons fallout from intercepted missiles has not been considered in the PEIS. If a kinetic hit to kill interceptor knocks out an ICBM in the mid phase or terminal phase, the nuclear warhead or its fragments are going to produce a tremendous amount of radioactive contamination where ever they land. Such radioactive fallout will clearly have major, highly deleterious effects on adults, children, and especially on developing embryos, and fetuses. While such an interception is very likely to be highly preferable to damage resulting from an air or ground burst over a city, the resulting radioactive contamination needs to be considered. The effects of war are normally excluded from analysis by the National Environmental Policy Act (NEPA). However, the proposed BMDS action is very likely to provoke a worldwide WMD arms race, and force	There would be no radioactive or biological material from missile intercepts during system integration testing of the proposed BMDS. Such material would not be used in any targets used for intercept and would only be expected in enemy missiles which would be launched to attack the U.S. Any intercepts resulting from such an act of war upon the U.S. would not need to be considered in this PEIS, because as the commenter correctly points out the effects of war are normally excluded from analysis under NEPA.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		other nations to prepare to launch a massive retaliation against the US should war ensue. Thus, these effects need to be considered relative to a real no action alternative. Since the proposed BMDS is very likely to cause a massive arms race, the environmental consequences of a resulting War involving nuclear or other WMD should not be ignored. The PEIS needs to consider the environmental effects of fallout from intercepted WMD as well as the effects of WMD the BMDS fails to intercept. Thus PEIS needs to consider these hazardous waste and materials issues. Appropriate references include "The Effects of Nuclear Weapons, Compiled and Edited by Samuel Glasstone and Philip Dolan, third Ed. DOD, DOE. 1977.	
BMDS	E0427-18 and E0439-18	17) Also note that the technology and environmental effects of "advanced systems" remain to be defined. How can the environment effects of an undefined "advanced system" be evaluated in this PEIS? A full environmental analysis is needed for each component of the PEIS to be added. If any component of the BMDS will ever use nuclear warheads in any interceptors the MDA needs to thoroughly consider the environmental effects, as discussed above.	Appendix F of the BMDS PEIS provides a brief overview of proposed Advanced Systems concepts. Because these ideas and concepts are still emerging, the BMDS PEIS provides a top level review of these programs, as the technology for these systems becomes more advanced, additional tiered site- and component-specific analysis will be developed as required. In addition, see response to comment DC_E0439 (DC_E0427)-15.
BMDS	E0427-19 and E0439-19	18) Will any MDA interceptors or Lasers use anti-matter weapons? A US Air Force anti-mater weapons research programs has recently been described in the SF Chronicle http://sfgate.com/cgi-in/article.cgi?file=/c/a/2004/10/04/MNGM393GPKl.DTL. IF the BMDS will use antimatter weapons or energy sources, the environmental effects including the health and safety risks, and chemical exposure risks need to be described in detail.	The BMDS envisioned by the MDA would include the use of weapons as described in the BMDS PEIS. The BMDS would not include the use of "anti-matter" weapons.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
BMDS	E0427-21 and E0439-21	The following points are points that need to be considered in the no action alternative. 20) The PEIS needs to consider whether the BMDS will result in Proliferation of Weapons of Mass Destruction (WMD) and an arms race in space. The response of other nations to the BMDS has not been considered. Specifically, the BMDS is coupled to other offensive weapons programs and will force other nations to proliferate and/or smuggle WMD so that they can re-establish deterrence. Relatively inexpensive countermeasures to BMD will likely thwart the goals of BMD. Such proliferation coupled with increased international tension will decrease rather than increase our security and lock us in to an expensive and destabilizing amis race and will have devastating long-term environmental consequences.	The Department of Energy (DOE) review was critical because it involved the use of nuclear power, which is not an issue associated with the proposed BMDS. The nature of the proposed system is one that is comprised of existing and new/proposed systems/technologies that are becoming mature and providing new capabilities to destroy a threat missile before it could carry out its mission. It is not reasonable to assume that all activities would stop on individual systems dealing with security and defensive issues in the absence of an integrated system. Nor is it reasonable to assume that the testing of an integrated BMDS would lead to nuclear proliferation any more than other general U.S. international policies and positions.
BMDS	F0005-11	For example, the PEIS projects 515 BMDS launches over the next decade. The sheer volume of this many launches dwarfs the number of projected government and commercial launches over the same period, and the volume of solid rocket propellant involved will generate large quantities of hydrogen chloride, which reacts in the atmosphere to create acid rain.	The PEIS considers the conservative scenario of conducting up to 515 BMDS-related launches over the ten-year period. This would include launch of interceptors and targets. Appendix I of the PEIS provides the background information used to determine the potential cumulative impacts from BMDS launches. This appendix provides the total amount of hydrogen chloride expected to be released from up to 515 BMDS launches. The PEIS finds that the emission loads of chlorine (from hydrogen chloride and free chlorine) from both BMDS and other launches worldwide would account for only 0.5 percent of the industrial chlorine load from the U.S. alone over the same 10 year period. The cumulative impacts analyses of the BMDS implementation alternatives are provided in Sections 4.1.4 and 4.2.3 of the PEIS.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
BMDS	PHO0044-4	Probably the most serious problem is that this document is largely irrelevant. As the summary in Section 1.2 indicates, environmental analyses have been done for most of the components already. Notable exceptions are sea-based midcourse defense and space weapons, which to my knowledge have not been analyzed.	The PEIS examines the potential environmental impacts of MDA's concept for developing and implementing an integrated BMDS, based on Congressional and Presidential direction. The PEIS provides the framework for analyzing the development, testing, deployment, and planning for decommissioning of the BMDS. As Section 4.2.1 of the PEIS states, the potential impacts associated with the use of space-based interceptors are considered in the PEIS and additional environmental analyses would be conducted as needed when the technologies intended to be used become more defined and robust. Aegis BMD operations are addressed in the PEIS to the same extent as other ballistic missile defense programs. As detailed in the PEIS the individual program elements while developed individually historically are now undergoing integration testing to provide a layered BMDS capable of destroying all ranges of threat missiles in all flight phases. Specific test locations and activities are not analyzed in this PEIS; however, MDA routinely considers all test activities, including those involving Aegis BMD as player or watcher, to determine and prepare the requisite level of NEPA analysis. MDA will continue to consider the environmental impacts of its testing programs tiering from the PEIS, as appropriate.
BMDS	PHO0044-5	R&D and testing of most of the components is well underway and decisions have mostly been made about these systems, including even decisions about the initial	See previous response.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		deployment of the ground-based midcourse defense and the sea-based midcourse defense.	
BMDS	PHW0001-2	The system being deployed has no demonstrated capability against a real attack and is missing most of its major elements, including (l) the X-Band radar; (2) the satellite constellations SBIRS-High and SBIRS-low (the-latter now called STSS), and (3) adequate discrimination capability by its exo-atmospheric kill vehicle interceptor, the EKV, which is also missing. The inescapable conclusion is that the Administration is deploying a system that doesn't work and hasn't been adequately tested. Moreover, it will not have the capability even theoretically to protect much of the United States.	The deployment of an initial defensive capability referred to as Initial Defensive Operations (IDO) or Initial Defensive Operations Capability (IDOC) has been considered in previous NEPA documents including the GMD IDOC at Vandenberg Air Force Base (AFB) EA and the National Missile Defense (NMD) Deployment EIS. Subsequent decisions regarding deployment of an initial defensive capability have been made based on these analyses as documented in the GMD IDOC at Vandenberg AFB Finding of No Significant Impact and the GMD IDOC at Ft. Greely ROD (based on the NMD Deployment EIS).
BMDS	PHW0002-2	Alternative 2, which includes the usage of space-based interceptors (SBIs), is questionable for many reasons. It looks at the effect of using space-based interceptors in lieu of terrestrial-based ones; however, the BMDS that is repeatedly envisioned by MDA and Pentagon officials is one where targets would be engaged at all stages in their flight, from all types of launch platforms. To look only at the usage of an SBI is to willfully ignore the concept of operations that has been used to justify this massive defense system. The American Physical Society, in its boost-phase intercept study released in July 2003, estimated that a constellation of at least 1000 SBIs would be required to provide a minimal defense against liquid-fuelled ICBMs. Granted, testing would be of a much lesser nature than a complete constellation, but at some point presumably the system would be tested at some	In Alternative 2 the PEIS considers the use of weapons from land-, sea-, air-, and space-based platforms. Because the analysis of impacts of using weapons from land-, sea-, and air-based platforms was considered in Alternative 1, the PEIS focuses on the impacts of using weapons from space-based platforms in the discussion of Alternative 2. These impacts would be in addition to those impacts for Alternative 1, as was stated in the first paragraph of Section 4.2 of the PEIS. Section 4.2.2 considers the potential environmental impacts from System Integration Tests using land-, sea-, air-, and space-based platforms for weapons, sensors, C2BMC, and support assets. The PEIS considers the impacts of the proposed BMDS as currently envisioned over a period of ten years. Other actions that are outside this evaluation period are outside of the scope of this PEIS and would need to be considered in future analyses.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		fraction of its full strength. This draft PEIS does not take into consideration that possibility.	
BMDS	F0004-3	2 You have said in the past year that there are NO longer plans to install Missile Silos on Kodiak. Keep that Plan. No Silos...Period. You must keep your word true to us citizens. After all its OUR Home + Our Program too.	The PEIS does not address specific locations for BMDS assets for the implementation alternatives; it provides examples of test locations so that resources can be examined for the potentially affected environment. At this time, the MDA has no plans to construct/operate silos at KLC.
BMDS	PHO0023-4	The same with the Airborne Laser. There is a very good probability that an Airborne Laser would never work in shooting down a missile in the boost phase and all tests indicate that. But it could be highly effective in a directed energy targeting on Earth for terrestrial targets. And you should be honest about what that weapon might also be used for. It would be helpful to actually not mask the true purposes of some of these weapons.	The ABL is designed to intercept threat missiles in the boost phase of flight. The ABL would be deployed to and operate in areas where boost-phase intercepts could be attempted. Its effectiveness is undergoing thorough testing as an integral component of the BMDS boost phase defense. The MDA has no plans to use the ABL for terrestrial targets.
BMDS	E0162-3	1) The PEIS should give quantitative information on the reliabilities of the boosters to be used to launch targets for BMDS tests. I noted in my scoping comment (See first comment on page B-15 of the draft PEIS.) that I had asked for this information in my comments on the 1994 BMD draft PEIS and that the response was inadequate for any meaningful assessment of the risks from launch failures. This information is especially important to include in the PEIS because the same target boosters are used in various test programs and because the information has not been included in previous environmental analyses. I noted in my comments on the 2003 GMD ETR draft EIS that an analysis of Minuteman test launches found a rate of severe failures of 15% and that the Strategic Target System has had one serious failure (9 Nov. 2001 launch from Kodiak)	Booster reliability is considered for individual tests. The range or facility safety personnel at the locations of the testing calculate the impact zones for intercept debris as well as impact areas where a non-nominal or errant target or interceptor would impact. These calculations consider the impact areas including the effects of the use of a flight or thrust termination system or other safety measures. In addition, strict range/facility safety procedures required by each range/facility would be adhered to. The MDA uses many different boosters in its testing program and the risk associated with any specific booster would be assessed and addressed by range or facility safety personnel prior to a test.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		in five launches. Including my scoping comment in exhibit B-9 as a health and safety issue seems to imply that this aspect should be analyzed in the PEIS. At the 26 Oct. public meeting in Honolulu, I was assured that including booster reliability information would be considered.	
BMDS	F0005-15	1) In order to evaluate the risks from launch failures, the PEIS should give qualitative information on the reliabilities of the boosters to be used to launch targets for BMDS tests.	See previous response.
BMDS	E0162-6	4) Page D-15 of the PEIS contains misleading information about previous NEPA analyses related to Aegis BMD. It cites the 1998 PMRF Enhanced Capability EIS as a supporting NEPA analysis. In fact, this EIS explicitly excluded the Navy Theater-Wide System (now called Aegis BMD) from evaluation. No subsequent environmental analysis has been done even though Aegis-LEAP tests have been done near PMRF. The PEIS should indicate when environmental analyses of this system will be done. Press reports have indicated that 20 sea-based midcourse interceptors are scheduled for deployment in 2005. The PEIS states on page D-19 that three Aegis BMD cruisers and 15 Aegis BMD destroyers would be available for deployment at the end of Block 2004.	As noted in the 1998 Pacific Missile Range Facility (PMRF) Enhanced Capability EIS, the Theater-Wide system would be designed to engage missiles at long-range and high altitude (outside the atmosphere) and to protect a very large area (theater). This capability is especially important if the attacking missile is carrying a nuclear, chemical, or biological warhead. The Theater-Wide program would provide vital political and military assets, supporting infrastructures, population centers, and entire geographic regions with timely and extensive protection against medium/long range Theater Ballistic Missiles. Operating in international waters, forward deployed ships equipped with the Navy Theater-Wide Theater Ballistic Millise Defense system would have the capability to engage Theater Ballistic Missiles early in their ballistic missile trajectory. Multiple ships operating in mutual support would be capable of providing the layered defense and overlapping coverage that lead to improved levels of protection. It was determined that the Theater-Wide program was not sufficiently developed to be evaluated in the 1998 document. However, Aegis

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
			Lightweight Exoatmospheric Projectile intercept tests are designed to assess interceptor missile operations outside of the atmosphere. These tests were analyzed in the 1998 EIS.
BMDS	F0005-18	(4) The PEIS should indicate when an environmental analysis of the Aegis BMD system will be done. The earlier EIS relied upon at page D-15 contains misleading information.	See previous response.
BMDS	E0162-12	10) The brief history of U.S. missile defense activities in section 1.2 excludes any mention of critical technical analyses of components and testing of them. For example, the 1998 report of the Pentagon panel headed by Gen. Welch characterized the inadequate preparation for flight tests as a "rush to failure." Two GAO reports in 2003 (GAO-03-441 and GAO-03-600 available at www.gao.gov) questioned the adequacy of testing and readiness for NMD deployment. The May 2004 report Technical Realities (available at www.ucsusa.org/global_security/missile_defense/index.cfm<http://www.ucsusa.org/global_security/missile_defense/index.cfm>) by the Union of Concerned Scientists provided a critical analysis of the NMD system being deployed. It is noted on page 1-7 that Pres. Bush's 17 Dec. 2002 decision to deploy an initial defense capability followed "continued test bed development and successful flight test activities." It should be added that this decision followed by six days a test failure and that the test record so far is five intercepts in eight attempts.	These comments have been noted for the record. Section 1.2 of the BMDS PEIS is intended to provide the reader with a brief history of U.S. missile defense activities. The PEIS is a programmatic level analysis of potential environmental impacts associated with the implementation alternatives identified for the proposed BMDS. It does not address DoD threat assessment policy-making issues or the technological feasibility of missile defense system design. Appendix D of the PEIS was intended to provide the reader with a very brief historical perspective on the past development including relevant NEPA analyses, of various DoD programs whose components are being considered for integration into the proposed BMDS. The specific numbers of intercepts or failures of previous Aegis LEAP tests are not relevant to the consideration of environmental impacts from the system integration testing of the proposed integrated BMDS. As specific Aegis BMD components take part in specific system integration tests, analysis of environmental impacts will be analyzed in NEPA documents appropriately tiered from this PEIS.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
BMDS	E0162-13	11) The brief history of the Lightweight Exoatmospheric Projectile (LEAP) program on page D-17 states that tests in the early 1990's showed that LEAP "could be integrated into a sea-based tactical missile for ballistic missile defense." In fact there were no successful intercepts in five attempts in these tests. Two successful Aegis LEAP intercept tests in 2002 are described but there is no mention of the intercept failure on 18 June 2003. The Aegis LEAP test record so far is four intercepts in five attempts.	See previous response.
BMDS	E0162-14	12) It is stated on page D-40 that there were eleven THAAD flight tests in the 1990s and that, "Upon successful intercept, the THAAD program began planning to validate the performance capability and overall effectiveness of the THAAD element, flights tests, and intercepts of target missile launches over more realistic distances..." Of the eight intercept attempts in the 1990's tests, there were only two hits.	See previous response.
BMDS	E0319-11	The PEIS should include all proposed laser test sites including the BOA, and, what experiments will take place at each site, and the total amount of acreage needed as a safety zone. For example, will the Airborne Laser 'test fire' at targets or interceptors launched from Vandenberg AFB, Kwajalein, Kodiak Island, Fort Greeley, or Poker Flats Rocket Range, Alaska?	The PEIS does not address specific locations for BMDS assets for the implementation alternatives; it provides examples of test locations so that resources can be examined for the potentially affected environment. If future plans identify specific locations that are required to support laser activation tests, they would be considered in subsequent tiered NEPA analyses.
BMDS	E0319-14	Draft PEIS Volume 2, pages D-25, D-26 (Exhibit D-6) states Ground-Based 'Interceptors' will be launched from the Kodiak Launch Complex (KLC), Alaska. In the Fall of 2003, a press release by the MDA stated only target missiles, not interceptors would be launched from the	The GMD ETR EIS did analyze the environmental impacts of launching interceptors from KLC. As the commenter correctly states, the MDA announced in a ROD that there were currently no plans to launch interceptors from KLC. This is still the case. The information presented in Appendix D has been corrected

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		KLC. No previously released EAs or EISs have included plans for launching interceptors from Kodiak Island.	in the Final PEIS to reflect that there are currently no plans to launch interceptors from the KLC.
BMDS	E0395-11	The PEIS states that space-based interceptors could be placed in geosynchronous orbit: 35,786 kilometers above the Earth's surface. To actually get a weapon from geosynchronous orbit to low-Earth orbit or even a lower trajectory of a missile within 20 minutes or half hour and do so accurately is physically impossible. Therefore the PEIS has mischaracterized this space weapon. Simply, any weapon placed in geosynchronous orbit could not be an anti-missile weapon. However such a deployment could be an anti-satellite weapon, an ASAT. The agency should then go through the process of trying the field this ASAT weapon on its own merits.	The BMDS PEIS states that space-based platforms for sensors or C2BMC could be placed into Geosynchronous Earth Orbit (GEO); however, there is no mention of placing space-based platforms for weapons into GEO. If future plans were to identify the need for the use of space-based platforms for weapons in GEO, they would be considered in subsequent tiered NEPA analyses, as appropriate.
BMDS	PHO0023-3	The other thing I want to bring up is in regards to in the PEIS there is some statements in the effect that some of the space-based interceptors would be placed in geosynchronous orbit, which I believe is some 24,000 kilometers from Earth. To actually get a weapon from 24,000 kilometers out to what would be a low-Earth orbit or even a lower trajectory of a missile within 20 minutes or half hour and do so accurately and to hit the missile is fantasy. And therefore I think the PEIS mischaracterizes any weapon that would be placed in geosynchronous orbit as being an anti-missile weapon. It should simply not be listed as a possibility. That would be -- well, you would be deploying an ASAT -- an anti-satellite weapon. And you should go through the process of actually fielding that before the public and have -- and take your hits for that if, indeed, you're doing that.	See previous response.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
BMDS	E0395-12	With respect to the Airborne Laser, the PEIS says that, "the ABL is currently the only proposed BMDS element with a weapon using an air platform." This is not correct. The PEIS should also address another proposed BMDS element using air platforms, namely, interceptors fired from aircraft.	At this time there are no plans to use any weapons other than the ABL from air-based platforms to support the BMDS. If future plans were to identify the need to use other weapons from air-based platforms, they would be considered in subsequent tiered NEPA analyses, as appropriate.
BMDS	PHO0026-1	The Airborne Laser is currently the only -- emphasize only -- proposed BMDS element with a weapon using an air platform, closed quotes. However, the PEIS does not discuss another proposed BMDS element that would use air platforms; namely, interceptors fired from aircraft.	See previous response.
BMDS	E0395-16	A third interceptor site is mentioned in the PEIS but it's location is not stated or described. More importantly, the environmental impact of BMDS operations at that third site are not addressed either. MDA officials have said that this third site could hold up to 20 ground-based interceptors and be bigger than the site at Fort Greely, Alaska. The environmental impacts of such as large operation should be addressed.	The PEIS does not address specific locations for BMDS assets for the implementation alternatives considered in the BMDS PEIS; rather it provides location types so that resources can be examined for potentially affected environments. As the BMDS is a defense system undergoing constant scrutiny for improvement, there could be additional locations for various components being considered at stages too preliminary for NEPA analysis. As additional locations or facilities are identified as necessary to support the BMDS, they would be considered in subsequent NEPA analyses tiered from the PEIS, as appropriate.
BMDS	E0401-1	I would like to raise the issue of the 3rd ground-based interceptor site, something which I believe has been completely overlooked in the draft Ballistic Missile Defense System Programmatic Environmental Impact Statement. There is no hard and fast information in this document which indicates where the 3rd interceptor site may be located. However, news stories this fall claim that the United States has been discussing with the United	See previous response.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		Kingdom the possibility of basing our interceptors on their territory. Alternatively, there are reports that Poland may be the host of the third site. Be that as it may, the draft PEIS gives no indication of where the third site will be, nor of the extent of its size. Presumably, if this document is to lay the groundwork for the missile defense network in its entirety, at least several of these alternatives would have to be examined.	
BMDS	PHO0011-4	The environmental consequences of mini rocket launches needed to deploy and maintain space-based interceptors has not been adequately considered, nor has the environmental consequences of the fuel. They talk about having all of the -- these -- in other words, in Option 2, they have many different interceptors in space that would have a reduced environmental consequence. But there's no consideration you have to launch all of those missiles in the place to get there.	As stated in the BMDS PEIS (Section 2.2.4 Support Assets), the launch vehicles used to insert space-based platforms into the proper orbit would likely be existing launch vehicles; and therefore, the impacts of launches to deploy and maintain BMDS assets in space would be as described for Support Assets.
BMDS	PHO0037-4	Another concern is that it didn't really look at the many rocket launches that are needed to test and deploy and maintain the space interceptors.	See previous response.
Decommis-sioning	M0268-2	When it comes time for decommissioning the military often finds it does not have the technology, or the funds required, to clean up damaged sites. This has certainly been true of other complex systems, like those involving chemical and nuclear weapons. In those cases there is still uncertainty about how to safely destroy or store decommissioned weapons and the associated toxic wastes. MDA needs to address these questions satisfactorily in advance. We suspect they are not addressed because costs involved would be prohibitive and in some cases the technology for disposal does not exist.	Section 4, Environmental Consequences, Decommissioning Phase Activities, of the PEIS states that environmental impacts associated with decommissioning of specific components would be more appropriately addressed in subsequent tiered environmental analyses. However, this section provides a roadmap for considering the impacts of decommissioning for each component. Future tiered analyses would consider specific environmental impacts related to decommissioning individual components as appropriate.

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
Radar	PHO0038-2	I remember from last time, part of about the radar, somebody from Valdez was worried about that it was going to set off airbags in cars, set off fire extinguishers, some kind of weird effects of the radar, but I didn't see any mention of that in there and I didn't get a chance to read the whole thing.	Potential health and safety impacts of radars are outlined in Section 4.1.1.3 of the document. The MDA has found no indication that effects of EMR would include setting off vehicle airbags or initiating fire extinguishers.
Radar	E0402-2	None of the X-band radars that are central to the system are built hence we are exposing ourselves and the world with a system that has no hope of working.	As noted in Section 2.2.2, the BMDS would consist of three different types of sensors: weapon/element sensors, BMDS mission sensors, and test range telemetry sensors. The BMDS mission sensors would provide information for missile warning, early interceptor commit, in-flight target updates, and target object maps. As part of a layered and integrated system, numerous sensors would be used to direct and track threat missiles; direct interceptors or other defenses; and assess whether a threat missile has been destroyed.
Radar	M0161-1	In addition, the Administration's missile defense system lacks a key component: the X-band radar intended to track incoming warheads and help guide the interceptors to their targets.	See previous response.
Radar	M7806-1	It is also my understanding that the deployment is being made without the radar system because it is faulty. How, might I ask will a missile be guided?	See previous response.
Sensors	E0142-1	Very briefly, it is my perception that the state of the art in automatic image analysis is such that reliable object recognition is possible only in well-controlled environments wherein the quiescent illumination, the clutter, and preferably the orientation of the target object are under control. These environmental constraints obviously cannot be imposed on a ballistic missile defense system, and therefore one should be very skeptical of	Sensors would be tested to evaluate performance in detecting and tracking threat ballistic missiles. Tests would use targets of opportunity as well as BMDS targets. Performance would be evaluated by comparing observed and predicted performance of the test sensor's ability to detect the target, accurately measure and track the target, and discriminate the reentry vehicle from countermeasures. Generally, components would be

Exhibit K-2. Responses to Comments – BMDS and Components

Issue Topic	Comment Number	Excerpt Text	Response
		claims that enemy missiles can be reliably identified. To the extent that the proposed system depends on automatic detection of enemy missiles, it is very unlikely that it will be reliable, given the present state of the art.	deployed after sufficient testing to demonstrate that they are capable of operating successfully within an integrated BMDS.
Weapons	E0387-4	Missile Defence plans extend to the possible deployment of space-based weaponry and space-based weapons systems. It is crucial that the PEIS consider seriously the likely impact of space weapons deployment. The use of space weapons, for whatever reason, to attack or destroy objects outside of the atmosphere would produce space debris, changing the near Earth environment and would become a serious hazard to future space missions, even possibly preventing them from leaving Earth. At the speeds required to escape the Earth's gravitational pull, the impact of just a tiny object on a space rocket could be disastrous. Space-based conflict of any sort could add to this problem enormously and it is an issue that deserves serious attention.	The impacts from the use of space-based weapons are considered in Sections 4.2.1 and 4.2.2. This analysis includes consideration of orbital debris that would be produced as a result of placing and testing weapons in space. MDA has added Technical Appendix L to the Final PEIS to discuss orbital debris issues more fully.
Deployment	E0395-8	In the statement read by Mr. Marty Duke at the Public Hearing held in Sacramento on October 19, 2004, Mr. Duke said that if testing failed to show that the system worked, the system would not go forward. However, as you know, the system is already being deployed even though it has no demonstrated capability to work under realistic conditions. Accordingly, the environmental process described in this PEIS is not believable since the statement made by Mr. Duke on October 19 has already been nullified by the Missile Defense Agency.	The MDA has not made a decision on how to implement the BMDS. The commenter is referring to a decision made by President Bush explained in Section 1.2 of the PEIS to implement an initial defensive capability to protect the U.S. Homeland. This decision in itself does not constitute a decision on how to configure or deploy the BMDS. The statements made at the public hearing which are available on the MDA PEIS web site are accurate and constitute the MDA's current acquisition strategy which allows for reviews of a proposed component's operational feasibility during all life cycle phases of the component's development.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
Airspace	E0402-7	4) The risk of accidental missile launching to civilian or military aircraft is a real concern. The window of opportunity for successful launch is too narrow given its unproven track record, that the target identification is inadequate. This will result in incredible toxins being released as aircraft contain fuel, sometimes depleted uranium ballast, among other cargos not to mention the deaths of innocent victims.	BMDS testing activity would be limited to areas of restricted range and airspace. Before testing is conducted, range areas would be cleared and NOTAMs would be issued to the public. Airspace designations would be such that even in the event of an anomaly, debris would not pose a danger to health and safety. The PEIS does not consider the impacts to airspace during an actual threat missile launch and subsequent use of the system.
Airspace	PHO0011-2	While the BMDS states that warning will be provided to enable time to clear the air space, it's highly doubtful that such time would be allowed in such an emergency.	See previous response.
Biological Resources	E0030-2	10) The environmental effect of the X-band radar upon people and birds have not been thoroughly studied.	The environmental impacts of radar, including radar operating within the X-band, on birds is considered in Section 4.1.1.1 of the PEIS. In addition, the PEIS incorporates by reference previous NEPA studies in which the potential impacts of radar activation on biological resources are considered (see Appendix N of the PEIS).
Biological Resources	F0004-5	4 Dropping Rocket booster stages anywhere along the east side (or interior) of Kodiak Island is totally unacceptable! It is all critical habitat area for the endangered Steller Sea Lions. There are numerous haul-outs + rookeries all along the Coast of the Kodiak Archipelago. We commercial fisherman have severely shut down from fishing near any of these places So...you can't disturb them either! If you kill any off we get the blame, and we will be shut completely down from fishing! Please consider our fate to make a living ok.	The site-specific detail of this comment cannot be appropriately considered in this type of programmatic environmental analysis. However, additional text has been added to the Final PEIS to explain that meetings with the USFWS and National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service occurred. Additional information about possible impacts to biological resources from launch debris including booster stages impacting land and water are considered in Section 4.1.1.2 of the PEIS.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
Biological Resources	PHO0010-1	But the truth is over the decade life of the program, the global level of perchlorates may rise. Amphibians skin needs to be moist. They're very sensitive to all industrial chemicals. Seventy percent of the species are in decline right now, even in habitats that aren't disturbed. Why would we care about them? The mosquitos are coming out. We don't have hard figures. We don't have real analysis. We're told this is a half a percent. What they're disguising there is most of the chemicals are residual from former manufacturing processes. And even so, the largest contributor -- as a scientist, I'm simply telling you, the largest contributor actually is the manufacturing, testing, open detonation of old rocket motors and the whole thing.	Historically, the manufacturing and disposal of solid rocket propellant that contains ammonium perchlorate as an oxidizer has led to perchlorate contamination. There is no evidence to suggest that burning solid propellant in a solid rocket motor (SRM) leads to emissions of perchlorate to the atmosphere. Perchlorate could be released into the environment in the form of uncombusted solid rocket propellant from a non-nominal launch or other accident causing release of solid propellant to land or water. These have been considered in the PEIS. Additional information on perchlorate has been added to the PEIS text as well as a technical appendix (Appendix M) on perchlorate. This appendix considers the uses, sources, and disposal of perchlorate as well as the human health and ecological risk of exposure to perchlorate.
Cultural Resources	PHO0051-8	Hawaiian burials and sacred sites are desecrated by the missile launches and Star Wars facilities, while cultural practices and subsistence access rights are denied due to base security measures.	The PEIS analyzes the programmatic development, testing, deployment, and planning for decommissioning activities for an integrated BMDS. Specific facilities that would be used to carry out subsequent activities comprising the life cycle phase testing would be analyzed in site-specific documents. These subsequent NEPA analyses could tier from this PEIS, as appropriate.
Cumulative Impacts	E0162-5	3) The PEIS discussion of cumulative impacts in section 4.1.4 and Appendix I has no details about the location, schedule, and specific missiles to be used for the estimated 515 launches from 2004 to 2014. This is important because there are annual limits on the numbers of launches at the Pacific Missile Range Facility (PMRF), Kodiak, and Vandenberg AFB, as noted in the GMD ETR EIS. The GMD ETR EIS estimated 10 launches per year	The PEIS is a programmatic level NEPA analysis that considers implementation alternatives for an integrated BMDS. The PEIS considers the program as a whole to allow tiering of subsequent site-specific analyses from the PEIS and as such does not address specific sites or specific activities at those sites. Launches occurring from site-specific locations would not exceed annual launch limits established by the range.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		so the PEIS needs to give some details about the additional 415 launches. Some information about future launches for tests of some BMDS components is provided in Appendix D. However, there are no estimates for Aegis BMD tests and only vague estimates for GMD tests. For example, it is stated on page D-25 that, "GMD test plans include a number of missile-launches (interceptors and/or targets) from each launch facility per year." The PEIS should also include impacts of test launches of offensive missiles. For example, tests of the Trident D5 are reported to be planned near PMRF in 2005.	The number of launches considered in the PEIS includes not only the launch of ground-based interceptors (GBIs), but also the launch of targets and other missiles used in testing individual components of the BMDS and system integration flight testing. As stated in Section 2.1, the BMDS is designed to negate threat ballistic missiles and thus is comprised of multiple defensive weapons. The BMDS is not designed to be an offensive system. Test assets, such as targets, that would be used to test BMDS components have been included in the 515 projected launches that were analyzed to determine the cumulative impacts of BMDS launches.
Cumulative Impacts	E0319-20	Page 4-112, Section 4.1.4-Cumulative Impacts, does not give any useful or detailed information regarding the 515 projected BMDS launches during 2004-2014. The PEIS needs to include a breakdown of the 515 proposed launches and where each launch will take place (ground-based, sea-based, and space-based test locations). Where did the MDA come up with the 'magic' number of 515? A total of only 10 launches per year have been proposed from the KLC in previous EA documents (Air Force, Army). The MDA needs to validate and justify the need for 515 launches, considering the fact that 'Emissions from activities for the proposed BMDS include carbon monoxide, sulfur oxides, nitrogen oxides, volatile organic compounds, hazardous air pollutants, and particulate matter'. 'Most sites where activities for the proposed BMDS may occur would be classified as a major emissions source' (BMDS Draft PEIS Volume 2, pages H-18- H-19-Existing Emission Sources)	The PEIS is a programmatic level NEPA analysis that considers implementation alternatives for an integrated BMDS and as such does not address specific sites or specific activities at those sites, but rather considers the program as a whole to allow tiering of subsequent site-specific analyses from the PEIS. As the cumulative consideration of launches is global, the specific launch sites are in fact not needed to consider the cumulative impacts of these launches on global warming or ozone depletion. Launches occurring from site-specific locations would be analyzed as appropriate to ensure that either individually or cumulatively they would not exceed local emissions thresholds or limitations in specific areas. Appendix I notes that as indicated in Ross, 1998 although ozone loss occurs in the plume wakes of the largest solid propellant boosters, the amount and

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			duration of the loss appears to be temporary and limited. In addition, the cumulative impact from launch emissions has been shown to be insignificant when compared to other sources of greenhouse gases and ozone-depleting substances. Impacts from launches occurring from sites in the Arctic Tundra or the Sub-Arctic Taiga Biomes would be addressed in subsequent site-specific analyses tiered from the PEIS, as appropriate.
Cumulative Impacts	F0005-17	(3) The PEIS discussion of cumulative impacts in Sec. 4.1.4 and Appendix 1 contains no details about the location, schedule, and specific missiles to be used for the estimated 515 launches from 2004 to 2014. They are essential.	See previous response.
Cumulative Impacts	E0319-21	The MDA's own admission in the Draft PEIS confirms the fact that: "Launches can contribute to cumulative impacts including ozone completion, global warming, and orbital debris, which could affect global warming and depletion of the stratospheric ozone layer (Volume 2, page I-2-Cumulative Impacts). The MDA must discontinue all future BMDS test plans which will contribute to further global warming or contamination in the affected Biomes listed in the PEIS; especially the Arctic Tundra Biome and the Sub-Arctic Taiga Biome-which includes areas of the Aleutian Chain where various radars or sensors are activated or will be activated as part of the proposed BMDS (e.g. Adak Island where the Sea-Based X-Band Radar will be home-ported, Shemya Island where the COBRA DANE is located, and the BOA in the Gulf of Alaska).	It was shown in Ross, 1998 (as referenced in Appendix I of this PEIS) that although ozone loss occurs in the plume wakes of large solid propellant boosters, the amount and duration of the loss appears to be temporary and limited. In addition, the cumulative impact from launch emissions has been shown to be insignificant when compared to other sources of greenhouse gases and ozone-depleting substances. Impacts from launches occurring from the Arctic Tundra or the Sub-Arctic Taiga Biomes would be addressed in subsequent site-specific analyses, as appropriate.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
Cumulative Impacts	E0427-20	19) The BMDS PEIS needs to consider direct, indirect and cumulative effects of the proposed project in conjunction with other federal offensive military weapons systems and policies were not addressed, but need to be addressed. The National Environmental Policy Act (NEPA) (http://ceq.eh.doe.gov/nepa/regs/nepa/nepaeqia.htm) and especially the Regulations for Implementing NEPA (http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm), state that both the direct and indirect effects of the proposed project as well as the Cumulative impact of the project should be considered. Sec. 1508.7 States that the "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. In the context of this global ballistic missile defense system, the cumulative impact of reasonably foreseeable future actions of the US as well as other nations, agencies and persons need to be considered. Yet the reasonable foreseeable actions of other nations and individuals responding to the BMDS by proliferating WMD was not considered by the MDA in this PEIS. As stated in Sec. 1508.8 "Effects" include:(a) Direct effects, which are caused by the action and occur at the same time and place and (b) Indirect effects, which are	BMDS weapons components are considered defensive weapon system components that would be used to destroy threat missiles. The projected BMDS launches used to calculate the cumulative impacts of launch emissions include targets that would be used to test various BMDS components. The PEIS considered all potential environmental effects including cumulative effects of implementing a proposed BMDS from a programmatic standpoint. The argument that the proposed BMDS would lead other nations to proliferation of weapons of mass destruction is the opinion of the commenter; and as such MDA does not consider it a reasonably foreseeable action to be considered in the PEIS. As shown in Appendix I, foreign military launches were included in the cumulative impacts analysis to consider impacts on global warming and ozone depletion.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial. Thus, by law the MDA also needs to consider the Direct, Indirect and Cumulative impacts on the environment of the proposed BMDS along with other US offensive weapons systems and stated & demonstrated US preemptive first-strike policy.	
Cumulative Impacts	E0429-10	At least by number, the 515 projected BMDS launches over the decade beginning this year dwarfs the 99 other projected government launches and the 77 estimated U.S. commercial launched anticipated over the same time period. The environmental review of such a large system, to be developed over a period of many years and potentially deployed for decades, provides an opportunity to reconsider the technologies that our country uses for launching rockets. The draft Programmatic Environmental Impact Statement ignores that opportunity.	Section 4.1.4 shows that BMDS launches are only three times the amount of non-BMDS U.S. launches instead of five times the amount as indicated by the commenter. While projected BMDS launches may account for more launches than other U.S. launches, the size of the BMDS boosters would be on average much smaller than those used for other U.S. launches. Boosters were classified into ranges based on the size of the propulsion system. As shown in Exhibit I-2 of Appendix I of this PEIS, all of the 515 projected BMDS launches fall within the low propellant weight category. Therefore emission loads to the stratosphere from BMDS projected launches (shown in Exhibit I-6) are less than those for other U.S. launches (shown in Exhibits I-7 and I-8).

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			The BMDS PEIS considers the use of a wide variety of propellants including three types of boosters, pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant boosters. The environmental impacts of the use of each of these three types of boosters are presented in Section 4.1.1.2 of the PEIS.
Cumulative Impacts	PHW0004-10	At least by number, the 515 projected BMDS launches over the decade beginning this year dwarfs the 99 other projected government launches and the 77 estimated U.S. commercial launched anticipated over the same time period. The environmental review of such a large system, to be developed over a period of many years and potentially deployed for decades, provides an opportunity to reconsider the technologies that our country uses for launching rockets. The draft Programmatic Environmental Impact Statement ignores that opportunity.	See previous response.
Cumulative Impacts	E0429-13 and PHW0004-13	Once again, the PEIS acknowledges this environmental impact, but it plays it down: "The cumulative impact on stratospheric ozone depletion from launches would be far below and indistinguishable from the effects caused by other natural and man-made causes." (page 4-114). I appreciate the data presented in Appendix I, but the conclusion reached by the authors is implausible.	As indicated in the PEIS on page 4-114, the chlorine emissions from projected BMDS launches during 2004-2014 is a very small fraction (.05%) of the total chlorine emissions from U.S. industrial sources during that same 10-year period. This does not account for emissions of chlorine from natural causes or from sources throughout the industrialized world, only U.S. industrial sources. Therefore, it is completely plausible that the cumulative impact from BMDS launches on stratospheric ozone depletion would be far below and indistinguishable from chlorine emissions from other natural and man-made causes.
Cumulative Impacts	E0429-14 and PHW0004-14	However, the industrial "emissions" are actually the residuals of production and use of chemical which have been phased out, under the Clean Air Act Amendments of	As the commenter states, production and use of ozone depleting substances are being phased out. The production of the most destructive ozone depleting

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		1990 and a series of international protocols. That is, these substances are already in the environment; nothing can be done to put them back in the bottle. Thus, each year stratospheric releases of rocket fuel exhaust become a larger fraction of the problem, as fewer industrial ozone-depleters are manufactured. More important, the fractional contribution of rocket-launches to ozone depletion does not make it desirable. It is as large as all but the largest industrial releasers, before the phase-out took effect, and orders of magnitude larger than the releases from a home refrigerator or a car air conditioning system. Our environmental laws and policies do not excuse pollution simply because there are other, larger sources. That is, if I were a repairer of air conditioning systems, I could not-and should not -release chlorine-containing refrigerants into the atmosphere simply because a Titan or Delta launch vehicle emits much more chlorine.	substances (Class I substances) has already ended and the production (for domestic use) of Class II ozone depleting substances (which are less destructive than Class I substances) is slated to end by 2030. However, it is expected that emissions of Class I compounds will continue, albeit in ever decreasing amounts, for many more years. The emissions of Class II compounds are expected to increase until many years after the phase-out of these substances is complete. ("Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2001," U.S. EPA 430-R-03-004, April 2003). Therefore, it is unlikely that there will be dramatic decreases in the emissions of the ozone depleting substances for many years and thus rocket emissions will continue to comprise an insignificant fraction of these emissions for the next several decades. Because rocket emissions are released directly into the stratosphere at elevated temperatures, they do not behave exactly like emissions of ozone depleting substances released into the troposphere. Studies have found that although rocket exhaust emissions can cause immediate loss of ozone in individual plumes, the emission plumes from these rockets disperse in a way that makes it highly unlikely these ozone losses will impact areas near launch sites, even with launches of the largest solid rockets. In addition, measurements of rocket plumes from vehicles much larger than those proposed for BMDS have shown that "the amount of ozone destruction does not increase without limit" (i.e., the amount of emissions is not necessarily directly proportional to the amount of ozone

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			depletion). Ozone loss has also been shown to slow about one hour after launch, suggesting that the most ozone-destructive emissions have been deactivated by reactions with various gases in the surrounding air and that the duration of the impact of these emissions is fairly short, especially compared to other ozone depleting substances that persist for many years in the stratosphere. Based on this and other related research, the Air Force and the entire space-launch community are "confident that ozone loss from both individual and collective launches does not constitute a significant environmental hazard." (http://www.aero.org/publications/crosslink/summer2000/01.html)
Cumulative Impacts	E0439-20	19) The BMDS PEIS needs to consider direct, indirect and cumulative effects of the proposed project in conjunction with other federal offensive military weapons systems and policies were not addressed, but need to be addressed. The National Environmental Policy Act (NEPA) (http://ceq.eh.doe.gov/nepa/regs/nepa/nepaeqia.htm) and especially The Regulations for Implementing NEPA (http://ceq.eh.doe.gov/nepa/regs/ceq/toc_ceq.htm), state that both the direct and indirect effects of the proposed project as well as the Cumulative impact of the project should be considered. Sec. 1508.7 States that the "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually	BMDS weapons components are considered defensive weapon system components that would be used to destroy threat missiles. The projected BMDS launches used to calculate the cumulative impacts of launch emissions include targets that would be used to test various BMDS components. The PEIS considered all potential environmental effects including cumulative effects of implementing a proposed BMDS from a programmatic standpoint. The argument that the proposed BMDS would lead other nations to proliferation of weapons of mass destruction is the opinion of the commenter; and as such MDA does not consider it a reasonably foreseeable action to be considered in the PEIS. As shown in Appendix I, foreign military launches were included in the

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		minor but collectively significant actions taking place over a period of time. In the context of this global ballistic missile defense system, the cumulative impact of reasonably-foreseeable future actions of the US as well as other nations, agencies and persons need to be considered. Yet the reasonable foreseeable actions of other nations and individuals responding to the BMDS by proliferating WMD was not considered by the MDA in this PEIS. As stated in Sec. 1508.8 "Effects" include:(a) Direct effects, which are caused by the action and occur at the same time and place and (b) Indirect effects, which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Effects and impacts as used in these regulations are synonymous. Effects includes ecological (such as the effects on natural resources and on the components, structures, and functioning of affected ecosystems), aesthetic, historic, cultural, economic, social, or health, whether direct, indirect, or cumulative. Effects may also include those resulting from actions which may have both beneficial and detrimental effects, even if on balance the agency believes that the effect will be beneficial. Thus, by law the MDA also needs to consider the Direct, Indirect and Cumulative impacts on the environment of the proposed BMDS along with other US offensive weapons systems and stated & demonstrated US preemptive first-strike policy.	cumulative impacts analysis to consider impacts on global warming and ozone depletion.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
Cumulative Impacts	PHO0009-1	It's ridiculous that the -- there is 515 launches proposed for Star Wars. That is five times the amount that would be launched under the programs that are non-Star Wars. And you can look this up for yourself. Don't trust me. Check it out. The second thing is the PEIS is based on the Star Wars program as proposed -- and here we have a statement. Okay. This statement was made by General Henry Tray Obering. He's the head of the Missile Defense Agency. So this is not a statement from some conspiracy website. This is a statement from the head of the MDA. What did he say when he was speaking at a Homeland Security conference on a missile defense panel on October 13th in Colorado Springs, Colorado? He was asked about the THAAD, which is the Theater High Altitude Defense Missiles that are scheduled to go into production in 2005. He was asked about these. What did General -- General Henry Tray Obering say about the missiles? He said, quote, These missiles are intended to augment, not replace, the current generation of ground-based midcourse interceptors.	Section 4.1.4 shows that BMDS launches are only three times the number of non-BMDS U.S. launches instead of five times the number as indicated by the commenter. While projected BMDS launches may account for more launches than other U.S. launches, the size of the BMDS boosters would be on average much smaller than those used for other U.S. launches. Boosters were categorized based on the size of the propulsion system. As shown in Exhibit I-2 of Appendix I, all of the 515 projected BMDS launches fall within the low propellant size category. Therefore emissions loads to the stratosphere from BMDS project launches (shown in Exhibit I-6) are less than those for other U.S. launches (shown in Exhibits I-7 and I-8). The number of BMDS project launches outlined in Section 4.1.4 includes all launches related to BMDS operations, including targets and interceptors, and as such does include Terminal High Altitude Area Defense (THAAD) launches. Because the projected launches would include all potential launches and not just GBI launches, the proposed THAAD launches, which are intended to augment the GBI program, would be included in the projected numbers. Therefore, additional launches would not need to be analyzed for the cumulative impacts analysis.
Cumulative Impacts	PHO0023-5	The PEIS is insufficient in dealing with cumulative effects, especially in Southern California, as so many of our local contractors are working on the weapons systems. We're bearing the brunt of our environmental impacts of the laser weapon development and many of the rocket	The PEIS is a programmatic level NEPA analysis that considers implementation alternatives for an integrated BMDS and as such does not address specific sites or specific activities at those sites, but rather considers the program as a whole to allow tiering of subsequent site-

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		launches and the rockets that are being assembled for those launches to launch these 515 launches that may take place over the next 10 years.	specific analyses from the PEIS. Subsequent analyses for activities occurring at specific locations would consider the localized cumulative impacts of those proposed activities at each individual location.
Cumulative Impacts	PHO0044-2	There's some inconsistencies and confusion about cumulative impacts. This EIS estimates 515 launches in a ten-year period, the previous 2003 ground-based missile defense extended test range EIS estimated only 100 in a ten-year period.	The GMD ETR EIS analyzed a total of 100 launches over a 10-year period to validate the GMD ETR test program. The 515 launches analyzed in the PEIS include all launches that would occur as a part of the proposed BMDS including GMD program launches.
Cumulative Impacts	PHO0046-7	The cumulative impacts analysis I think was very flawed. You said earlier that you would only consider similar types of global actions in comparing what the cumulative impacts would be, but I think that's a way of effectively ignoring the combined effects of many, many local impacts that occur when you have these programs in many forms around the world. So I think you need to consider all those analyses, the local studies that are being done, that have been done, past, present and future.	The PEIS is a programmatic level NEPA analysis that considers implementation alternatives for an integrated BMDS and as such does not address specific sites or specific activities at those sites, but rather considers the program as a whole to allow tiering of subsequent site-specific analyses from the PEIS. Subsequent analyses for activities occurring at specific locations would consider the localized cumulative impacts of those proposed activities at each individual location.
Cumulative Impacts	PHO0048-6	Also, the cumulative impact analysis is also inadequate. NEPA requires that past, present, and future activities that may incrementally add up to accumulative impact on an area be assessed, but this PEIS is flawed for several reasons. First, it doesn't really consider past projects in the cumulative impact analysis. It says something to the effect of, well, there are things that had gone through NEPA assessment before and so we're not considering those now. This is obviously logically flawed. I mean, the EISs that we've gone through before, had any of them ever dreamed that there would be a missile defense thing shot from space? I mean, let's look at the Striker IS. We're all familiar with that. Does that mention at all anywhere	The cumulative impact of worldwide launch programs on ozone depletion and global warming does indeed consider the effects of past launch programs as MDA strives to determine impacts on an atmosphere already impacted in these areas by all previous launches. Ozone depletion is well documented as a phenomenon that is caused by complex chemical reactions due to release of chlorofluorocarbons and other industrial chlorine-containing chemicals into the stratosphere as well as other activities like rocket launches that create emissions that may impact ozone depletion. MDA's cumulative analysis takes a snapshot of the affected environment as it currently exists, already affected by years of launches

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		ballistic missiles? No. Okay. So clearly relying on a NEPA document published before this day is not going to give us an adequate analysis of whether it's a cumulative impact. In fact, there's a heck of a lot going on here caused by the military that never went through NEPA analysis.	and other chemical industrial activities in the past. It would be impossible to try to determine the past contribution of launch emissions to ozone depletion and with new regulatory controls the contribution of launch emissions may be increasingly important in the future. Therefore MDA elected to consider the potential contribution from worldwide government and commercial launch programs projecting a launch manifest forward in time from 2004 as an appropriate representation of the cumulative impacts of the BMDS program.
Cumulative Impacts	PHO0048-7	In addition, they also put this really interesting limitation on it that I've never seen before in an EIS, and I've read quite a few myself. It says, well, because this has a national and international nature to the impact of the ballistic missiles, they were only going to consider national/international cumulative impacts. That means only something that affects the entire continent, only if it affects the entire world. So we're not going to look at the unique situation of Hawaii. And what we are having to go through is the increasing militarization of Hawaii, and that's not sufficient. I mean, to really consider the cumulative impacts of this PEIS, we need to talk about things that are in the areas that are likely to be affected and likely to be caused harm.	The PEIS is a programmatic level NEPA analysis that considers implementation alternatives for an integrated BMDS and as such does not address specific sites or specific activities at those sites, but rather considers the program as a whole to allow tiering of subsequent site-specific analyses from the PEIS. As noted in Section 4.1.4 of the PEIS, the proposed BMDS is worldwide in scope. Therefore, it is appropriate to consider other worldwide activities, including U.S. and foreign commercial and foreign government launches, along with the proposed BMDS launches to estimate cumulative impacts.
Cumulative Impacts	PHO0049-1	The cumulative effects on the Marshallese people, for example, who have already been exposed to so much nuclear poison and now you want to add more toxic waste into their lagoons. And the accumulation, the additive factors, I think you have not even touched on how this is	The PEIS is a programmatic level NEPA analysis that considers implementation alternatives for an integrated BMDS and as such does not address specific sites or specific activities at those sites, but rather considers the program as a whole to allow tiering of subsequent site-specific analyses from the PEIS. Cumulative impacts

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		going to impact a group of people that have already suffered enough for us Americans.	from activities occurring in specific locations, such as the Marshall Islands, would be considered in subsequent analyses as appropriate.
Cumulative Impacts	PHW0006-1	1. The 515 projected BMDS launches that are evaluated by the PEIS do not include the intended expansion of the BMDS program, and thus does not meet criteria of the National Environmental Policy Act (NEPA). This intended expansion was described on October 13 by General Henry "Trey" Obering the director of the Missile Defense Agency (MDA). Speaking at the Homeland Security Conference in Colorado Springs General Obering was asked about the new Theater High-Altitude Area Defense (THAAD) missiles scheduled to move into production in late 2005. In response General Obering stated they will "augment, not replace, the current generation of ground-based midcourse interceptors. In fact, there will be a continued spiraling up of capabilities in both missile networks, with more missiles and additional sites being added for the current missiles, and an expansion of THAAD beyond the initial scheduled 25 missiles"	The number of BMDS project launches outlined in Section 4.1.4 includes all launches related to BMDS operations such as targets and interceptors and thus, does include THAAD launches. The projected launches would include all potential launches and not just ground-based midcourse interceptor launches. Therefore, the proposed THAAD launches, which are intended to augment the GBI program, would be included in the projected numbers and additional launches would not need to be analyzed for the cumulative impacts analysis.
Emissions	E0320-1	2. The hydrogen chloride injected into the atmosphere with each launch has incredible potential to neutralize ozone, enlarging the famous hole which now requires Australian school children to be outside only with hats and long-sleeved shirts.	The potential impacts from launches on the atmosphere are discussed in Section 4.1.1.2 of the PEIS. Specifically, the PEIS discusses the fact that atomic and molecular chlorine could be produced as a result of chemical reactions involving hydrogen chloride. Atomic and molecular chlorine have been shown to contribute to localized ozone depletion in the plume wakes of boosters. However, the PEIS found that based on the amount of chlorine produced, the large volume of air volume over which these emissions would be spread, and

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			because of rapid dispersion by stratospheric winds, the active chlorine from launches would not contribute to significant localized ozone depletion. Therefore, it is unlikely that emissions from launches would lead to an increase in skin cancers due to a thinning of the stratospheric ozone layer.
Emissions	E0402-4	1) The result of release of hydrogen chloride, aluminum oxide, and hydrochloric acid into the upper atmosphere will consume huge amounts of ozone, resulting in dramatic increases in UV light exposure with epidemics of skin cancer, cataracts and the less studied but known effects on sensitive species such as amphibians and microscopic organisms.	See previous response.
Emissions	E0424-1	a) The planned heightened increase in missile launches would potentially lead to increased exposures to the population from toxic pollutants. These include liquid propellants containing hydrazines, nitrogen tetroxide, and other toxic compounds. In addition, the ammonium perchlorate used in solid propellants blocks the formation of key thyroid hormones which are critical for the growth and development especially in fetuses and children. The PEIS proposes to allow an over 30-fold higher level of perchlorate (200 parts per billion) than those proposed by the State of California (6 parts per billion). The numerous anticipated rocket launches will release chemicals including aluminum oxide, hydrogen chloride and hydrochloric acid into the upper atmosphere, with the potential for further depleting the diminished ozone layer. For example, each molecule of hydrogen chloride consumes 100,000 molecules of ozone, resulting in the widening of the ozone hole, thereby dramatically	The DoD and the MDA are aware of the potential health concerns associated with perchlorate contaminated water and of the various Federal and state initiatives to address this issue. In addition to citing the Perchlorate Study Group findings, the PEIS has been modified to include the proposed findings from the State of California Office of Environmental Health Hazard Assessment, the State of Massachusetts, and U.S. EPA. To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical Appendix M addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers the uses, sources, and disposal of perchlorate as well as the effects on human health and the environment.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		increasing levels of UV light. Elevated levels of UV light cause sunburn, skin cancer, cataracts, and many other forms of UV damage to sensitive species;	The potential impacts from launches on the atmosphere are discussed in Section 4.1.1.2 of the PEIS. Specifically, the PEIS discusses the possibility that ozone would be depleted through complex reactions with chlorine, aluminum oxide, and nitrogen oxides. The PEIS presents a discussion of these complex interactions and supports the determination that "Due to the large air volume over which [chlorine] emissions would be spread, and because of rapid dispersion by stratospheric winds, the active chlorine from launches would not contribute to significant localized ozone depletion.", "The exact magnitude of ozone depletion that can result from a build-up of Aluminum Oxide (Al_2O_3) over time has not yet been determined quantitatively, but appears to be insignificant based on existing analysis.", and "Stratospheric winds would disperse these quantities [of nitrous oxides] rapidly; therefore, no significant effect on ozone depletion would be expected from these emissions. (Molina, 1996 as referenced in U.S. Department of the Air Force, 1997a)
Emissions	E0427-5 and E0439-5	6) Not only does the BMDS PEIS under represent the total amount of emissions, from the estimated 515 BMDS rocket launches over the next several years, it also discounts that this program will be injecting large quantities of chemicals including aluminum oxide, hydrogen chloride and hydrochloric acid into the upper atmosphere, stratosphere, etc. Most concerning is the injection of hydrogen chloride into the upper atmosphere where the breakdown of each hydrogen chloride molecule to chloride ion catalyzed the breakdown of 100,000 ozone molecules, thereby depleting ozone, and decreasing the	See previous response.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		blocking of UV rays. This depletion of ozone will increase risk of cataracts and skin cancer. Thus, the BMDS will have a much greater effect on ozone depletion and skin cancer than HC1 released at sea level.	
Emissions	E0427-4 and E0439-4	5) The BMDS PEIS did not adequately consider impacts of Hazardous waste and materials and on Health and safety, Water Resources and Biological resources of environmental contamination from toxic and hazardous components of rocket fuels and explosives. The BMDS PEIS markedly under reports the emissions of representative interceptors. Exhibit 4-11 reports the emission of (90+58+52+22+17+6+6)=251 pounds for a representative interceptor. However, ground based interceptors are much larger (approximately 54 feet long 3 stage solid propellant rockets (such as the Minuteman III) weighting 22.5 to 25 tons and containing approximately 30,000 to 45,000 pounds of solid propellant. Thus the MDA underestimates the emissions from such interceptor rockets by factor of greater than 100. This is totally unacceptable. This underestimate of BMDS pollutants is apparently repeated in Exhibits 4-13, 4-14 and 4-15. Thus the MDA needs to revaluate the environmental effects of these pollutants. Also the MDA should define what are the emissions from the missiles used to launch spaced based interceptors, and sensors.	The PEIS did consider the impacts of rocket propellants released into the environment from non-nominal launches or transport/handling spills as hazardous waste, on soils and water resources, on biological resources, and on health and safety. Further the PEIS analyzed the impacts of emissions from nominal launches of various propellant types in support of BMDS test activities. The interceptor emission products noted in Exhibit 4-11 are for a PAC-3 missile. Although all proposed integration test launches would not include the launch of a GBI, the exhibit has been updated to include the emissions from a GBI. As shown in the updated exhibit, even when considering the emissions from a target and a GBI, emissions would not exceed de minimis levels. Further, as noted in Appendix I, various sizes of boosters were considered in calculating the cumulative impact of BMDS launches. Therefore, Exhibits 4-13, 4-14, and 4-15 do not need to be updated. The emissions from the vehicles used to launch the space-based interceptors, sensors and other assets into space have been considered as part of support assets as defined and analyzed in the PEIS.
Emissions	E0429-2	Solid rocket propellant that contains ammonium perchlorate as an oxidizer is designed to generate large quantities of hydrogen chloride, which reacts with moisture in the atmosphere to create hydrochloric acid- that is, acid precipitation. The PEIS should consider how	The BMDS PEIS considers the use of a wide variety of propellants including three types of boosters, pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant boosters. The environmental impacts of each of these three types of boosters are presented in

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		the missile defense program might develop and test alternate launch technologies that are not so environmentally destructive.	Section 4.1.1.2 of the PEIS. In addition, a technical appendix (Appendix M) has been added to the PEIS that addresses issues specifically related to perchlorate. The appendix includes the alternatives that DoD is currently evaluating to the use of perchlorate in munitions.
Emissions	E0429-7, PHW0004-7, E0429-26, PHW0004-26	3. Evaluate alternative launch technologies not based upon ammonium perchlorate.	See previous response.
Emissions	PHW0004-2	Solid rocket propellant that contains ammonium perchlorate as an oxidizer is designed to generate large quantities of hydrogen chloride, which reacts with moisture in the atmosphere to create hydrochloric acid-that is, acid precipitation. The PEIS should consider how the missile defense program might develop and test alternate launch technologies that are not so environmentally destructive.	See previous response.
Emissions	E0429-3 and PHW0004-3	When rockets are launched into the upper atmosphere, they directly deliver hydrogen chloride to the ozone layer, exposing human, other animals, and other biota to the harmful, persistent effects of ultraviolet-B radiation (UVB). Rocket launches are among the largest causes of ozone depletion, and the persistence of such substances from other sources is no excuse for additional pollution. The BMDS program should at the very least evaluate the mitigation of such seriously harmful environmental consequences through the development and deployment of alternative solid rocket propellants.	The potential impacts from launches on the atmosphere are discussed in Section 4.1.1.2 of the PEIS. Specifically, the PEIS discusses the possibility that ozone would be depleted through complex reactions with chlorine, aluminum oxide, and nitrogen oxides. The PEIS presents a discussion of these complex interactions and supports the determination that "Due to the large air volume over which [chlorine] emissions would be spread, and because of rapid dispersion by stratospheric winds, the active chlorine from launches would not contribute to significant localized ozone depletion.", "The exact magnitude of ozone depletion that can result from a build-up of Al_2O_3 over time has not yet been determined quantitatively, but appears to be insignificant

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			based on existing analysis.", and "Stratospheric winds would disperse these quantities [of nitrous oxides] rapidly; therefore, no significant effect on ozone depletion would be expected from these emissions. (Molina, 1996 as referenced in U.S. Department of the Air Force, 1997a)" The BMDS PEIS considers the use of a wide variety of propellants including three types of boosters, pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant boosters. The environmental impacts of each of these three types of boosters are presented in Section 4.1.1.2 of the PEIS. In addition, Appendix M includes DoD-wide research initiatives under the Strategic Environmental Research and Development Program that have focused on the development of more environmentally-friendly launch technologies, such as missile propellants that do not use ammonium perchlorate as an oxidizer. While these alternate propellant formulations have showed promise, a significant amount of development remains to optimize the formulation for specific missile systems. In addition, these formulations will go through a lengthy and stringent performance and safety certification process. Since these alternative technologies are in a research and development phase and are not yet advanced enough for their use to be reasonably foreseeable under NEPA, they are not analyzed in this PEIS. The MDA may consider the use of these alternative environmentally-friendly technologies as they become available in the future and meet the operational test requirements for the BMDS.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			Among launch technologies that are available today, the BMDS PEIS considers a wide variety of propellants used in three types of boosters, pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant boosters. The environmental impacts of each of these three types of boosters are presented in Section 4.1.1.2 of the PEIS.
Emissions	PHO0011-1	As we know, the -- the perchlorates are used in the self-propellants in the formation of a key thyroid hormone which are critical for growth and development of fetuses and children. The PEIS proposes to allow over thirty-fold higher levels of perchlorate at 200 parts per billion than proposed by the State of California, which is six parts per billion. Thus, many rocket launches will inject chemicals including aluminum oxide, hydrogen chloride and hydrochloric acid directly into the upper atmosphere, thereby depleting the ozone. The PEIS does not address the direct injection of the chemicals high into the atmosphere.	The DoD and the MDA are aware of the potential health concerns associated with perchlorate contaminated water and of the various Federal and state initiatives to address this issue. In addition to citing the Perchlorate Study Group findings, the PEIS has been modified to include the proposed findings from the State of California Office of Environmental Health Hazard Assessment, the State of Massachusetts, and U.S. EPA. To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical Appendix M addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers the uses, sources, and disposal of perchlorate as well as the effects on human health and the environment. The potential impacts from launches on the atmosphere are discussed in Section 4.1.1.2 of the PEIS. Specifically, the PEIS discusses the possibility that ozone would be depleted through complex reactions with chlorine, aluminum oxide, and nitrogen oxides. The PEIS presents a discussion of these complex interactions and supports the determination that "Due to the large air

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			volume over which [chlorine] emissions would be spread, and because of rapid dispersion by stratospheric winds, the active chlorine from launches would not contribute to significant localized ozone depletion.", "The exact magnitude of ozone depletion that can result from a build-up of Al_2O_3 over time has not yet been determined quantitatively, but appears to be insignificant based on existing analysis.", and "Stratospheric winds would disperse these quantities [of nitrous oxides] rapidly; therefore, no significant effect on ozone depletion would be expected from these emissions. (Molina, 1996 as referenced in U.S. Department of the Air Force, 1997a)
Emissions	PHO0025-2	Further, rocket launches deliver hydrochloric acid in the upper atmosphere which, in turn, chemically interact with the protective ozone layer. It is therefore fair to assume that an increase in rocket launches may correspondingly bring about additional cases of skin cancer.	The potential impacts from launches on the atmosphere are discussed in Section 4.1.1.2 of the PEIS. Specifically, the PEIS discusses the fact that atomic and molecular chlorine could be produced as a result of chemical reactions involving hydrogen chloride produced from SRMs. Atomic and molecular chlorine have been shown to contribute to localized ozone depletion in the wake of SRM boosters. However, the PEIS found that based on the amount of chlorine produced, the large volume of air volume over which these emissions would be spread, and because of rapid dispersion by stratospheric winds, the active chlorine from SRM launches would not contribute to significant localized ozone depletion. Therefore, it is unlikely that emissions from MDA test launches would lead to an increase in skin cancers due to a thinning of the stratospheric ozone layer.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
Emissions	E0162-11	9)There are egregious errors in Exhibit 4-11 on page 4-102. There is an addition error in the line for HC1 emissions. The more serious error is that the total emissions of 115 kilograms for the representative interceptor is too small by a factor exceeding 100. Table 4.1.1-8 of the 2003 GMD ETR Final EIS gives total stage 1 exhaust emissions of greater than 15,000 kilograms. The GBI analyzed in that EIS had a total propellant mass of 19,767 kilograms of which 15,069 was in stage 1. The PEIS notes on page D-20 that each GBI may contain up to 20,500 kilograms of solid propellant. Exhibit 4-11 should be corrected; the information for BMDS launches in Exhibits 4-13, 4-14, and 4-15 may need correction if it is based on the interceptor data in Exhibit 4-11.	Addition error has been addressed. The interceptor emission products noted in Exhibit 4-11 of the Draft PEIS are for a PAC-3 missile. Although all proposed integration test launches would not include the launch of a GBI, the exhibit has been updated to include the emissions from a GBI. As shown in the updated exhibit, even when considering the emissions from a target and a GBI, emissions would not exceed de minimis levels. Further, as noted in Appendix I, various sizes of boosters were considered in calculating the cumulative impact of BMDS launches. Therefore, Exhibits 4-13, 4-14, and 4-15 do not need to be updated.
Emissions	PHO0044-3	There's an egregious error in Exhibit 4-11 on page 4-102. First of all, there's an addition error in the table. The more serious error is that total emissions for the interceptor are given as 115 kilograms, whereas the 2003 EIS for the ground-based interceptor gave the first stage emissions as 15,000 kilograms. So what's given in this EIS is a factor of 100 too small.	See previous response.
Emissions	E0427-5 and E0439-5	6) Not only does the BMDS PEIS under represent the total amount of emissions, from the estimated 515 BMDS rocket launches over the next several years, it also discounts that this program will be injecting large quantities of chemicals including aluminum oxide, hydrogen chloride and hydrochloric acid into the upper atmosphere, stratosphere, etc. Most concerning is the injection of hydrogen chloride into the upper atmosphere	The potential impacts from launches on the atmosphere are discussed in Section 4.1.1.2 of the PEIS. Specifically, the PEIS discusses the fact that atomic and molecular chlorine could be produced as a result of chemical reactions involving hydrogen chloride. Atomic and molecular chlorine have been shown to contribute to localized ozone depletion in the wake of boosters. However, the PEIS found that based on the amount of

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		where the breakdown of each hydrogen chloride molecule to chloride ion catalyzed the breakdown of 100,000 ozone molecules, thereby depleting ozone, and decreasing the blocking of UV rays. This depletion of ozone will increase risk of cataracts and skin cancer. Thus, the BMDS will have a much greater effect on ozone depletion and skin cancer than HC1 released at sea level.	chlorine produced, the large volume of air volume over which these emissions would be spread, and because of rapid dispersion by stratospheric winds, the active chlorine from launches would not contribute to significant localized ozone depletion. In addition, the PEIS considers the possibility that ozone would be depleted through complex reactions with chlorine, aluminum oxide, and nitrogen oxides. The PEIS presents a discussion of these complex interactions and supports the determination that "Due to the large air volume over which [chlorine] emissions would be spread, and because of rapid dispersion by stratospheric winds, the active chlorine from launches would not contribute to significant localized ozone depletion." "The exact magnitude of ozone depletion that can result from a build-up of Al_2O_3 over time has not yet been determined quantitatively, but appears to be insignificant based on existing analysis.", and "Stratospheric winds would disperse these quantities [of nitrous oxides] rapidly; therefore, no significant effect on ozone depletion would be expected from these emissions. (Molina, 1996 as referenced in U.S. Department of the Air Force, 1997a)" Therefore, it is unlikely that emissions from launches would lead to an increase in skin cancers due to a thinning of the stratospheric ozone layer.
Environmental Justice	E0363-2	Certainly, those individuals (often consisting of minority ethnic groups) and non-human species who live on or near test sites are at particular risk, and this issue is not sufficiently addressed in the PEIS.	The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws,

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			regulations, and policies is defined as environmental justice. Environmental justice is discussed in Section 3.1.5 of the PEIS. This programmatic analysis does not consider impacts at specific locations or sites; therefore, it is not possible to perform a meaningful environmental justice analysis as directed by Executive Order (EO) 12898; however, a roadmap for subsequent tiered analyses is included in Section 3.1.5. As specific locations are identified for possible BMDS activities tiered site-specific analyses would consider environmental justice.
Environmental Justice	PHO0025-5	There should also be an environmental health evaluation concerning cumulative impacts for military production, testing and deployment of missile defense systems compounded on top of past military use. This evaluation should be done with an eye on disproportionate impacts on low-income communities of color.	See previous response.
Environmental Justice	PHO0046-8	And this gets to the environment justice analysis, which is also flawed and inadequate. There is an adverse and significant impact on native peoples here in Hawaii, in Greenland, Enewetak in the Marshall Islands, and in other places, Alaska and so forth, and you did not look at how this program has a disparate effect on those peoples, their culture, their resources, and actually their survival. So please consider those.	See previous response.
Environmental Justice	PHO0051-7	Also, Ohana Koa believes that Star Wars will have a significant adverse impact on native Hawaiians, our Marshall Island brothers and sisters, the Enewetaks, and other indigenous peoples; and that the Programmatic	See previous response.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		Environmental Impact Statement fails to consider these impacts.	
Environmental Justice	M0268-4	Effect of hazardous and toxic waste on minority communities: As an organization we have a strong concern for human rights and racial justice. We note that the Environmental Impact Assessment requires consideration of undue negative impact on minority communities. It is our understanding that the test sites are mainly on Indian lands or on lands belonging to Marshall Islanders. The statement in the PEIS that "Environmental justice analyses require information about local communities, and therefore will be analyzed in site specific environmental documentation. " is hardly adequate. We know what damage has been done to such communities already by bombing ranges (as in Puerto Rico) or nuclear weapons testing (as in the South Pacific and on Indian lands in the U.S. southwest). Such an analysis should have been made before the deployment and testing began. The program should be halted until thorough analysis is made, and it should not continue if there is evidence of detrimental effect on these populations and their environment.	See previous response.
Hazardous Materials Hazardous Waste	E0395-13	The PEIS does not present the total quantities of specific hazardous chemicals that would be carried aboard an ABL aircraft nor does it describe the total quantities of specific hazardous chemicals that would be stored on the ground at various test and training locations. In addition, the PEIS does not address the environmental impacts should those chemicals be spread over the land from an accident or aircraft crash, or jettisoned at low altitude in an emergency.	The PEIS is a programmatic analysis and is intended to serve as a tiering document for future site-specific analyses. Therefore, it is not possible to consider the total quantities of specific hazardous materials that would be used at a specific facility. Future tiered analyses would need to consider the impacts associated with the quantities of hazardous materials used and hazardous waste generated as a result of a particular action or test. The PEIS presents information on the

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			potential environmental impacts of possible failure scenarios for various components including laser weapons operating from air environments. In addition, the amounts of chemicals used in the ABL are provided in the EIS for the Program Definition and Risk Reduction Phase of the Airborne Laser Program (U.S. Department of the Air Force, 1997b) and Airborne Laser Program Supplemental EIS (MDA, 2003a), which are incorporated by reference (as listed in Appendix C).
Hazardous Materials Hazardous Waste	E0429-22	The PEIS should consider the environmental consequences of various disposal strategies so the BMDS program can develop the technology or capacity to address its waste or consider the use of alternative launch technologies or strategies to minimize either the waste or the negative environmental impacts.	The BMDS PEIS considers the use of a wide variety of propellants including three types of boosters, pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant boosters. The environmental impacts of the use of each of these three types of boosters are presented in Section 4.1.1.2 of the PEIS. The BMDS must rely on the most appropriate launch technology to support the development, testing, deployment, and decommissioning of an integrated missile defense capability. Many of the boosters used as target missiles for the BMDS would already have been manufactured for other DoD programs, which are in inventory and no longer needed. The MDA will continue to use appropriate disposal strategies to handle hazardous materials and waste. The environmental impacts of hazardous materials and hazardous waste generated from launch related activities are considered in Section 4.1.1.2 of the PEIS.
Hazardous Materials Hazardous	PHW0004-22	The PEIS should consider the environmental consequences of various disposal strategies so the BMDS program can develop the technology or capacity to address	See previous response.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
Waste		its waste or consider the use of alternative launch technologies or strategies to minimize either the waste or the negative environmental impacts.	
Hazardous Materials Hazardous Waste	F0006-1	1. NOAA Fisheries recommends that the Missile Defense Agency be responsible for handling and disposing of all hazardous materials or hazardous wastes in all phases of the proposed action in accordance with applicable Federal, state, and local laws, utilizing best management practices at all life cycle activities of the proposed action and through appropriate project planning and design measures including appropriate spill prevention, control and contingency plans (e.g., Oil Discharge Prevention and Contingency Plan, Storm Water Pollution Prevention Plan) for each site.	The disposal of all hazardous materials and hazardous wastes would be conducted in compliance with applicable Federal, state, and local laws. Project planning would take spill prevention, control, and contingency planning into account to ensure compliance with all relevant regulations.
Health and Safety	E0319-10	The BMDS Draft PEIS discusses ground testing of 'portable' lasers, but does not list all the potential test sites. A September 2004 ABC news report stated a Delta Airlines pilot received an eye injury when a laser beam came through the cockpit window on his approach to the Salt Lake City, Utah airport. There have been no further reports regarding where the laser beam originated; however, it leaves open the possibility of whether some ground-based or air-based laser tests were going on at the High Energy Laser Systems Test Facility located at the White Sands Missile Range in New Mexico and the Delta Airlines pilot happened to get caught in the laser's crossfire. Utah and New Mexico are within close proximity in air miles. As stated in the Draft PEIS (Volume 1, page 4-21 thru 4-34), environmental and human health hazards would result from testing air based and ground based 'portable' lasers, which is: cancer	As referenced in the comment, the PEIS discusses the potential impacts on health and safety and biological resources from the activation and use of laser weapons (Section 4.1.1.1) and laser sensors (Section 4.1.1.5). If it is determined that laser weapons or laser sensors need to be tested at specific locations, the environmental impacts of their use at these locations would be considered in subsequent site-specific NEPA analyses tiered from this PEIS, as appropriate.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		causing chemical releases into the air and waters, potential skin burns and retina damage from laser beams and/or laser 'scatter', hazards to commercial and other aircraft, birds, plants and wildlife. "Hydrochloric acid produced as a result of the interaction between laser emissions and moisture in the air has the potential to produce impacts on biological resources, including plants and aquatic animals, and water quality" (Draft PEIS Volume 1, page 4-23). "Exhaust emissions from laser activation have the potential to harm human health." "Laser beams can cause serious health problems if they contact the skin or eyes" (Volume 1, page 4-34).	
Health and Safety	E0319-18	The safety hazards of launching interceptors from the KLC should have been discussed in the Draft PEIS, considering the high winds which occur on Kodiak Island throughout the year-- peak gusts up to 35 miles per hour in June and 83 miles per hour in December (PEIS Volume 2, Page H-18, Section H.2.1-Air Quality). As Kodiak residents have previously pointed out to the MDA in other EA comments (which the MDA has ignored), launching missile targets, and now possibly interceptors in a southwest trajectory down the East side of Kodiak Island would be extremely risky and potentially hazardous should a launch accident occur, because of populated native villages (e.g. Old Harbor and Akhiok) which are within the 'explosive safety hazard zone'.	The GMD ETR EIS did analyze the environmental impacts of launching interceptors from KLC. However, the MDA announced in a ROD that there were currently no plans to launch interceptors from KLC. This is still the case. The environmental impacts of conducting launch activities from the KLC have been considered in a number of earlier NEPA analyses. Site-specific environmental analyses tiered from this PEIS will be conducted for future proposed activities at specific sites such as the KLC, as appropriate.
Health and Safety	E0319-23	Executive Order 13229 (October 9, 2001) does not change the requirements of EO 13045 (April 21, 1997), it only amends section 3-306 of that order "for a period of 4 years from the first meeting" and inserting in lieu thereof "for 6 years from the date of this order". The PEIS cannot	In considering the potential impacts to health and safety from the BMDS as described in Section 4 of the BMDS PEIS, the MDA did not identify any environmental health and safety risks that may disproportionately affect children.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		identify environmental health and safety risks if the Department of Defense (MDA) has not requested any studies on the issue.	
Health and Safety	E0319-25	Executive Order 13045, Section 1. Policy 1-101 states: "A growing body of scientific knowledge demonstrates that children may suffer disproportionately from environmental health risks and safety risks. These risks arise because: children's neurological, immunological, digestive, and other bodily systems are still developing; children eat more food, drink more fluids, and breathe more air in proportion to their body weight than adults". Section 2-203, "Environmental health risks and safety risks means risks to health or safety that are attributable to products or substances that the child is likely to come into contact with or ingest (such as the air we breathe, the food we eat, the water we drink or use for recreation, the soil we live on, and the products we use or are exposed to)". Once again, refer to Draft PEIS Volume 2, pages H-18, H-19-Existing Emission Sources; "Most sites where activities for the proposed BMDS may occur would be classified as a major emissions source". It is the major emission sources related to MDA activities, which has the people living near launch test sites concerned. The PEIS should include ALL test sites locations that will be affected by future BMDS activity.	The MDA complies with all applicable regulations to address disproportionate risks to children that result from environmental health risks or safety risks. The MDA strives to protect human health (including that of our children) and the environment while carrying out its mission. The definition used for "major source" in the PEIS is the same that is used in the Clean Air Act Section 112(a)(1). This section defines "major source" as "any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any hazardous air pollutant (HAP) or 25 tons per year or more of any combination of HAPs. The Administrator may establish a lesser quantity, or in the case of radionuclides different criteria, for a major source than that specified in the previous sentence, on the basis of the potency of the air pollutant, persistence, potential for bioaccumulation, other characteristics of the air pollutant, or other relevant factors." Site-specific environmental analyses will be conducted for future proposed activities at specific locations, as appropriate.
Health and Safety	E0380-1	1) In category after category, case after case, the PEIS repeatedly discounts the impacts of toxic substances resulting from and involved in activities at every level - manufacture, launching, use, etc. - by contending that the toxic substances will have no impact because they will be handled in accordance with existing law and guidelines.	As stated in the PEIS, the MDA would comply with all applicable regulations and requirements regarding the use and disposal of toxic substances. In addition, activities proposed at specific ranges/facilities will comply with applicable mitigation measures that apply to

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		Such a blanket contention flies in the face of current experience with toxic substances. Many factors result in the legal guidelines failing to insure public and environmental safety when toxic substances are involved. The report fails to entertain the possibility of accidental spills and discharges, whether in the transportation stage or as a consequence of mishaps at other stages. Additionally, the report ignore our experiences in which we have repeatedly experienced toxic consequences from currently legal uses of chemicals. The claim that there will be no toxic impacts by merely following existing handling rules is implausible. Moreover, new discoveries about the minute amounts of substances that can still have a deleterious effect are continually forcing us to readjust safety standards. To initiate the massive undertakings proposed within the BMDS without making any attempt to mitigate the impacts - readily imaginable based on the evolving nature of toxin safety understandings - is unrealistic.	the specific range/facility where the actions are proposed to occur. The potential impacts associated with the accidental release of toxic substances including laser chemicals and booster propellants are discussed in Sections 4.1.1.1 and 4.1.1.2 of the PEIS.
Health and Safety	E0425-1	Please factor an inhalation pathway for exposure to ammonium perchlorate. Please assess for both public and occupational exposure. For toxicity information on this newly discovered pathway please see the following study.	The acute toxic effects found in the referenced study occurred when high levels of ammonium perchlorate were injected into rats' lungs. Available research suggests that the possibility of ammonium perchlorate inhalation is small because there is little or no residual perchlorate left after combustion of the solid propellant. This research would suggest that any exposure to ammonium perchlorate through air would not be at a high enough level to cause these kinds of effects.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			The MDA has reviewed available research on perchlorate and developed an appendix (see Appendix M) to the PEIS which provides additional information on the potential human health impacts of perchlorate.
Health and Safety	E0427-11 and E0439-11	The BMDS PEIS (page 4-32) cites that exposure to a reflected laser beam while in the air operating environment would be very short, < 0.01 seconds that and would not impact the health and safety (US Air Force 1997A). But no estimates are provided for the actual danger zone for the HEL to detrimentally affect health and safety, e.g. causing skin and especially retinal damage. The Draft Supplemental Environmental Impact Statement for the Airborne Laser Program (2002) (page 99) cites the power of the HEL as about 107 watts per square centimeter. Ten million watts per square centimeter will burn retinas and eyeballs very quickly. While the PEIS states that medium energy lasers such as the SHEL if focused at point 12 km away, would be hazardous to the human eye 2 km before to 2 km past the focus point. Where as the other lasers and especially the HEL would be hazardous immediately after leaving the turret of the ABL. While the PEIS states that the BILL and TILL no hazard distance would extend > 10 km beyond the target, and the HEL hazard distance would extend even beyond these distances. But the BILL, TILL and I presume the HEL hazard distances are apparently classified. How can the public comment on the effects of the BILL TILL and especially the HEL on health and safety if the distance at which these lasers cause eye damage is not available? The public and the MDA / Air force need to make this	As referenced in the comment, the PEIS discusses the potential impacts on health and safety and biological resources from the activation and use of laser weapons (Section 4.1.1.1) and laser sensors (Section 4.1.1.5). If it is determined that laser weapons or laser sensors need to be tested at specific locations, the environmental impacts of their use at these locations would be considered in subsequent site-specific NEPA analyses tiered from this PEIS, as appropriate.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		information available to better ensure the heath and safety of the public.	
Health and Safety	E0427-12 and E0439-12	The PEIS focuses on the testing of these lasers, but fails to reveal whether once deployed, the ABL or any other BMDS weapons lasers will ever be directed toward aircraft including airliners, or individuals on the surface of the earth, e.g. on land or at sea. If so, the MDA needs to address the effects of HEL and other weapons lasers on endangering health and safety, especially skin and eye damage.	The ABL is designed to intercept threat missiles in the boost phase of flight. The ABL would be deployed to and operate in areas where boost-phase intercepts could be attempted. Its effectiveness is undergoing thorough testing as an integral component of the BMDS boost phase defense. The MDA has no plans to use the ABL for terrestrial targets.
Land Use	M0275-4	Page 3-31: In the portion titled "Impact assessment," we suggest referencing the Service National Wildlife Refuges.	A reference to the Service National Wildlife Refuges has been added to the BMDS.
Orbital Debris	F0005-14	Nor would the back-of-the-envelope dismissal of debris, orbital and otherwise. Frequently the PEIS posits that such debris poses a small risk, and downgrades the threat - which would come as a great surprise to our partners in the International Space Station. LAWS adopts and incorporates here by reference the compelling exposition of the dangers from space debris set out in the October 18, 2004 testimony of Theresa Hitchens, Vice President and Director of Space Security of the Center for Defense Information. This is a dramatically fatal flaw in the PEIS; one that ought not be swept under the NEPA rug.	Specific altitudes at which high altitude ground-based intercepts would take place are not provided in the BMDS PEIS. MDA has not underestimated the risk to spacecraft and the space environment. For every flight test, a detailed and comprehensive assessment of the risks posed to spacecraft is conducted. The risk assessment calculates the probability of impact between intercept debris and spacecraft as a function of time in a launch window. These calculations are not "back of the envelope" approximations of the risk; rather they account for both spatial and temporal changes in intercept debris flux, satellite area, satellite dwell time within the cloud, and so forth. The analysis allows mission planners and test conducters to determine the safest time to conduct a flight test minimizing the risk to both manned and unmanned spacecraft.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			Analysis shows that most of the intercept debris (>90%) reenters within six hours of the intercept. The remaining debris spreads into the background of space where it becomes indistinguishable from the background debris that has accumulated over decades of space operations. In fact, background debris poses a far greater risk to the International Space Station (ISS) than intercept debris. Testing of space-based interceptors would only be conducted in areas where airspace had been cleared. For debris reentering in an uncontrolled manger, most debris would not be expected to survive the severe heating and other forces during reentry. During the past 40 years an average of one cataloged piece of debris fell back to Earth each day and no serious injuries or significant property damage has been confirmed. As stated in Section 4.2.1, during testing the MDA would design flight test scenarios so that interceptor and target debris impacts in designated areas within the ocean or on cleared land-based ranges. Because the development of a space-based test bed is too speculative to be analyzed in this PEIS, the specific impacts of launching interceptors from space-based platforms for BMDS testing would be considered in subsequent analyses as appropriate. The MDA wanted to consider the broad possibilities of space-based interceptors as an alternative strategy to enhance the integrated BMDS recognizing that the technologies for this application are in initial stages of planning and development and that

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			subsequent NEPA analyses would likely be needed as technologies and plans became more mature. The MDA has created a technical appendix to the PEIS (see Appendix L), which provides additional information on the creation, reentry, and disposition of orbital debris.
Orbital Debris	PHO0002-3	Major inadequacies in the PEIS treatment of issues related to debris include: Number one: the PEIS severely understates the potential threats to satellites and spacecraft, as well as to people and objects on the ground, from orbital debris caused by ground-based midcourse interceptor tests.	See previous response.
Orbital Debris	PHO0002-4	The PEIS fails to support its claim that little debris would be created because of lack of adequate modeling of likely debris creation from realistic testing of the ground-based interceptor, which would involve higher speed impacts at higher altitudes than testing so far. Under realistic testing of GBIs, ground-based interceptors, there is a significant chance that debris could be created that would last for years, not simply the months as asserted by the PEIS.	See previous response. Also note hypervelocity intercepts create debris. As stated earlier, most of the debris reenters within a few hours of the intercept. Detailed analysis of the risks posed to spacecraft is conducted as part of the mission planning process.
Orbital Debris	PHO0023-6	Last but not least, I would also suggest that you conduct a space debris analysis, as you have sited in the PEIS, that there may be intercepts as high a 400 kilometers. That either you do testing at 400 kilometers, which is ill-advised because of the debris problem, but how would you know if the weapons work unless you conduct the tests? Or you should actually assume that the weapons won't work because you cannot conduct the tests at 400 kilometers above.	See previous response.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
Orbital Debris	PHO0037-3	Third, it neglected to look at space debris from high altitude midcourse missile intercepts or destruction of satellites, and it really glossed over potential impacts of debris falling to earth. It just wrote them off as being burned up in the atmosphere.	See previous response.
Orbital Debris	PHW0003-2	Ground-based interceptors will create debris in LEO if they impact their targets (Intercontinental Ballistic Missiles [ICBMs] fired at the United States) in the so-called mid-course phase, when they are outside the Earth's atmosphere. In this phase, the ICBM will be either rising into LEO, at the peak of its trajectory, or starting to descend back through space into the atmosphere. The PEIS states, "The amount of orbital debris could increase from .. .Ground-based Midcourse Defense ... . Such increases in orbital debris would be temporary, as studies indicate that objects in orbit between 200 and 399 kilometers (123 to 248 miles) reenter the atmosphere within a few months." This statement, however, is somewhat misleading. Up to now, MDA has been configuring ground-based, mid-course intercept tests so as to avoid debris creation, conducting tests at low altitudes and slow speeds, with both interceptor and target on a downward trajectory, so debris created will rapidly reenter the atmosphere.	See previous response.
Orbital Debris	PHW0003-7	Second, even if "best guesses" about a SBI configuration are used based on previously proposed and internal MDA designs, the PEIS fails to take into account the issues mentioned above regarding altitude, size and persistence of debris created by midcourse intercepts, and likely dangers to spacecraft from it.	See previous response.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
Orbital Debris	PHW0001-6	As Ms. Hitchins makes clear, the PEIS fails to adequately analyze and discuss the possible dangers of debris in space. If the missile defense program has an Achilles heel, this is it. It is inexcusable for the MDA not to have undertaken or provided adequate scientific review of the physics involved in debris creation and re-entry, as well as of the multiple scenarios for missile defense intercepts. The dangers to people, and to objects in the air and on the ground are real, yet the PEIS blithely ignores such dangers. Depending upon the missile trajectory, debris could also be a threat to Canadian citizens, aircraft and ground facilities. As Ms. Hitchens notes, all T trajectories to the continental US from North Korea pass over both Canada and Russia, so that both nations are potentially at risk from boost-phase shortfall.	As noted in Section 4.1.1.2 of this PEIS, trajectory modeling would be conducted to verify that launch-related debris would be contained within predetermined areas, all of which would be located away from land and populated areas. The MDA has created a technical appendix to the PEIS (see Appendix L), which provides additional information on the creation and reentry of orbital debris.
Orbital Debris	PHW0002-4	Nowhere is this dismissive attitude indicated more clearly than in how the draft PEIS treats debris, orbital and otherwise. Orbital debris is listed as a resource consideration "because of the likelihood of orbital debris occurring from various launch and testing activities and its potential for impact to health and safety and the environment." (p. ES-12) Yet in every case that orbital debris is detailed as resulting from the proposed actions, it is written off as a non-threat to space assets or the terrestrial environment. It is claimed that the orbital debris from booster failure, for example, would be on-orbit for too little time to create damage, and that it would burn up upon re-entry, but even if it didn't, the likelihood of damage is small, (p. ES-21) This same justification is repeated ad nauseum throughout the document. The draft PEIS does admit that the International Space Station (ISS)	Analysis shows that most intercept debris reenters (>90%) within six hours of the intercept. The remaining debris spreads into the background of space and becomes a part of the background debris field. NASA estimates that there are several hundred million particles of background debris (> 1mm). Intercept debris adds a very small fraction (< 1%) to the overall background debris. Hence the overall background debris count and the resulting risk do not change appreciably. Many orbiting structures can practice collision avoidance, or alterations of their orbit, to avoid cataloged debris. Please note that the U.S. Air Force's Space Control Center indicated that the ISS has practiced collision avoidance six times; however, similar maneuvers are conducted on an approximately monthly

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		may be affected by orbital debris, but again downgrades the threat, saying that the ISS could merely do collision avoidance to ensure its safety, (p. ES-39) This no doubt comes as surprise to our partners in the ISS who were unaware that we were planning on weapons systems that very well could destroy our joint effort unless valuable fuel was used to effect a collision avoidance strategy. This dismissal of the threat of orbital debris to space assets contradicts statements made elsewhere in the draft PEIS. The document discloses that "little advance warning could be given to clear air space" if an SBI had an uncontrolled reentry, (p. 4-121) And, with a nod to the unpredictable, the document says, "Objects reentering may skip off the Earth's atmosphere, similar to a stone skipping across a pond, causing them to impact much farther away than originally predicted." (p. 4-122) Despite this, the document still clings stubbornly to the conclusion that orbital debris would have no significant impact.	basis to maintain orbital altitude. The MDA, however, would conduct pre-flight launch window screening to ensure that high altitude tests would only be conducted when ISS would not pass through the resulting debris clouds. Testing of space-based interceptors would only be conducted in areas where airspace had been cleared. For debris reentering in an uncontrolled manner, most debris would not be expected to survive the severe heating and other forces during reentry. During the past 40 years an average of one cataloged piece of debris fell back to Earth each day and no serious injuries or significant property damage has been confirmed. The MDA has added an appendix to the PEIS (Appendix L), which provides additional information on the creation, reentry, and disposition of orbital debris.
Orbital Debris	PHO0002-1	The overall assumption of the PEIS is that there is a low-level risk from either orbital debris or debris reentering the Earth's atmosphere, and that is not supportable, due in large part to the failure of the MDA to undertake and provide adequate scientific review of the physics involved in debris creation and reentry from the multiple possible scenarios for missile defense intercepts.	MDA has conducted an exhaustive study on this subject. Results are being coordinated with the space community. Testing would be conducted such that intercept debris would fall into the open ocean or over restricted land areas. MDA has conducted modeling of high altitude ground-based intercepts. This modeling has shown that the majority of post-intercept debris resulting from high altitude intercepts would reenter the atmosphere within a few hours. A small amount of post-intercept debris may become orbital debris; however, risks to spacecraft from this debris are less than the risk posed by existing background debris. The MDA has created a technical

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			appendix to the PEIS (see Appendix L), which provides additional information on the creation and reentry of orbital debris.
Orbital Debris	PHW0003-1	The PEIS, however, dramatically fails to address the potential dangers (both to space-based objects and those on the Earth) from space debris that MDA admits will be created by testing or use of ballistic missile interceptors. The PEIS states (p. ES-33): "Proposed BMDS space-based sensor activities would be expected to produce small quantities of debris, primarily explosive bolts and small pieces of hardware. It may be possible for debris from an exoatmospheric intercept to become orbital debris. However, because the majority of the BMDS activities would occur in Low Earth Orbit where debris would gradually drop into successively lower orbits and eventually reenter the atmosphere, the debris would not be a permanent hazard to orbiting spacecraft. As BMDS testing becomes more realistic, there is a potential for an increased amount of debris reaching and remaining on orbit. A large portion of this debris would likely not remain on orbit for more than one revolution, and eventually all of the debris would be expected to de-orbit." While these statements are perhaps true, they also serve to downplay the possible dangers of debris. The overall assumption in the PEIS that there is a low-level of risk is not supportable, due to the failure of MDA to undertake or provide adequate scientific review of the physics involved in debris creation and reentry, as well as of the multiple scenarios for missile defense intercepts. The following is	See previous response.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		an overview of the major inadequacies in the PEIS treatment of issues related to orbital debris.	
Orbital Debris	PHO0002-6	Finally, the PEIS asserts that most of the debris created in low Earth orbit would be small and thus not a major hazard to the ISS. Unfortunately, as I said, even tiny pieces of debris could destroy the ISS or other space assets. In actuality, small debris is considered by space operators as a bigger hazard to space objects because it cannot be detected and tracked adequately enough to allow planning for evasive maneuvers by those space objects that can do so. In other words, smaller debris could be a bigger threat to the ISS and other craft than larger pieces on orbit, and the PEIS undertakes no review of this fact of physics.	See previous response.
Orbital Debris	PHW0003-3	In the last successful test in October 2002, the interceptor hit the target at an altitude in excess of 210 kilometers (140 miles) above the Earth, at a speed of about half of what would be required in a real-life scenario. Realistic testing and employment of a ground-based mid-course system would require intercepts at higher altitudes orbit of around 300+ kilometers and extremely high speeds, and would more likely take place with both the interceptor and the target flying in an upward trajectory - facts of physics that would lead to the creation of more debris and likely result in debris being flung into a higher orbital plane than the altitude of the intercept itself. If the debris ends up orbiting at higher than 399 kilometers, it could remain in space for years. There is no evidence that the PEIS takes into account this latter possibility.	Higher intercept altitudes with both the interceptor and target on ascending trajectories do not create more debris, as the author indicates. The amount of debris produced is proportional to the closing velocity and the mass properties of each object (density, mass distribution) not the intercept conditions. MDA conducts a rigorous analysis to assess the risk to both manned and unmanned spacecraft prior to each mission. This analysis determines the safest time to conduct the flight test minimizing the probability of impact between intercept debris and spacecraft (including the ISS). The relatively small percentage of intercept debris (<10%) that remains orbital does not retain any semblance to a "cloud". It is important to understand that as a result of the high spreading velocities imparted to the debris post-intercept, the intercept debris spreads

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		Even if the debris remains in space only for a "few months" it would still pose a potential threat to space assets in its orbital pathway, including perhaps, as the PEIS itself admits, the International Space Station (ISS). While, as the PEIS notes, the ISS can be (and has been in the past) moved to avoid potential collision with space debris, this is not a simple task and takes time. Indeed, the PEIS couches its language on threats to the ISS by saying only that it "may be possible" for the ISS to perform collision avoidance to get out the way of any "large debris" created. Further, many other satellites in LEO lack the ability to maneuver at all to avoid debris - a fact that the PEIS fails to mention.	into the background, becomes a part of the background debris field - indistinguishable from background debris. With respect to the ISS, collision avoidance maneuvers would not be necessary. As per the current coordination with Air Force Space Command, safe launch times would be selected so that the debris cloud avoids the ISS altogether.
Orbital Debris	PHO0002-2	Space debris is a major hazard to spacecraft and satellites because of the high impact velocities generated in orbit, meaning that even tiny pieces of debris, which you mention, such as bolts can damage or destroy an on-orbit asset. Reentry of space-based objects, such as the SBIs, can also threaten people or objects on the ground, as not all debris is burned up on its way through the atmosphere.	Operational spacecraft are struck by small pieces of orbital debris and micrometeoroids routinely with little or no effect; many orbiting structures use shielding methods to protect from debris as large as 1 centimeter in diameter. The probability of two large objects colliding in space is very low, only one such documented incident has occurred between objects from different missions in 45 years.
Orbital Debris	PHO0002-5	Further, even short-term debris could be a danger to space objects such as the International Space Station, as the PEIS admits. And while the PEIS states that the ISS could be moved to avoid a collision with any large debris, it fails to recognize that other objects in low Earth orbit that might be threatened are not maneuverable.	See previous response.
Orbital Debris	PHW0003-4	Finally, the PEIS contradicts itself somewhat on the issue of debris risk by stating (on p. 4-132) that since the "debris created is expected to be small" and collision avoidance strategies could be used, there are "no	Because the development of a space-based test bed is too speculative to be analyzed in this PEIS, the specific impacts of launching interceptors from space-based platforms for BMDS testing would be considered in

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		significant impacts expected to the ISS." While it is debatable whether the debris would indeed be "small" - as the PEIS provides no actual modeling to predict the size of debris created by a ground-based midcourse intercept -the fact is that small debris could actually be more dangerous to the ISS and other spacecraft in LEO. That is because current debris tracking systems cannot track debris smaller than 10 centimeters in diameter (about the size of a softball) adequately enough to allow planning of collision avoidance maneuvers. Debris between 10 cm and 1 cm in diameter (a bit larger than a marble) will penetrate and damage most spacecraft (as the PEIS admits on p. 4-131) and could possible destroy space assets depending on where debris strikes the spacecraft. It also should be noted that the orbital plane between 300 and 400 kilometers is already one of the bands of space most polluted with this size of debris.	subsequent analyses as appropriate. The MDA wanted to consider the broad possibilities of space-based interceptors as an alternative strategy to enhance the integrated BMDS recognizing that the technologies for this application are in initial stages of planning and development and that subsequent NEPA analyses would likely be needed as technologies and plans became more mature.
Orbital Debris	PHO0002-11	Last of all, the PEIS also neglects a critical factor regarding the potential for debris creation from SBIs: that is, the fact that any architecture means large numbers of missiles filled with highly volatile rocket fuel would be orbiting in LEO at altitudes where they themselves will be constantly bombarded by space debris, with an attendant risk of explosion caused by debris impact.	See previous response.
Orbital Debris	PHW0003-5	The PEIS completely fails to support its claim that there would be no significant impact to spacecraft from the use of Space-Based Interceptors (SBIs) for either boost-phase intercept (as an ICBM is rising into the upper atmosphere) or midcourse intercept, due to the inability of the MDA to provide data required for necessary scientific review.	See previous response.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		Given the inadequate articulation by MDA of the SBI concept and the lack of sufficient scientific coverage of space debris in this PEIS, it is impossible for the PEIS to make any claims about potential debris production from SBI tests, deployment or usage - other than that the creation of debris is a certitude. The PEIS states (p. 4-118), "Using interceptors from a space-based platform would create orbital debris, from successfully intercepting a threat missile and causing it to break up or from the break up of any unsuccessful interceptor or space platform." It further notes (p. 4-118) that SBIs would travel through space after launch, and thus potentially endanger other satellites it their path. It does not, however, mention the fact that launching an SBI constellation into either LEO or GEO would also have debris impacts that might be significant.	
Orbital Debris	PHW0003-6	The dangers of the debris created, however, can not be scientifically analyzed because the configuration of the SBIs themselves (i.e., their size, mass and speed) has yet to be revealed by MDA; neither has the architecture for their deployment (how many SBIs on orbit and at what altitude) or usage (how many SBIs would be fired at an incoming target) been publicly determined. As noted above, the potential for debris creation depends on a number of factors including the mass of the two objects, the speed of the impact, the altitude of the impact, and the angle of impact. With none of the specific parameters identified for a SBI system by MDA (including in this PEIS), these factors are impossible to model.	See previous response.
Orbital Debris	PHW0003-8	Third, and perhaps the most egregious inadequacy in the PEIS review of the SBI option, proposals for a SBI	See previous response.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		network postulate between 500 and several thousand interceptors in LEO - each of which would be filled with a large amount of highly-volatile rocket fuel. Thus, the SBIs themselves would be in potential danger of colliding with space debris already on orbit. Such collisions could result in the explosion of the SBI. In fact, current orbital debris mitigation regulations in the United States and elsewhere, as a first-order priority, require space operators to vent any excess fuel from booster rockets used in launching satellites in order to avoid on-orbit explosions, which are proven to create vast amounts of wide-spread debris. The SBIs would also be constantly bombarded by smaller debris that could comprise their integrity. The PEIS completely ignores the possibility of SBIs being damaged by debris.	
Orbital Debris	PHW0003-9	And while the PEIS suggests the possibility that some SBIs also might be based in GEO, there is no effort to address the even more serious threats this architecture would pose to spacecraft. An SBI traveling toward the Earth from GEO would have many more opportunities to collide with other spacecraft as it passed through subsequently lower orbital altitudes. Also as GEO is already highly crowded with satellites (mostly for commercial communications and broadcast), the threat of debris creation by a network of new, explosive SBIs based in that orbital band could be high. Neither of these potential threats is modeled in the PEIS.	The BMDS PEIS states that space-based platforms for sensors or C2BMC could be placed into GEO; however, there is no mention of placing space-based platforms for weapons into GEO. If future plans were to identify the need for the use of space-based platforms for weapons in GEO, they would be considered in subsequent tiered analyses, as appropriate.
Orbital Debris	PHW0003-10	Indeed, the PEIS itself states (p. 4-116) that "additional environmental analysis could be needed as the technologies intended to be used became more defined and robust." Even more worrisome, an article in the Sept.	The MDA coordinates its activities with appropriate Federal agencies. The MDA participates in a Working Group studying the characterization of operational engagement space (i.e., conducting high speed, high

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		13 edition of Space News ("Space-Based Interceptor Could Pose Debris Threat") reveals that MDA has not even held detailed discussions about the potential for damaging debris from space-based interceptors with NASA's Orbital Debris Program Office.	altitude intercept scenarios to test GMD) with respect to debris risk. Members of the analysis working group include MDA, NASA, U.S. Air Force Space Command (AFSPC), the Aerospace Corporation, and System Test and Evaluation Planning Analysis Lab (STEPAL). The policy component of this working group includes NASA, AFSPC, STRATCOM, National Reconnaissance Office (NRO), and the Pacific Range Support Team (PRST). MDA is conducting modeling in this venue to try to consider realistic test scenarios and considering debris risk at the ground/surface and in space with the goal of developing criteria for protecting space assets. These efforts are currently underway.
Orbital Debris	PHW0003-11	The PEIS states on a number of occasions that any debris reentering the atmosphere from a midcourse intercept (by either ground-based or space-based interceptors) event would likely be "small" and thus "burn up" before impacting the ground. Considering that a Delta 2 second stage is a good bit smaller than either an ICBM or the current design of the ground-based midcourse interceptor, that statement is debatable. Nor is it supported by the PEIS itself, which simply does not provide the scientific analysis needed to determine the size of debris created by a midcourse intercept or the possibility of it making landfall intact	MDA has conducted an exhaustive study of the risks posed to spacecraft. Results are being coordinated with the space community. This analysis has shown that the majority of post-intercept debris resulting from high altitude intercepts would reenter the atmosphere within a few hours. A small amount of post-intercept debris may become orbital debris; however, risks to spacecraft from this debris are less than the risk posed by existing background debris. The MDA has created a technical appendix to the PEIS (see Appendix L), which provides additional information on the creation and reentry of orbital debris.
Orbital Debris	PHW0003-12	For example, in the case of a booster malfunction or a miss by an interceptor successfully launched from the ground, large pieces of debris likely would fall back to Earth. There is little evidence given in the PEIS to back its contrary assertion that debris would be small and limited in its "footprint." Even in the case of a successful	As part of the normal mission planning process, scenarios are designed so that in the event of a flight termination action, all debris will impact the open ocean or designated areas on land ranges. Booster drop zones, flight termination and intercept debris footprints are coordinated with the appropriate test range authorities.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		intercept, there is no data provided by the PEIS about the likely size and altitude of debris, data that is required to predict whether or not pieces would make landfall intact.	
Orbital Debris	PHO0002-10	Number Two: The PEIS fails to support its claim that there would be no significant impact to spacecraft and satellites, and objects and people on the ground, from the testing and deployment of Space-Based Interceptors. Given the inadequate articulation by MDA of the SBI concept itself, it is impossible for the MDA to make any claims about the risks to space objects from SBIs. Debris creation depends on a number of specific factors about individual impacts, such as the mass of the two objects impacting, their relative velocities at impact, the angle of impact, and altitude. Since the MDA has yet to determine nor to provide in this PEIS critical design parameters of the SBIs themselves--their size, mass, and their speed--and the architecture of an SBI network, how many interceptors on orbit at what altitude--it is simply impossible for the MDA to support the PEIS claim that there is little debris risk, much less to support the PEIS suggestion that a space-based architecture would present less risk to the environment than a solely ground-based one. Without any specific parameters for an SBI network available, the MDA has no data for undertaking the necessary calculations to support its claims.	As stated in Section 4.2.1, during testing the MDA would select launch scenarios that would result in both the interceptor and intercept debris clouds impacting in designated areas within the ocean or on cleared land-based ranges. Because the development of a space-based test bed is too speculative to be analyzed in this PEIS at this time, further analysis would be conducted as the space-based technology develops and matures.
Orbital Debris	PHW0003-13	As the size, mass and speed of any SBI remains undetermined by MDA, it is impossible for the MDA at this time claim that there would be little risk of landfall by debris. However, the possibility of an SBI missing its	See previous response.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		target and reentering the atmosphere is worrisome, and should be further reviewed using reentry modeling based on several SBI configuration options - modeling that has not been provided by the PEIS.	
Orbital Debris	PHW0003-14	The PEIS (p. 4-70) also states that "even if an object does survive reentry, only one third of the Earth's surface is land area, and only a small portion of this land area is densely populated. The chance of hitting a populated land area upon reentry would be small." While this is a statement of fact, it does not take into account the trajectory of likely missile tests or intercepts over the Earth. Where reentry might happen is dependent on from where the target missile is launched as well as from where the interceptor is launched, and at what point in their individual trajectories impact is made. The PEIS fails to provide specific data about likely intercept scenarios required to model possible reentry points. For example, there is some question about MDA's ability to do intercept tests from Ft. Greely, the first location for the new ground-based midcourse interceptors, because of concerns about endangering people and the environment. Finally, the PEIS itself admits (p. 4-122) that "Objects reentering may skip off the Earth's atmosphere, similar to a stone skipping across a pond, causing them to impact much farther away than originally predicted."	The PEIS is intended to provide a programmatic analysis of the potential impacts associated with the development, testing, deployment, and decommissioning of the BMDS. The PEIS is not a site- or component-specific environmental analysis and therefore does not provide specific information about particular components or their operation at various facilities. Specific booster or debris impact zones are coordinated with the appropriate test range authority months if not years prior to a mission. Moreover, coordination is conducted for every mission. If future plans identify specific locations that are required to support specific target and interceptor launches, they would be considered in subsequent tiered NEPA analyses, as appropriate.
Orbital Debris	PHW0003-15	In the case of a SBI launch designed to hit an ICBM in its boost phase, it is currently (as with a midcourse design) impossible to predict with reliability the potential for debris to make landfall intact due to the lack of data about the configuration of SBIs. That said, however, a miss likely would result in major ground impact. That is	There is no reason to believe that if there is a miss during a future test involving a space-based interceptor that there would be major impact on the ground. Although it is completely speculative at this point, a space-based interceptor intended for use as a test article would likely be fitted with a flight termination system to preclude an

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		because by any design, an SBI must be able to survive reentry of the atmosphere so as to hit the target ICBM before it exits the atmosphere. This issue is not addressed by the PEIS at all - and represents a fact that seems to run directly counter to the PEIS's assertion (p. 4-121) that, "Upon reentry, the majority of the space-based interceptor and its platform would burn due to the intense friction and heat created during reentry through the Earth's atmosphere."	intact interceptor from reaching the surface of the Earth. Further, a missed intercept would likely bounce off the atmosphere and spin out into space. The altitude and trajectory for space-based boost phase intercepts have not yet been determined; however, the space platform (vehicle) itself would likely leave its parking orbit upon communication that a boost phase engagement was to occur, it would likely deploy one or more kill vehicles (multiple mini-kill vehicles) that would serve as the boost phase interceptors, and the space platform would then return to its parking orbit.
Orbital Debris	PHW0003-16	Finally, the PEIS admits that any accident (such as a communications failure caused by a defect or jamming) that caused an SBI to reenter the Earth's atmosphere in an uncontrolled manner could create a danger to aircraft in flight. It states (p. 4-121), "Given the difficulty in predicting that path of uncontrolled reentering space-based interceptors and their associated platforms, little advanced warning could be given to clear airspace." It then goes on to assert that most objects break up upon reentry and the impacts to airspace would not likely be significant - an assertion for which no scientific backup is provided, especially given the fact that SBIs designed for boost-phase intercept would by their nature be required to reenter at least the upper atmosphere intact. Further, even smaller pieces of white-hot debris could severely damage an aircraft in flight.	Assuming a space platform with kill vehicles awaits communication of a boost phase engagement, it would come out of parking orbit and deploy one or more kill vehicles that would serve to intercept the target, and then return to orbit. The technologies for space-based interceptors are simply not mature enough to state for certain whether they would break up, burn up or reenter intact given their intended use especially as test articles. However, testing involving space-based boost phase intercepts would always take place in restricted airspace after ensuring that NOTAMs have been issued and the airspace has been cleared prior to test activities. It is extremely unlikely that a test scenario would result in danger to aircraft because the scheduling and safety restrictions prior to and during testing are stringent and are rigorously applied to ensure that this type of accident does not happen.
Orbital Debris	PHO0002-7	That said, the PEIS does not provide adequate scientific review to support the assertion that most debris would be small, a term that is undefined in the PEIS, raising the	The MDA has created a technical appendix to the PEIS (see Appendix L), which provides additional information on the creation, reentry, and disposition of orbital debris.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		question of the risks from reentry into the atmosphere of both the interceptor and its target after an impact.	
Orbital Debris	PHO0002-8	Not all debris reentering the atmosphere burns up, as the PEIS suggests.	See previous response.
Orbital Debris	PHO0002-9	In January 1997, a Delta Two rocket second stage came down over Georgetown, Texas, with large pieces making landfall including a 580-pound stainless-steel fuel tank that landed 50 yards from a house. Another Delta Two second stage reentered the atmosphere over Cape Town, South Africa in April 2000, similarly raining large pieces of debris to the ground. It is important to note that a Delta Two second stage is considerably smaller than the either a ground-based midcourse interceptor or a target ICBM. It also is highly difficult to predict reentry trajectories even from scripted test events because debris can, as the PEIS admits, skip off the atmosphere and land miles away from its original reentry point, and the PEIS provides no evidence that MDA made any significant effort to undertake the complex computer modeling required to predict such possible reentry scenarios.	The MDA has performed modeling of high altitude ground-based intercepts. This modeling has shown that the majority of post-intercept debris resulting from high altitude intercepts would reenter the atmosphere within a few hours. A small amount of post-intercept debris may become orbital debris; however, risk to spacecraft from this debris is less than the risk posed by existing background debris. The MDA has added a technical appendix to the PEIS (see Appendix L), which provides additional information on the creation and reentry of orbital debris.
Orbital Debris	PHO0002-12	The PEIS ignores this risk altogether. In sum, the PEIS fails to support its conclusions about the risk from the creation of orbital debris and its possible reentry into the atmosphere due to a lack of adequate and complete scientific review.	See previous response.
Perchlorate	E0319-24	The PEIS should include any environmental health hazard studies the Department of Defense (DOD) has done since 1997 on children living in communities near rocket/missile launch sites and/or U.S. military training bases world-wide. An excerpt from an October 1, 2004 DOD news release titled: 'DOD, California Perchlorate	Section 4.1.1.2 of the Draft PEIS provided information developed by the Perchlorate Study Group, this group worked with the U.S. EPA, NASA, state governments, water purveyors, and other business organizations to assess whether there is a level of perchlorate in drinking water that poses a risk to human health. In addition to

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		Sampling Prioritization Protocol Reached', stated: "Currently, no drinking water standard for perchlorate has been adopted". According to the news article, the DOD apparently is finally agreeing to involve itself with environmental studies, along with the state of California, to research the findings of large quantities of perchlorates in the state's drinking water. Since perchlorate is a rocket and missile propellant, and there have been no previous drinking water standards for the chemical, the PEIS cannot state without conclusive studies that there has been no health and safety risks to children (or the general public) who live near test launch sites.	citing the Perchlorate Study Group findings, the Final PEIS has been modified to include the proposed findings from the State of California Office of Environmental Health Hazard Assessment, the State of Massachusetts, and U.S. EPA. The U.S. EPA has established an official reference dose (RfD) of 0.0007 milligrams per kilogram (mg/kg) per day of perchlorate, which translates into a drinking water equivalent level of 24.5 parts per billion (ppb). A Drinking Water Equivalent Level, which assumes that all of a contaminant comes from drinking water, is the concentration of a contaminant in drinking water that will have no adverse effect with a margin of safety. Because there is a margin of safety built into the RfD and the drinking water equivalent level, exposures above the drinking water equivalent level are not necessarily considered unsafe. To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS.
Perchlorate	E0326-1	The testing of the system at Vandenberg AFB has inevitably had the effect of polluting the surrounding area with perchlorates. We do not know the extent of birth defects and growth retardation caused by rocket fuel in	The DoD and the MDA are aware of the potential health concerns associated with perchlorate contamination. The DoD, U.S. EPA, DOE, and NASA asked the National Research Council (NRC) to assess independently the adverse health effects of perchlorate ingestion from

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		this area because no studies among this population have been done.	clinical, toxicological, and public health perspectives. The NRC study considered thyroid function in infants including possible impacts from perchlorate exposure on birth defects and skeletal growth. Regarding birth defects resulting from non-normal thyroid function the NRC study states: *"The consequences of severe combined maternal and fetal hypothyroidism during fetal life and in newborn infants include microcephaly (small brain), mental retardation, deaf-mutism, paraplegia or quadriplegia, and movement disorders. Those abnormalities are not reversible by treatment with T4 (Foley 2000). However, the abnormalities can be largely prevented by administration of iodide to the mothers before or during the first trimester and early part of the second trimester of pregnancy (Pharoah 1993; Cao et al. 1994)."* Regarding impacts to skeletal growth from non-normal thyroid function, the NRC study states: *"T4 and T3 also are required for normal skeletal development and growth. Bone cells have T3 receptors, and T3 stimulates bone formation and the appearance of the epiphyseal centers that are needed for normal growth of long bones. T3 also stimulates the production of pituitary growth hormone and insulin-like growth factor. Treatment with T4 leads to resumption of bone growth and*

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			skeletal maturation, but severely affected infants are unlikely to have normal stature." In addition, the NRC report noted that "The primary sources of uncertainty in estimating an RfD for perchlorate in drinking water arise from the absence of data on possible side effects of iodide deficiency (pregnant women and their fetuses and newborns). Therefore, new epidemiologic research should assess the possible health effects of perchlorate exposure in those populations." Section 4.1.1.2 of the Draft PEIS provided information developed by the Perchlorate Study Group, this group worked with the U.S. EPA, NASA, state governments, water purveyors, and other business organizations to assess whether there is a level of perchlorate in drinking water that poses a risk to human health. The Final PEIS has been modified to include the proposed findings from the State of California Office of Environmental Health Hazard Assessment, the State of Massachusetts, and U.S. EPA. To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers the uses, sources, and disposal of perchlorate as well as the effects on human health and the

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			environment. It should be noted that future tiered analyses for specific proposed activities at sites such as Vandenberg AFB would appropriately consider the potential impacts of activities on water quality.
Perchlorate	E0363-1	In particular, I am concerned about the hazardous waste associated with the system. For example, perchlorate from rocket fuel has already contaminated rivers and ground water, and can find its way into milk supplies (e.g., as has occurred in Texas). Like other toxins that act as endocrine disruptors, perchlorate can interfere with thyroid hormones and disrupt pre- and post-natal brain development, resulting in reductions of IQ and attention, mental retardation, hearing loss, and defects in speech and coordination. Seventeen percent of children suffer from developmental and learning disabilities, and as many as 25% of those disabilities are due to the effects of environmental toxins either acting alone or in combination with genetic and other environmental factors.	The DoD and the MDA are aware of the potential health concerns associated with perchlorate contaminated water. However, currently, there are no Federal drinking water standards for perchlorate. The U.S. EPA would be responsible for establishing Federal drinking water standards and has issued draft risk assessments of perchlorate. However, these assessments have been criticized because it has been suggested that the findings are based on flawed scientific studies and that not all available data were considered and incorporated into the assessments. The U.S. EPA study's draft RfD for perchlorate was 0.00003 mg/kg per day and the NRC study recommended an RfD of 0.0007 mg/kg per day. The NRC stated that this value is supported by other clinical studies, epidemiologic studies, and studies of long-term perchlorate administration. The NRC report concluded that the proposed RfD of 0.0007 mg/kg per day should protect even the most sensitive populations. The U.S. EPA has established an official RfD of 0.0007 mg/kg per day of perchlorate, which translates into a drinking water equivalent level of 24.5 ppb. A Drinking Water Equivalent Level, which assumes that all of a contaminant comes from drinking water, is the concentration of a contaminant in drinking water that will have no adverse effect with a margin of safety. Because there is a margin of safety built into the RfD and the drinking water equivalent level, exposures above

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			the drinking water equivalent level are not necessarily considered unsafe. To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical Appendix M addressing issues specifically related to perchlorate has been added to the Final PEIS.
Perchlorate	PHO0025-1	This weapons system is designed to intercept enemy missiles in space from ground platforms in Fort Greely, Alaska, Vandenberg Air Force Base in Southern California. The chemicals used in solid rocket propellant that would be used to launch the intercept missiles, the test missiles and especially the booster rockets that place related detection communication satellites in space would all use imodium perchlorates as the oxidizing agent in the rocket fuel. The fuel would also contain highly toxic hydrazine compounds and nitrogen oxide. In the news of late, the developmental toxin perchlorate has been found in many of our nation's drinking water sources. This chemical inhibits thyroid hormone creation and release. In low doses, perchlorate is presumed to decrease the intelligence potential of a developing fetus. In cases of more severe exposure, can cause frank retardation. Additionally, once combusted and exposed to air moisture, perchlorates create hydrochloric acid, more commonly known as "acid rain."	The DoD and the MDA are aware of the potential health concerns associated with perchlorate contaminated water. In 1985, perchlorate was detected in wells of California Superfund sites; however, perchlorate contamination was not detected nationwide until 1997. Currently, there are no Federal drinking water standards for perchlorate. The DoD, U.S. EPA, DOE, and NASA asked the NRC to assess independently the adverse health effects of perchlorate ingestion from clinical, toxicological, and public health perspectives. The NRC report considered the potential health effects to children born to mothers with non-normal thyroid function and found that *"Those studies, although not definitive, suggest an effect on development in infants whose mothers had subclinical hypothyroidism or low-normal serum free T4 concentrations during pregnancy, but they have limitations. The differences in test scores were small, and the scores could be confounded by socioeconomic, educational, and other differences*

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			between the study groups. Moreover, the results contrast with the normal development of the infants of mothers who had overt hypothyroidism (Liu et al. 1994). Nonetheless, if confirmed, they emphasize the potential vulnerability of fetuses to decreases in maternal thyroid function." A technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS. Section 4.1.1.2 of the Final PEIS considers the impacts of exhaust products from solid propellant boosters; including the impact from the conversion of hydrogen chloride to hydrochloric acid.
Perchlorate	E0376-1	In the draft Programmatic Environmental Impact Statement for the Missile Defense System (1 September 2004), I would like to point out incomplete and misleading statements about perchlorate toxicity and standards in the bottom paragraph on Vol. 1, p. 4-56. This discussion provides the viewpoint of the DoD and the Perchlorate Study Group, an Industry Workgroup, on perchlorate toxicity, but ignores all risk assessments conducted by actual risk assessment agencies. The U.S. EPA has been evaluating perchlorate toxicity for years, in association with several defense agencies (as stated), and has released a draft risk assessment which proposes a drinking water equivalent level of 1 ppb. The State of California Office of Environmental Health Hazard Assessment has published our risk assessment	In addition to citing the Perchlorate Study Group findings, the Final PEIS has been modified to include the proposed findings from the State of California Office of Environmental Health Hazard Assessment, the State of Massachusetts, and U.S. EPA. To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers the uses, sources, and disposal of perchlorate as well as the effects on human health and the environment.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		which estimates a health-protectice level of perchlorate in drinking water of 6 ppb. The State of Massachusetts has recently released their evaluation with a recommended drinking water level of 1 ppb to protect pregnant women and fetuses (or other sensitive sub-populations), and 18 ppb for healthy adults. The U.S. EPA guidance applicable to water contaminant plumes emanating from industrial and DoD sites has used a standard of 4-18 ppb for several years. To not consider and apply these relevant and applicable standards to the evaluation of potential environmental impact of the deployed missile systems seems to me to be putting both the DoD and the public at risk, both from legal liability and potential chemical hazards. I recommend that this section of the report, and any financial and toxicological calculations based on it, be revised to include the viewpoints expressed by the regulatory agencies whose job it is to regulate the public and environmental exposure to perchlorate. Acknowledging these opinions need not wait for the finalization of the U.S. EPA's current draft risk assessment for perchlorate, currently under review by the National Academy of Sciences, nor the promulgation of the California Maximum Contaminant Level for perchlorate in drinking water, scheduled for 2005.	
Perchlorate	E0427-7 and E0439-7	8) Ammonium perchlorate is one of the main components of rocket fuel, typically constituting 60% to 75% of missile propellant and about 70% of space shuttle rocket motors. Since the fuel and perchlorate goes flat, the fuel/perchlorate has to be replaced every few years or it	Section 4.1.1.2 of the Draft PEIS provided information developed by the Perchlorate Study Group, this group worked with the U.S. EPA, NASA, state governments, water purveyors, and other business organizations to assess whether there is a level of perchlorate in drinking

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		will fail to function properly, thereby increasing the amount of perchlorate waste and exposure problems. Ammonium Perchlorate is well characterized as a thyroid hormone disruptor. http://www.ewg.org/reports/rocketscience/chap3.html. At high enough concentrations, perchlorate can affect thyroid gland functions, where it blocks iodide uptake necessary for the synthesis of thyroid hormones (Urbansky 2002). Perchlorate can cause hypothyroidism, and thyroid cancer. The environmental levels of perchlorate have been show to inhibit development in frogs (Goleman et al. 2002). California has extensive perchlorate contamination problems with the drinking water sources of at least 7 million Californians and millions of other Americans are contaminated with perchlorate. A federal safe daily perchlorate exposure has not yet been set by the EPA, and its expected release in 2002 has been delayed. It has been delayed since the DoD objected to EPA studies suggested a standard of 1 ppb. Senator Barbara Boxer has introduced legislation to require the EPA to establish a standard for perchlorate contamination by July 1, 2004. While most contaminated samples are in the 4 to 20 ppb levels, surveys of California water sources show several sites with perchlorate levels from 4 to 820 ppb. http://www.ewg.org/reports/rocketwater/tablel.php Ammonium perchlorate used in solid propellants blocks the formation of key thyroid hormones which are critical for growth and development especially in fetuses and children. The PEIS proposes to allow over 30-fold higher levels of perchlorate (200 parts per billion) than that proposed by the State of California (6 parts per billion).	water that poses a risk to human health. In addition to citing the Perchlorate Study Group findings, the Final PEIS has been modified to include the proposed findings from the State of California Office of Environmental Health Hazard Assessment, the State of Massachusetts, and U.S. EPA. Currently, there are no Federal drinking water standards for perchlorate. The U.S. EPA would be responsible for establishing Federal drinking water standards and has issued draft risk assessments of perchlorate. However, these assessments have been criticized because it has been suggested that the findings are based on flawed scientific studies and that not all available data were considered and incorporated into the assessments. The U.S. EPA study's draft RfD for perchlorate was 0.00003 mg/kg per day and the NRC study recommended an RfD of 0.0007 mg/kg per day. The NRC stated that this value is supported by other clinical studies, epidemiologic studies, and studies of long-term perchlorate administration. The NRC report concluded that the proposed RfD of 0.0007 mg/kg per day should protect even the most sensitive populations. The U.S. EPA has established an official RfD of 0.0007 mg/kg per day of perchlorate, which translates into a drinking water equivalent level of 24.5 ppb. A Drinking Water Equivalent Level, which assumes that all of a contaminant comes from drinking water, is the concentration of a contaminant in drinking water that will have no adverse effect with a margin of safety. Because there is a margin of safety built into the RfD

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		As pointed out in the comments of Lenny Siegel: The reason that there is no federal drinking water standard for perchlorate is that the Defense Department objected to EPA studies that suggested a standard of one part per billion (ppb). Meanwhile, regulatory agencies are using levels far below the 200 ppb asserted in the PEIS. On the way to establishing its own legal standard, California has adopted a Public Health Goal of 6 ppb (Frequently Asked Questions (FAQs) About the Public Health Goal for Perchlorate," California Office of Environmental Health Hazard Assessment (OEHHA), March 11, 2004. hittp:/www.oehha.ca.gov/public_info/facts/perchloratesfacts.html). Even these levels of perchlorate may be detrimental to fetuses and infants. The human study considered in setting the California public health goal did not evaluate pregnant women, fetuses or infants (Greer et al. 2002). The study of Greer at al 2002, only used a 14-day exposure to perchlorate, which is insufficient to deplete thyroid colloid which acts as a storage form of thyroid hormones. Thus this study is insufficient to estimate the effect of long-term perchlorate exposure on iodine uptake or thyroid hormone levels. Since the effect of long term perchlorate exposure on reducing thyroid hormone levels, especially in the fetus and in infants has not been considered, the MDA needs to evaluate these effects on these sensitive groups as required by federal law. In May, 2004, Massachusetts identified a reference dose for perchlorate that would correspond to a 1 ppb drinking water exposure limit. Also note that perchlorate	and the drinking water equivalent level, exposures above the drinking water equivalent level are not necessarily considered unsafe. To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		is found in milk and in several plant species, including lettuce, where high levels have been reported. Thus multiple sources of perchlorate exposure need to be considered.	
Perchlorate	E0427-8 and EO439-8	9) To ensure maximum environmental protection and reduce known, widespread human health risks from the use and disposal of rocket propellants, the BMDS PEIS should compare the proposed alternatives against a real No Action Alternative. At a minimum the BMDS PEIS should: A. Acknowledge and address emerging regulatory standards for perchlorate exposure. B. Consider the effects of perchlorate on susceptible subpopulations, including fetuses, and children. The MDA also needs to consider the effects of perchlorate exposure on even more sensitive congenitally hypothyroid populations, so that these individuals are not detrimentally affected by perchlorate from BMDS missile launches. C. Since water supplies in several regions of central and southern California are already at, exceeding and in some cases markedly exceeding the emerging regulatory standards for perchlorate, the MDA should acknowledge and address the perchlorate problem so as to protect the public.	The DoD and the MDA are aware of the potential health concerns associated with perchlorate contaminated water. In 1985, perchlorate was detected in wells of California Superfund sites; however, perchlorate contamination was not detected nationwide until 1997. Currently, there are no Federal drinking water standards for perchlorate. The U.S. EPA would be responsible for establishing Federal drinking water standards and has issued draft risk assessments of perchlorate. However, these assessments have been criticized because it has been suggested that the findings are based on flawed scientific studies and that not all available data were considered and incorporated into the assessment. The U.S. EPA study's draft RfD for perchlorate was 0.00003 mg/kg per day and the NRC study recommended an RfD of 0.0007 mg/kg per day. The NRC stated that this value is supported by other clinical studies, epidemiologic studies, and studies of long-term perchlorate administration. The NRC report concluded that the proposed RfD of 0.0007 mg/kg per day should protect even the most sensitive populations. The U.S. EPA has established an official RfD of 0.0007 mg/kg per day of perchlorate, which translates into a drinking water equivalent level of 24.5 ppb. A Drinking Water Equivalent Level, which assumes that all of a contaminant comes from drinking water, is the concentration of a contaminant in drinking water that

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			will have no adverse effect with a margin of safety. Because there is a margin of safety built into the RfD and the drinking water equivalent level, exposures above the drinking water equivalent level are not necessarily considered unsafe. The NRC report noted that "The primary sources of uncertainty in estimating an RfD for perchlorate in drinking water arise from the absence of data on possible side effects of iodide deficiency (pregnant women and their fetuses and newborns). Therefore, new epidemiologic research should assess the possible health effects of perchlorate exposure in those populations." The Council's report further stressed that "Finally, in its deliberations on the health effects of perchlorate in drinking water, the committee considered pregnant women and their fetuses to be particularly sensitive populations." Epidemiologic studies considered by the NRC have examined the relationship between perchlorate exposure and thyroid function and thyroid disease in newborns, children, and adults. The NRC concluded that no studies have investigated the effect of perchlorate exposure in vulnerable groups, such as low-birth weight or preterm infants. In addition, these studies have not considered the impacts to the offspring of mothers who were exposed to perchlorate and had a low iodide intake. Finally, adequate studies have not been completed of maternal perchlorate exposure and neurodevelopment outcomes in infants.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS.
Perchlorate	E0429-5, E0429-24, PHW0004-5, PHW0004-24	1. Provide more detailed estimates of perchlorate waste likely to be generated by system development, testing, deployment, maintenance, and decommissioning and acknowledge emerging regulatory standards for perchlorate exposure.	This PEIS is not intended to analyze specific testing or deployment of defined missile defense architecture. Therefore, it is not possible to provide detailed estimates of perchlorate likely to be generated by BMDS-related activities. The MDA has stated that the disposal of hazardous materials and hazardous wastes would be conducted in compliance with applicable regulations. Currently, there are no Federal drinking water standards for perchlorate. The U.S. EPA would be responsible for establishing Federal drinking water standards and has issued draft risk assessments of perchlorate. However, these assessments have been criticized because it has been suggested that the findings are based on flawed scientific studies and that not all available data were considered and incorporated into the assessment. The U.S. EPA study's draft RfD for perchlorate was 0.00003 mg/kg per day and the NRC study recommended an RfD of 0.0007 mg/kg per day. The NRC stated that this value is supported by other clinical studies, epidemiologic studies, and studies of long-term perchlorate administration. The NRC report concluded that the proposed RfD of 0.0007 mg/kg per day should protect even the most sensitive populations. The U.S. EPA has

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			established an official RfD of 0.0007 mg/kg per day of perchlorate, which translates into a drinking water equivalent level of 24.5 ppb. A Drinking Water Equivalent Level, which assumes that all of a contaminant comes from drinking water, is the concentration of a contaminant in drinking water that will have no adverse effect with a margin of safety. Because there is a margin of safety built into the RfD and the drinking water equivalent level, exposures above the drinking water equivalent level are not necessarily considered unsafe. Section 4.1.1.2 of the Final PEIS has been modified to include the proposed findings from the State of California Office of Environmental Health Hazard Assessment, the State of Massachusetts, and the U.S. EPA, as well as the results of the NRC study, *Health Implications of Perchlorate Ingestion*. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS.
Perchlorate	E0429-23, PHW0004-23	The Army should follow the advice of the Air Force contractors and conduct site-specific analysis of the impact of perchlorate debris on any freshwater lake that might receive perchlorate debris as well as confined oceans waters, such as within the Marshall Islands, where repeated releases of perchlorate could damage sensitive ecosystems or essential food supplies. It should also work with NASA and the Air Force to ground-truth models on perchlorate releases by conducting actual water, soil, and sediment sampling for perchlorate at major launch	The PEIS has been modified to include additional information on perchlorate including more detailed information from the series of studies conducted by the Aerospace Corporation. As stated throughout the PEIS, this document is intended to serve as a tiering document from which future site-specific NEPA analyses will be tiered. These site-specific analyses can consider the potential impacts to individual water bodies that may be impacted by solid propellant debris. The proposed

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		facilities such as Cape Canaveral and Vandenberg Air Force Base.	BMDS activities would be conducted in compliance with all applicable regulations regarding perchlorate.
Perchlorate	F0005-12	The PEIS should provide more detailed estimates of perchlorate waste likely to be generated by system development, testing, deployment, maintenance, and decommissioning, and acknowledge the potential impacts of such exposure.	This PEIS is not intended to analyze specific testing or deployment of defined missile defense architecture. Therefore, it is not possible to provide detailed estimates of perchlorate likely to be generated by BMDS-related activities. The MDA has stated that disposal of hazardous materials and hazardous wastes will be conducted in compliance with applicable regulations. The DoD and the MDA are aware of the potential health concerns associated with perchlorate contaminated water. To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers the uses, sources, and disposal of perchlorate as well as the effects on human health and the environment.
Propellant	E0402-6	3) Rocket launches result in incredible amounts of chemical releases. Liquid propellants containing hydrazines, nitrogen tetraoxide, and other compounds are highly toxic to all living species. Ammonium perchlorate used in solid propellants blocks the formation of key thyroid hormones which are critical for growth and development especially in fetuses and children. The PEIS proposes to allow over 30-fold higher levels of perchlorate (200 parts per billion) than that proposed by the State of California (6 parts per billion).	The environmental impacts from the use of various liquid and solid propellants are discussed in Section 4.1.1.2 of the PEIS. This section of the Final PEIS has been modified to include additional information regarding the potential impacts of perchlorate. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			the uses, sources, and disposal of perchlorate as well as the effects on human health and the environment.
Propellant	E0427-6, E0439-6	7) Liquid propellants containing hydrazines, nitrogen tetroxide, and other compounds are highly toxic. At very low concentrations, hydrazines irreversibly cross link to aldehyde groups on proteins at slightly acidic pH and can cause cancer. One of the most concerning pollutants from the firing of rocket engines is HC1, which combines with atmospheric water to produce acid rain. The PEIS did not address potential for interactions between HC1 and hydrazines commonly used in rocket engines such as monomethylhydrazine (MMH) and Unsymmetric dimethylhydrazine (UDMH). Specifically does the toxicity of hydrazine increase under acidic conditions found in acidic rocket exhaust?	Hydrazine and nitrogen tetroxide are hypergolic propellants and when used to power a rocket are not emitted in the rocket motor exhaust - they react without initiation to provide thrust to a rocket motor, resulting in emissions that include carbon monoxide, carbon dioxide, water, nitrogen, hydrogen, and nitrogen oxides. Hydrazine fuels are very reactive reducing agents that are hygroscopic and will react with carbon dioxide and oxygen in the air. However, hypergolic propellant systems do not generate hydrogen chloride, and thus would have no opportunity to interact with hydrogen chloride in the emission exhaust environment.
Propellant	E0429-4 and PHW0004-4	Perchlorate, primarily from the manufacturing, testing, aborted launches, maintenance, and decommissioning of solid rocket motors, is polluting the drinking water of more than twenty million people and may be endangering natural ecosystems from Cape Canaveral to the Marshall Islands. The PEIS understates the risks of exposure, and it fails to provide data on the quantities of solid rocket propellant likely to be produced, used, released, and disposed by the BMDS. The PEIS should consider the environmental consequences of various disposal strategies so the BMDS program can develop the technology or capacity to address its waste or consider the use of alternative launch technologies or strategies to minimize either the waste or the negative environmental impacts.	Section 2.1.3.2 of the BMDS PEIS describes the spiral development process which will be used to determine which components will be transitioned to the military service responsible for deployment, operation and maintenance. The PEIS does not attempt to detail the architecture of the deployed BMDS. The PEIS states "Thus the MDA can consider deployment of a missile defense system that has no specified final architecture and no set operational requirements but which will be improved incrementally over time." Therefore, it cannot be said with certainty how much propellant will be used or how often it will be necessary to dispose of propellant. A technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers the uses,

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			sources, and disposal of perchlorate as well as the effects on human health and the environment. The BMDS PEIS considers the use of a wide variety of propellants including three types of boosters, pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant boosters. The environmental impacts of the use of each of these three types of boosters are presented in Section 4.1.1.2 of the PEIS. In addition, DoD-wide research initiatives under the Strategic Environmental Research and Development Program have focused on the development of more environmentally-friendly launch technologies, such as missile propellants that do not use ammonium perchlorate as an oxidizer. While these alternate propellant formulations have shown promise, a significant amount of development remains to optimize the formulation for specific missile systems. In addition, these formulations will go through a lengthy and stringent performance and safety certification process. Because these alternative technologies are in a research and development phase and, are not yet advanced enough for their use to be reasonably foreseeable under NEPA, they are not analyzed in this PEIS. The MDA may consider the use of these alternative environmentally-friendly technologies as they become available in the future and meet the operational test requirements for the BMDS. Among launch technologies that are available today, the BMDS PEIS considers a wide variety of propellants used in three types of boosters, pre-fueled liquid propellant, non-pre-

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			fueled liquid propellant, and solid propellant boosters. The environmental impacts of each of these three types of boosters are presented in Section 4.1.1.2 of the PEIS. Additional information on perchlorate has been added to the PEIS text as well as a technical Appendix M on perchlorate. This appendix considers the uses, sources, and disposal of perchlorate as well as the human health and ecological risk of exposure to perchlorate.
Propellant	E0429-9 and PHW0004-9	However, liquid propellants, such as the hypergolic propellant containing hydrazine compounds and nitrogen tetroxide, are highly toxic, and the PEIS should consider how to minimize their environmental, health, and safety impacts as well.	See previous response.
Propellant	E0429-12 and PHW0004-12	The PEIS suggests that aluminum oxide, the other major combustion product of solid propellant, is non-toxic. (page 4-60) However, there is some evidence that aluminum in acid environments is toxic to fish. [Footnote 1: See, for example, Baker& Schofield, "Aluminum Toxicity to Fish in Acidic Waters," Water, Air, and Soil Pollution, 1987, cited in Heinz J. Mueller, Chief, Environmental Policy Section, Federal Activities Branch, U.S. EPA Region 4, "Environmental Assessment (EA) and Finding for No Significant Impact (FONSI) fro the Proposed Titan IV Upgrade Program. Cape Canaveral Air Force Station (CCAFS) and Kennedy Space Center (KSC), FL," letter to Captain Anothonly E. Fontana, III, Environmental Planning Division, Regional Civil Engineer, Eastern Region, Department of the Air Force, March 28, 1990.] The PEIS should review the literature and reconsider its conclusion based upon the weight of evidence.	MDA conducted a literature review for technical issues in this PEIS including the toxicity of Al_2O_3 which comprises the particulate matter in SRM emissions. The article indicated by the commenter refers to the increase in toxicity to fish of aluminum (as Al+3 ions) in acid waters (i.e., pH of 5 or less). Aluminum occurs naturally in soils/rock in such abundance that the amount of aluminum introduced into the atmosphere from Al_2O_3 emissions from the combustion of SRMs would be insignificant. Al_2O_3 also is naturally occurring in the environment and is used as an abrasive and polishing agent and is sold by many chemical supply companies. It is non-toxic, non-reactive and is not listed as a chemical of concern by the U.S. EPA or any Federal agency regulating toxic substances. Al_2O_3 is not toxic to humans or ecosystems. Al_2O_3 emissions might be of concern from a visibility perspective on the ground and

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			they have been studied as potential reaction sites in the stratosphere participating in the production of ozone. Neither has been determined to be significant impacts from BMDS launches.
Propellant	E0429-15 and PHW0004-15	Similarly, with the release of ozone-depleting compounds to the atmosphere, we as a society might decide that we shouldn't abruptly end space launches that depend upon solid rocket propellant. Instead, we might set a goal for the deployment of alternatively fueled rockets. The PEIS considers no such goal, despite the urgent need to mitigate global ozone depletion.	The PEIS did not conclude that launches related to BMDS activities would lead to significant impacts on global ozone depletion. Please refer to Section 4.1.1.2 of the PEIS for additional information on the potential impacts to the atmosphere of BMDS related launches. The BMDS PEIS considers the use of a wide variety of propellants including three types of boosters: pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant. As new technologies and propellants are developed and found to meet the needs of supporting the BMDS they could be incorporated into the BMDS.
Propellant	E0429-16 and PHW0004-16	The Defense Department, NASA, and others have conducted research on propellants designed to achieve the thrust of ammonium-perchlorate-based fuels without the environmental hazards, but these efforts are poorly funded, and there appears to be no urgency. The BMDS program should at the very least, in its PEIS, evaluate the mitigation of seriously harmful environmental consequences through the development and deployment of alternative solid rocket propellants.	The BMDS PEIS considers the use of a wide variety of propellants including three types of boosters, pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant boosters. The environmental impacts of each of these three types of boosters are presented in Section 4.1.1.2 of the PEIS. In addition, Appendix M includes DoD-wide research initiatives under the Strategic Environmental Research and Development Program that have focused on the development of more environmentally-friendly launch technologies, such as missile propellants that do not use ammonium perchlorate as an oxidizer. While these alternate propellant formulations have showed promise, a significant amount of development remains to optimize the formulation for specific missile systems. In addition, these formulations will go through a lengthy and

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			stringent performance and safety certification process. Since these alternative technologies are in a research and development phase and are not yet advanced enough for their use to be reasonably foreseeable under NEPA, they are not analyzed in this PEIS. The MDA may consider the use of these alternative environmentally-friendly technologies as they become available in the future and meet the operational test requirements for the BMDS. Among launch technologies that are available today, the BMDS PEIS considers a wide variety of propellants used in three types of boosters, pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant boosters. The environmental impacts of each of these three types of boosters are presented in Section 4.1.1.2 of the PEIS.
Propellant	E0429-17 and PHW0004-17	Rocket fuel wastes, from manufacturing, testing, training, maintenance, and decommissioning are a significant environmental hazard. This is a front page news story from California to Massachusetts, but it is barely mentioned in the PEIS.	To better characterize some of the potential impacts associated with proposed BMDS activities, additional information on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers the uses, sources, and disposal of perchlorate as well as the effects on human health and the environment.
Propellant	E0429-18, PHW0004-18	The PEIS should offer estimates of the quantities of solid rocket fuel that will be manufactured for the BMDS, not just for testing, but for missiles that will be deployed and hopefully never be launched. From that figure, it can estimate the quantities of manufacturing waste- propellant takes, chips, and wastewater-likely to be generated. The PEIS estimates that the BMDS program will launch 413	Section 2.1.3.2 of the BMDS PEIS describes the spiral development process which will be used to determine which components will be transitioned to the military service responsible for deployment, operation and maintenance. The PEIS does not attempt to detail the architecture of the deployed BMDS. The PEIS states "Thus the MDA can consider deployment of a missile

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		solid-propellant rockets, containing from under 500 kilograms (1,102 pounds) to 60,000 kilograms (132,277 pounds) of solid propellant each. About 70% of that propellant, by weight, will consist of ammonium perchlorate. But nowhere does it estimate what quantity of propellant will be contained in deployed missiles, or even how many missiles will be part of that system. Without that information there is no way to project the amount of propellant waste likely to be generated by the program.	defense system that has no specified final architecture and no set operational requirements but which will be improved incrementally over time." Therefore, it cannot be said with certainty how much propellant will be used or how often it will be necessary to dispose of propellant.
Propellant	E0429-19, PHW0004-19	Yet the PEIS appears not to address the environmental aspects of missile maintenance and it gives only cursory mention to decommissioning: Decommissioning of missiles would first require the removal and proper disposal of liquid, solid, or hybrid (liquid and solid combination) propellants from the booster(s). Where possible, propellants would be recovered and reused. Aging motors that contain flaws would likely be decommissioned using open detonation.... Solid rocket propellant would be removed for reclamation or burning in a controlled environment, such as an incinerator. Where practicable, incineration or closed burning of rocket propellant would be performed. Most of the acid and particulates ejected during the burn would be collected in plume scrubber water. This water would be treated for acceptance by a publicly owned (or federally owned) water treatment works in accordance with a National Pollutant Discharge Elimination System (NPDES) permit. (p. 4-16)	Section 4.0 of the BMDS PEIS describes how various activities including "maintenance and sustainment" were considered and analyzed in the PEIS. As described in Section 4.1.1.9, Exhibit 4-2 on Page 4-5, MDA did not consider missile maintenance further in this PEIS because it has been analyzed in previous NEPA documents. Decommissioning of missiles was discussed in Section 4 of the PEIS as identified in the comment. Beyond these activities, site and system specific decommissioning activities will be assessed in appropriate NEPA documentation tiered from the PEIS when decommissiong becomes the next step in the lifecycle of the component or system. Demilitarization and disposal of missile components will be performed in accordance with DoD Directives, Joint Service Regulations, and will comply with all applicable Federal and state regulations.
Propellant	E0429-20, PHW0004-20	Once again, the PEIS authors don't seem to be reading the newspapers. The disposal of solid rocket propellant	Section 2.1.3.2 of the BMDS PEIS describes the spiral development process which will be used to determine

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		through "hog-out" (washing out the propellant) or open burning/open detonation are some of the major sources of perchlorate contamination across the country. The PEIS should note how much propellant will be used, how often it will be necessary to dispose, and what the environmental impacts of each disposal or treatment method are likely to be. Such information is necessary, not just to estimate the life-cycle costs of the program, but also to figure out in advance how to reduce financial costs and environmental impacts through system redesign or ongoing mitigation activities. That's the purpose of the NEPA process.	which components will be transitioned to the military service responsible for deployment, operation and maintenance. The PEIS does not attempt to detail the architecture of the deployed BMDS. The PEIS states "Thus the MDA can consider deployment of a missile defense system that has no specified final architecture and no set operational requirements but which will be improved incrementally over time." Therefore, it cannot be said with certainty how much propellant will be used or how often it will be necessary to dispose of propellant. The DoD is exploring new technologies for disposal of ammonium perchlorate contaminated wastewater including using a biodegradation system and will use this and other new technologies as appropriate to dispose of wastewater. (U.S. Department of Defense, 2003. Joint Demilitarization Technology Program: A Report to Congress, http://www.dtic.mil/biosys/org/demil_rept2003_final.pdf accessed December 20, 2004)
Propellant	PHO0025-3	The disposal of solid rocket propellant through washing out, propelling or open burning, open detonation are some of the major sources of perchlorate contamination across the country.	Historically, the manufacturing and disposal of solid rocket propellant that contains ammonium perchlorate as an oxidizer has led to perchlorate contamination. There is no evidence to suggest that burning solid propellant in a SRM leads to emissions of perchlorate to the atmosphere. Perchlorate could be released into the environment in the form of uncombusted solid rocket propellant from a non-nominal launch or other accident causing release of solid propellant to land or water. These have been considered in the PEIS. Additional information on perchlorate has been added to the PEIS text as well as a technical appendix (Appendix M) on

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			perchlorate. This appendix considers the uses, sources, and disposal of perchlorate as well as the human health and ecological risk of exposure to perchlorate.
Propellant	PHO0037-2	Number one, exposure to increased levels of toxic pollutants from a dramatic increase in missile launches. Liquid propellants containing hydrozene, nitrogen tetroxides and other compounds that are highly toxic. In addition, ammonium perchlorate, which is used in solid propellants, it blocks the formation of key thyroid elements that are critical for growth and development, especially in fetuses and children, and this was not considered.	The impacts of accidental exposure to various propellants are discussed in Section 4.1.1.2 of the PEIS. This section of the Final PEIS has been modified to include additional information regarding the potential impacts of perchlorate. The DoD and the MDA are aware of the potential health concerns associated with perchlorate contaminated water and of the various Federal and state initiatives to address this issue. A technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers the uses, sources, and disposal of perchlorate as well as the effects on human health and the environment. The DoD and the MDA are aware of the NRC study that considered thyroid function in infants including possible impacts from perchlorate exposure on birth defects and skeletal growth. Regarding birth defects resulting from non-normal thyroid function the NRC study states: *"The consequences of severe combined maternal and fetal hypothyroidism during fetal life and in newborn infants include microcephaly (small brain), mental retardation, deaf-mutism, paraplegia or quadriplegia, and movement disorders. Those abnormalities are not reversible by treatment with T4 (Foley 2000). However, the abnormalities can be largely prevented by administration of iodide to the mothers before or*

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			during the first trimester and early part of the second trimester of pregnancy (Pharoah 1993; Cao et al. 1994).” Regarding impacts to skeletal growth from non-normal thyroid function, the NRC study states: *“T4 and T3 also are required for normal skeletal development and growth. Bone cells have T3 receptors, and T3 stimulates bone formation and the appearance of the epiphyseal centers that are needed for normal growth of long bones. T3 also stimulates the production of pituitary growth hormone and insulin-like growth factor. Treatment with T4 leads to resumption of bone growth and skeletal maturation, but severely affected infants are unlikely to have normal stature.”*
Propellant	PHO0038-5	The hydrozenes that Jean mentioned were the same things that I believe came from when the space shuttle crashed and landed in Texas and there was a very large mobilization to get people not to touch those things. And if that's the same chemical that's going up with each of these launches and potentially coming back down, then those will be grave consequences indeed.	Hydrazine is one of the propellants used as part of the NASA's Space Shuttle program. Following the loss of Space Shuttle Columbia the public was requested to notify NASA as to the location of debris. Some reports stated that there was a potential for debris to be contaminated with hydrazine. However, most experts agree that there would be little to no possibility of finding hydrazine contaminated debris after an accident of this type. Hydrazine is a highly volatile substance and would not be expected to persist in an open environment for extended periods of time. The impacts to the environment from the use of hydrazine for BMDS launches are discussed in Section 4.1.1.2.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
Noise	E0431-1	An increase of 1 dB is not a doubling of sound energy. Decibel are on a quasi-logrithmic scale and it does not function like the Richter scale. An increase of 3 dB is a doubling of sound and pressure.	The commenter is correct, an increase of 3 decibels (dB) would occur as a result of doubling sound pressure. The text of the document has been modified to further clarify this and other information on noise.
Noise	E0431-2	dBA is not used to assess human reaction to a single noise event averaged over a 24-hour period. dBA is measure of sound pressure using the A-weighted scale. Many other acoustical metric are used to assess human reaction, including Leq - equivalent noise level, sound exposure level, Ldn, etc.	A-weighting is used to sum noise levels as a function of frequency to a single number, expressed in dB as A-weighted decibels (dBA). A-weighting roughly corresponds to the frequency response of the human ear. Noise metrics such as equivalent noise level (L_{eq}), Sound Exposure Level (SEL) and Day Night Average Noise Level (DNL - a 24 hour average noise level with a 10 dB nighttime noise penalty) are used to reduce noise time-history data to a single number. However, dBA can be used in conjunction with temporal noise metrics such as L_{eq}. For example, highway noise studies typically express noise levels in terms of 1 hour L_{eq}, dBA. Instantaneous sound pressure level, expressed as dBA, is typically not used to assess human annoyance. L_{eq} and DNL are typically used to assess human annoyance because these metrics have been found to correlate well with human annoyance. Many Federal agencies use DNL to assess human annoyance, yet the application of DNL to a noise environment consisting of infrequent and loud single events can be problematic. Nevertheless, extensive research has been conducted to ascertain the suitability of DNL in such noise environments. The FAA uses DNL where the noise environment of a typical airport is comprised of discrete and loud noise events. A more

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			dramatic example is the U.S. Army's use of DNL to characterize the noise environment in the vicinity of weapon firing ranges. The U.S. Army has identified various means of correcting for impulsive weapon noise by using the C-weighting scale (which does not roll off low-frequency signal content).
Generic	E0162-1	The PEIS could make a useful contribution by analyzing how to judge the effectiveness of a system with no operational requirements.	The goal of the NEPA process as established by the CEQ guidelines implementing NEPA is to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment. The CEQ does not indicate that the NEPA process itself should consider the effectiveness of the action being proposed. The MDA decision makers will base their decision about whether and how to implement the BMDS after careful consideration of the environmental analysis presented in the PEIS as well as other operational and policy considerations. It is not the role of the PEIS to determine the operational effectiveness of the proposed system only to evaluate the environmental impacts of the proposed alternatives to provide the decision makers with the information necessary to inform and support their determination.
Generic	PHO0044-7	Finally, the spiral development approach seems to preclude any meaningful assessment. The PEIS could make an useful contribution by analyzing how to judge the effectiveness of the missile defense with no specified architecture and no operational requirements.	See previous response.
Generic	E0319-22	The 1990 Clean Air Act Amendments identified 188 chemical pollutants which cause or contribute to cancer, birth defects, genetic damage, and other adverse health	The PEIS addresses the potential impacts on air quality and on health and safety resulting from the activities associated with the proposed BMDS. After reviewing

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		effects. "The PEIS has not identified any environmental health and safety risks that may disproportionately affect children, in compliance with Executive Order (EO) 13045 as amended by EO 13229" (PEIS page 4-134, Section 4.7). Executive Order 13045 of April 1997, states that each Federal agency, including the Department of Defense (as defined in 5 U.S.C.102) a. shall make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children, and b. shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks.	the environmental analysis of these potential impacts and the potential impacts to all resource areas defined in the PEIS the MDA did not identify any environmental health and safety risks that may disproportionately affect children. The analysis of these impacts is presented in Section 4 of the PEIS.
Generic	E0347-4	There is no adequate official scientific study of the biological effects on plant, animal and the human body resulting from Fylingdales' radar emissions. Professor Dave Webb, Chair of Yorkshire Campaign for Nuclear Disarmament, has published a paper, Is it Safe?' which can be read at http://cndyorks.gn.apc.org/fdales/. Professor Webb maintains that the safety standards are inadequate and presents the evidence to substantiate his arguments. The reassuring conclusions published in the UK Ministry of Defence's 'Upgrade to RAF Fylingdales Early Warning Radar - Environment and Land Use Report are based on the inadequate safety guidelines. We endorse Prof. Webb's position and submit that his paper be considered by the US Missile Defense Agency as a	The comment has been noted and the reference has been added to the Administrative Record. The environmental impacts on biological resources and health and safety from radar activation are addressed in Section 4.1.1.3 of the PEIS and in technical Appendix N, Impacts of Radar on Wildlife. In addition to the reference mentioned by the commenter, i.e., Final Report, Upgraded Early Warning Radar, Fylingdales, UK, 7 April 2003, another official scientific study that considered Fylingdale's radar emissions is the NRC of the National Academies of Science *Assessment of Potential Health Effects from Exposure to PAVE PAWS Low-Level Phased-Array Radiofrequency Energy* published in 2005. The PEIS is a programmatic analysis; site-specific analyses would tier from this PEIS and would focus on unique aspects of these particular sites. MDA in its overseas activities has

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		contribution to public responses to the Programmatic Environmental Impact Statement.	and will comply with applicable EOs and DoD directives (see Section 4.1.3 and Appendix G). MDA has previously reviewed our activities at Fylingdales and made the appropriate determinations in compliance with applicable EOs and DoD Directives.
Generic	E0347-5	Both Fylingdales and Menwith Hill are sites of prehistoric importance known to date from the Neolithic period or earlier. Conservation of the archaeological heritage is a prime consideration in Britain and must be considered in the deliberations for the US Missile Defense Agency's Programmatic Environmental Impact Statement. The damage to these sites so far is incalculable. Herewith two examples: Menwith Hill: The Base is located on Forest Moor, an area of significance to archaeologists for its Neolithic settlement, testified by the wealth of flint microliths. The site is adjacent to an Iron-Age Brigantian Fort. The Roman Road joining the fort at Ilkley (Olicana) to the city of York (Eboracum) borders the southern boundary of the Base. The US occupants in c.1990 removed an ancient megalith known as Tibby Bilton', possibly the last standing remnant of a prehistoric group or circle of standing stones. Fylingdales (or more properly, Snod Hill): The presence of a tumulus, a group of (fallen) megaliths and petroglyphs is evidence that Snod Hill is a prehistoric funerary site.	Section 3.1.4 of the PEIS discusses why cultural resources, which include historical and archaeological concerns, are most appropriately analyzed in site-specific documentation. This section of the PEIS emphasizes that because of the unique qualities and characteristics, cultural resources should be characterized and analyzed for specific activities proposed at particular locations. The MDA has and will comply with EOs and DoD Directives applicable to MDA overseas installations and activities. (See Section 4.1.3 and Appendix G.) MDA has previously reviewed our activities at Fylingdales and made the appropriate determinations in compliance with applicable EOs and DoD Directives. If additional BMDS activities were proposed for sites such as Fylingdales, site-specific analyses including potential impacts on cultural resources would be prepared, as appropriate.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		Snod Hill is crossed by prehistoric trackways, ancient rights of way dating from the Bronze Age or earlier, for over two thousand years in use as a 'Salt Road' from the coastal settlements. The Salt Road is notorious in later history as a route for smugglers. The Salt Road was closed peremptorily and permanently to permit the construction of the Early Warning Radar facilities.	
Generic	E0429-6, E0429-25	2. Consider in detail the management practices-launch protocols, treatment technologies, etc.-necessary to mitigate the significant environmental impacts, including increased depletion of the stratospheric ozone layer and the likely release of perchlorate into groundwater, surface water, and soil.	Because of the programmatic nature of this document it is not possible to consider specific management practices that would be imposed at specific ranges where proposed BMDS activities would occur. Appropriate guidelines and protocols are developed prior to each test and are designed to address the unique features of the test. In addition, please note that the PEIS did not identify any significant programmatic environmental impacts that require mitigation. If BMDS activities are proposed at specific locations, future analyses may reveal the potential for significant impacts which could require mitigation.
Generic	F0004-7	6 Keep it clean wherever, you go to put this all in. Clean all your toxic wastes + garbages. Kodiak Island is one of the most pristine places left on this planet...Please keep it that way - Please. Our close ocean waters are Our Living they must be kept clean + respected!	The potential environmental impacts associated with the disposal of hazardous materials and hazardous wastes and health and safety are discussed in Section 4 of the PEIS. The environmental impacts associated with specific locations such as the KLC would be discussed in site-specific environmental analyses, as appropriate.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		Rockets + missile debrie and fish - just don't mix! And Las but NOT least...just be real damn careful out there. I love that island and want to keep it safe.	
Generic	M0267-1	Orbital debris: Testing and deployment of space-based interceptors can significantly increase space debris, endangering other objects in space, in the air and on land. We agree with the commentators from the Center for Defense Information that the PEIS does not answer sufficiently to these problems and dangers. We suspect the detrimental environmental effects are great enough in themselves to warrant cancellation of this portion of the program.	Please refer to responses to comments on orbital debris above. The MDA will announce a decision regarding the proposed activities considered in the PEIS through the issuance of a ROD.
Generic	M0267-2	Laser and kinetic kill weapons: The PEIS does not really deal with the detrimental environmental effects that will result from the process of developing, testing and deploying laser and kinetic kill weapons. Yet, these weapons are integral to the entire program. We understand there are still many problems to be solved if these science fiction fantasies are to be translated into reality. These problems and the dangers posed to the environment should be included in the PEIS. We suspect that they are great enough to warrant cancellation of the space weapons program.	The environmental impacts associated with the use of directed energy or laser weapons is considered in Section 4.1.1.1 (Weapons - Lasers) and the use of kinetic energy weapons or interceptors is considered in Section 4.1.1.2 (Weapons - Interceptors). The MDA will announce a decision regarding the proposed activities considered in the PEIS through the issuance of a ROD.
Generic	M0268-3	Hazards of use: Completely missing in this PEIS is an analysis of the hazards of use if the BMD system is ever employed. This is not a benign system, and possible hazards should be investigated. What would be the effect of a successful intercept over the Pacific Ocean or seconds after firing by another nation? What would be the extent of nuclear fall-out or the expectations of damage from an explosion of the incoming weapon? What would be the	The environmental impacts of intercepts of target missiles have been considered in Sections 4.1.2 and 4.2.2 of the PEIS. The impacts of the intercept of a threat missile launched at the U.S. by another nation would create a national security situation and perhaps lead to a war and as such would be considered outside of the scope of this NEPA analysis.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		environmental effect of a successful intercept of a nuclear weapon over the United States, resulting in a high altitude nuclear explosion? Could electrical and communications systems across the US be destroyed? Could satellites be destroyed? Is it possible that the use of these interceptors to protect U.S. citizens could actually result in unintended destruction? Might other non-U.S. territories, in the path of the weapons, be harmed by interceptions and nuclear explosions above their areas or by debris falling onto their territory? What will be the possible effects on people and the environment on earth below if MDA war fighters actually use their weapons in space or in the skies?	
Generic	PHO0047-4	You know, I'm not sure what kind of chemical you use or you put in a missile testing or in the warhead when you intercept it in space, but all over the years that you have been doing the testing between Kwajalein and Vandenberg, has there been any environmental study of all the debris that has fallen down into the ocean to find out how contaminated the area is and how far spread the contamination is? Has there been anything done like that? And have the people been aware of what has been done or has not been done?	The PEIS considers the potential impact of debris created as a result of BMDS activities including the launch and intercept of target and interceptor missiles. In addition, previous environmental analyses produced for specific tests occurring between Kwajalein and Vandenberg AFB considered these types of site-specific issues as appropriate. Many of the references that contain these environmental analyses are available for download from the MDA PEIS web site.
Generic	PHW0002-5	The draft PEIS fails to fully address the effects of other types of debris - rocket fragments, fuel, and so forth. Again, it barely scratches the surface of potential harmful consequences that could plausibly result from the alternatives listed, and again, it immediately dismisses the few consequences that are divulged. Debris that could fall into the ocean "would become diluted and would cease to be of concern." (p. 4-51) Debris that survived reentry is not to be worried about, as it would fall into a pre-	The impacts of debris from launches of interceptors are considered for each resource area in Section 4.1.1.2. It should also be noted that, where appropriate, separate analyses are recorded for launch debris impacting on land and in water. These discussions include the potential impacts from interceptor or target hardware as well as propellants.

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
		established footprint, and even if it didn't, "Debris is more likely to terminate in water than on land because water covers 75 percent of the Earth's surface." (p. 4-119) Debris from spills or intercepts in the air is assumed to dissipate before it hit the ground. (p. 4-24)	
Generic	PHW0002-6	Yet this is making a real leap of faith in how these actions would affect the environment, and doing so in a manner that precludes any real assessment of what sort of consequences could occur. The treatment of the Airborne Laser (ABL) is indicative of this attitude. The draft PEIS says that should the ABL not able to land at "an appropriate location," its fuel and laser chemicals may have to be jettisoned, but this would be at a minimum altitude of 15,000 feet and thus "would be diluted in the atmosphere." (p. 4-24) And if there was an accidental fire on the ABL, "the liquid and solid laser chemicals would be consumed or contained." (p. 4-34) These laser chemicals include hydrogen peroxide, ammonia, chlorine, helium, and iodine, according to the document, (p. 4-24) No explanation is given as to what would happen should the ABL jettison its chemicals at a lower altitude than 15,000 feet, nor how exactly the fire would contain all chemicals. The draft PEIS makes these reassuring statements with no solid evidence to back them up.	The PEIS states that the minimum altitude that laser chemicals would be jettisoned is 15,000 feet; therefore, no discussion of the potential impact of their jettison below 15,000 feet was necessary. As stated in the PEIS, in the event of an accidental fire on the ABL the laser chemicals would either be consumed in the fire or would be contained. The containment would be within the body of the aircraft and therefore the chemicals would not impact the external environment.
Generic	PHW0004-6	2. Consider in detail the management practices-launch protocols, treatment technologies, etc.-necessary to mitigate the significant environmental impacts, including increased depletion of the stratospheric ozone layer and the likely release of perchlorate into groundwater, surface water, and soil.	Because of the programmatic nature of this document it is not possible to consider specific management practices that would be imposed at specific ranges where proposed BMDS activities would occur. Appropriate guidelines and protocols are developed prior to each test and are designed to address the unique features of the test. In addition, please note that the PEIS did not identify any

Exhibit K-3. Responses to Comments – Environmental Impacts

Issue Topic	Comment Number	Excerpt Text	Response
			significant programmatic environmental impacts that require mitigation. If BMDS activities are proposed at specific locations, future analyses may reveal the potential for significant impacts which could require mitigation.
Generic	PHW0004-25	2. Consider in detail the management practices-launch protocols, treatment technologies, etc.-necessary to mitigate the significant environmental impacts, including increased depletion of the stratospheric ozone layer and the likely release of perchlorate into groundwater, surface water, and soil.	See previous response.

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
Accidents	F0004-4	3 When you have another accident like the one on Nov. 09, 2001 where the rocket Blew-up, Tell us the truth right away. Don't lie then tell the truth (forced as it was) 6 mos. later. Maybe if you don't try launching in 40 mph winds with snow + rain you might have a better launch window + help the process a lot...	There are inherent risks with any missile testing activity; however, protection of life and property, on and off range, is the prime concern of Range/Mission Safety personnel. The RCC Common Risk Criteria for National Test Ranges (RCC 321-02) sets the requirements for minimally acceptable risk criteria to occupational and non-occupational personnel, test facilities and non-military assets during range testing operations. Under RCC 321-02, individuals of the general public shall not be exposed to a probability of fatality greater than 1 in 10 million for any single mission and 1 in 1 million on an annual basis. Range Safety personnel also apply launch window criteria that consider various weather and climatic conditions, as appropriate.
Accidents	PHO0047-3	Or at least reassure the people that there's not going to be any accident happening. But we cannot say that there's not going to be any accident. There's no guaranty. No matter what, there's no guaranty. And if something happens, what are the people going to do?	As noted in Sections 4.1.1.1 and 4.1.1.2, Health and Safety, restricted areas are established to protect the public from launch and laser activities. These areas are established so that debris from non-nominal launches or the use of a flight termination/thrust system would not impact populated areas.
Nuclear	E0162-9	7) In addition to "hit-to-kill" interceptors and directed-energy weapons, there have been reports that interceptors armed with nuclear weapons are also being considered for missile defenses. The PEIS should indicate what research and development work is being planned for such weapons as part of the Advanced Systems in Appendix F. How would such systems be tested without violating the Limited Test Ban Treaty and the Comprehensive Test Ban Treaty?	As noted in Section 2.2.1.1, BMDS interceptors would use non-nuclear hit-to-kill or directed blast fragmentation technology to destroy a threat missile. No nuclear material will be used in any BMDS test systems. Any space-based interceptors that would be launched from a space-based platform would use propellants as indicated in the PEIS. No nuclear materials would be used to fuel the interceptors. Further, the interceptors would use non-nuclear hit-to-kill or directed blast

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
			fragmentation technology to intercept and destroy a threat missile.
Nuclear	E0363-3	Finally, it would be environmentally catastrophic if these weapons were ever actually used in war. The hazards of use, including high altitude nuclear explosions, are not discussed in the PEIS but should be addressed.	See previous response.
Nuclear	E0380-2	2) The PEIS completely ignores the well known environmental impacts of radiation. It does so by maintaining the transparent fiction that an effective BMDS can be implemented without resorting to the use of nuclear war heads. Current research with BMDS prototypes provides scant basis for the belief that lasar or kinetic weapons will serve to eliminate target warheads. A realistic PEIS for BMDS must include a full and detailed consideration of the environmental impacts of nuclear weaponry. Such an assessment must address the entire nuclear cycle - production and manufacture as well as decommissioning and waste storage.	See previous response.
Nuclear	E0395-1	With respect to what the overall BMDS actually could entail, the PEIS is so broad and generalized that it is not possible to know what is covered by the overall BMDS PEIS and what isn't. For example, nuclear-tipped interceptors have been discussed by MDA officials but are not addressed in this PEIS. The extent and limitations of this PEIS should be clearly stated.	See previous response.
Nuclear	E0402-5	2) Radioactive fallout from intercepted missiles has not been considered in this PEIS. The accepted concept that a missile blown up in the outer reaches of the atmosphere is the logical conclusion of the BMDS alone should keep us	There would be no radioactive or biological material from missile intercepts during system integration testing of the proposed BMDS. Such material would not be used in any targets used for intercept and would only be

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
		from deploying such a system and rather focus on truly preventative strategies that do not accept any nuclear weapon use by any country.	expected in enemy missiles which would be launched to attack the U.S. Any intercepts resulting from such an act of war upon the U.S. would not need to be considered in this PEIS, because as the commenter correctly points out the effects of war are normally excluded from analysis under NEPA.
Nuclear	E0424-2	e) The potential radioactive fallout from intercepted missiles.	See previous response.
Nuclear	E0427-17, E0439-17	16) Will any interceptors use nuclear warheads? The PEIS does not address the inability of mid- course or terminal kinetic interceptors to stop a "threat cloud" once a attack missile has MIRVed, or released many decoys or countermeasures (Richard L. Garwin. Holes in the Missile Shield. Scientific American, November 2004, page 70-79). The MDA may be temped to intercept such a threat by using large nuclear tipped interceptors. The potential use of nuclear tipped interceptors was discussed by high ranking US DOD officials in 2002. http://www.washingtonpost.com/ac2/wp-dyn/A28866-2002Apr10?language=printer. If such nuclear tipped interceptors were deployed, the environmental risks would be much greater. If so, the environmental consequences of the nuclear fallout and electromagnetic pulses from such high altitude nuclear detonations must be considered in detail. This would include analysis of risks to health and safety, contamination of water, land, soils, EMP effects on civilian and medical electrical and computer systems and infrastructure. The MDA should also consider the effects of radioactive fallout on health and safety, biological resources, and contamination of land and water resources.	See previous response.

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
		Furthermore, given the historic 15% missile launch failure rate, the radioactive fallout from accidents with nuclear tipped interceptors must be considered in detail. The public should have full opportunity to consider and comment on the use of such nuclear tipped interceptors in this PEIS. The point is that the blast fragmentation devices need to be described in detail to enable adequate evaluation of its environmental effects.	
Nuclear	F0005-20	(6) If interceptors armed with nuclear weapons are being considered or missile defenses, as some reports indicate, the PEIS should indicate what research and development work is being planned for such weapons as part of the Advanced Systems in Appendix F.	See previous response.
Nuclear	E0319-2	1. Whether or not any low-yield nuclear material will be used in the BMDS test systems (boosters, payloads, dummy warheads, satellites, interceptors, targets, radar systems) 2. Whether or not any low-yield nuclear material will be stored at Research Development Test Sites 3. If depleted uranium will be used in/on target missiles, interceptors, satellites, boosters, etc. 4. If depleted or spent uranium will be stored at Research, Development Test Sites	The PEIS states that interceptors may use non-nuclear lethality enhancers to increase the probability of a successful intercept. None of the components or the integrated system described in the BMDS PEIS would use nuclear material. Neither low yield nuclear material nor depleted uranium would be used in any BMDS test systems nor stored at any research and development test site.
Nuclear	E0319-19	Include in the PEIS the projected cumulative impacts from 'radiation fallout' for all space-based weapon systems (lasers, interceptors, warheads, e.g.).	There would be no radioactive or biological material from missile intercepts during system integration testing of the proposed BMDS. Such material would not be used in any targets used for intercept and would only be expected in enemy missiles which would be launched to attack the U.S. Any intercepts resulting from such an act of war upon the U.S. would not need to be considered in

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
			this PEIS, because the effects of war are normally excluded from analysis under NEPA.
Nuclear	E0427-2	Note that these authors also helped to write the 2002 US Nuclear Posture review, which further solidifies the US preemptive nuclear first strike policy. Gray and Payne make it clear that BMD is essential for a more aggressive US nuclear first strike policy. Thus, there is a reasonable foreseeability that the BMDS in conjunction with US offensive nuclear forces will increase the probability of a massive nuclear war. Thus, the BMDS needs to include a detailed analysis of the environmental effects of "limited" and "all out" nuclear war, including: medical radiological, blast, burn, fallout, disease, and cancer effects to health and safety; effects on nuclear winter, as well as effects on atmosphere, global supplies of fresh water, global food supplies, and nuclear power plants and power systems. The prospect of the BMDS leading to more aggressive US policies that result in a massive nuclear war also needs to be considered in regard to a true no action alternative.	See previous response.
Nuclear	E0427-3	In short, since there is a reasonable forseeability that the BMDS in conjunction with US and Allied nuclear weapon systems and current US nuclear weapons policy as defined in the 2002 Nuclear policy review will destabilize the nuclear arms race and lead to nuclear war, the environmental consequences of nuclear war need to be considered I detail in the BMDS PEIS. (Ambio Volume XI number 2-3, 1982, Nuclear War: The Aftermath. Entire journal dedicated to the effects of nuclear war, including effects on heath and safety, Air, water resources, agriculture, biological resources, and nuclear winter.) This requested in my scoping comments was ignored, e.g.	See previous response.

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
		Scoping comment "#18) The MDA needs to consider whether the BMDS in conjunction with offensive first strike weapon systems and first strike policy increase the probably of a major nuclear war or other disturbance that could result in nuclear Winter, with the associated loss of species"	
Nuclear	E0439-2	Note that these authors also helped to write the 2002 US Nuclear Posture review, which further solidifies the US preemptive nuclear first strike policy. Gray and Payne make it clear that BMD is essential for a more aggressive US nuclear first strike policy. Thus, there is a reasonable foreseeability that the BMDS in conjunction with US offensive nuclear forces will increase the probability of a massive nuclear war. Thus, the BMDS needs to include a detailed analysis of the environmental effects of "limited" and "all out" nuclear war, including: medical radiological, blast, burn, fallout, disease, and cancer effects to health and safety; effects on nuclear winter, as well as effects on atmosphere, global supplies of fresh water, global food supplies, and nuclear power plants and power systems. The prospect of the BMDS leading to more aggressive US policies that result in a massive nuclear war also needs to be considered in regard to a true no action alternative.	See previous response.
Nuclear	E0439-3	In short, since there is a reasonable forseeability that the BMDS in conjunction with US and Allied nuclear weapon systems and current US nuclear weapons policy as defined in the 2002 Nuclear policy review will destabilize the nuclear arms race and lead to nuclear war, the environmental consequences of nuclear war need to be considered in detail in the BMDS PEIS. (Ambio Volume XI number 2-3, 1982, Nuclear War: The Aftermath.	See previous response.

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
		Entire journal dedicated to the effects of nuclear war, including effects on heath and safety. Air, water resources, agriculture, biological resources, and nuclear winter.) This request in my scoping comments was ignored, e.g. Scoping comment "#18) The MDA needs to consider whether the BMDS in conjunction with offensive first strike weapon systems and first strike policy increase the probably of a major nuclear war or other disturbance that could result in nuclear Winter, with the associated loss of species"	
Nuclear	PHO0011-5	Also, will the space-based satellites use nuclear power sources? Will any BMDS interceptors use nuclear warheads? This was not clearly defined. This is unsatisfactory.	See previous response.
Nuclear	PHO0050-1	For example, I read all of the material out there. I don't even see the word "depleted uranium."	None of the components or the integrated system described in the BMDS PEIS would use nuclear material. Neither low yield nuclear material nor depleted uranium would be used in any BMDS test systems nor stored at any research and development test site.
Nuclear	E0319-8	The MDA has never referenced or included discussion on the INF Treaty MOU in any previous EA or EIS in regard to missile defense testing, nor is it discussed in the BMDS Draft PEIS. Why not? Why is the MDA avoiding this issue? Nor has the MDA referred to or listed the Research and Development test site locations in Alaska on the INF Treaty MOU list (e.g. Kodiak Launch Complex, Alaska and Poker Flats Rocket Range, Alaska). The MDA's avoidance of discussion on these test launch sites, leaves open the question as to whether or not nuclear material can and will be launched from these test-site locations on future targets, interceptors, boosters, dummy warheads or	Once plans for launching targets are sufficiently detailed, the plans are reviewed for compliance with all applicable arms control treaties, including the Intermediate-Range Nuclear Forces (INF) and Reduction and limitation of Strategic Offensive Arms Treaty (START) Treaties, if appropriate. Because it is the policy of the DoD to ensure that all DoD activities comply fully with U.S. arms control agreements, no activities will be conducted that would violate any such agreement. The PEIS considers international treaties and law in conjunction with EO 12114, Environmental Effects Abroad of Major Federal Actions.

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
		used in laser systems. The PEIS should include information on the INF Treaty, the INF Treaty MOU test locations, plus any proposed future plans to use nuclear material as part of ground-based or space-based BMDS testing. The MDA is projecting test plans up to the year 2014, so it already knows if nuclear material is part of the BMDS test system (power for space-based platforms, lasers, etc).	As noted in Section 2.2.1.1, BMDS interceptors would use non-nuclear hit-to-kill or directed blast fragmentation technology to destroy a threat missile. Neither low yield nuclear material nor depleted uranium would be used in any BMDS test systems nor stored at any research and development test site.
Nuclear	E0387-5	Further to this, plans for weapons such as the space-based laser may eventually incorporate the use of nuclear power. The deployment of nuclear powered satellites could be environmentally disastrous with considerable risk of high-level pollution at the point of initial launch, when in orbit (from attack or accident) and (if and when the orbit decays) during re-entry into the Earth's atmosphere	The space-based weapons platform described in Alternative 2 of the BMDS PEIS does not include the use of lasers or the use of nuclear power sources for the weapons platform. If the proposed design of the space-based weapons platform changed, the MDA would prepare additional environmental analyses, as appropriate.
Nuclear	E0395-10	The use of radioactive sources on missile defense satellites, either for surveillance, target tracking and target discrimination, or on space-based missile defense interceptors is not discussed.	As noted in Section 2.2.1.1, BMDS interceptors would use non-nuclear hit-to-kill or directed blast fragmentation technology to destroy a threat missile. No nuclear material will be used in any BMDS test systems. The space-based platforms for weapons and sensors described in the BMDS PEIS do not include the use of radioactive materials. If the proposed design of these space-based platforms changed, the MDA would prepare additional environmental analyses, as appropriate.
Nuclear	PHO0011-7	Also, the PEIS, has not considered any -- has not considered any radioactive follow-up from interceptive missiles.	There would be no radioactive or biological material from missile intercepts during system integration testing of the proposed BMDS. Such material would not be used in any targets used for intercept and would only be expected in enemy missiles which would be launched to attack the U.S. Any intercepts resulting from such an act

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
			of war upon the U.S. would not need to be considered in this PEIS, because the effects of war are normally excluded from analysis under NEPA.
Nuclear	PHO0037-5	Six, radioactive fallout from intercepted missiles has not been considered. The effects of war are normally excluded from analysis by NEPA; however, this proposed BMDS action is very likely to provoke a worldwide WMD arms race and force other nations to prepare to launch a massive retaliation against the U.S. should war ensue. And I believe that radioactive fallout needs to be looked at and not written off as a no significant impact.	See previous response.
Treaties	E0162-4	2) The PEIS should examine in detail treaty compliance of various BMDS tests. The draft PEIS has no discussion of INF Treaty restrictions on long-range air-launched and sea-launched targets or START Treaty restrictions on sea-launched targets even though I raised this issue in my scoping comments. (See fourth comment on page B-15.) The GMD ETR EIS did not consider treaty compliance despite the fact that previous analyses (1994 TMD ETR EIS and 1998 TMD ETR Draft Supplemental EIS) did consider this issue. The 1994 TMD ETR EIS refers to the INF treaty prohibition of air-launched and sea-launched missiles with ranges between 500 and 5,500 kilometers. The 1998 TMD ETR DSEIS notes that the START treaty prohibits launches from sea-based platforms and that launches from ships are restricted to ranges less than 600 kilometers. If subsequent compliance reviews of air-launched and sea-launched targets have been done, they should be discussed in the PEIS and references to them should be cited. I was assured at the 26 Oct. meeting in Honolulu that this would be considered.	Once plans for launching targets are sufficiently detailed, the plans are reviewed for compliance with all applicable arms control treaties, including the INF and START Treaties if appropriate. Because it is the policy of the DoD to ensure that all DoD activities comply fully with U.S. arms control agreements, no activities will be conducted that would violate any such agreement. The PEIS considers international treaties and law in conjunction with EO 12114, Environmental Effects Abroad of Major Federal Actions.

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
Treaties	F0005-16	(2) The draft PEIS contains no discussion of INF Treaty restrictions on long-range air-launched and sea-launched targets, or START Treaty restrictions on sea-launched targets. Accordingly, the PEIS should examine in detail treaty compliance of various BMDS tests.	Launches of air-launched and sea-launched targets would be reviewed for compliance with all applicable arms control treaties, including the INF and START Treaties as appropriate. Because it is the policy of the DoD to ensure that all DoD activities comply fully with U.S. arms control agreements, the MDA would conduct no testing activities that would violate any such agreements.
Treaties	E0319-8	The MDA has never referenced or included discussion on the INF Treaty MOU in any previous EA or EIS in regard to missile defense testing, nor is it discussed in the BMDS Draft PEIS. Why not? Why is the MDA avoiding this issue? Nor has the MDA referred to or listed the Research and Development test site locations in Alaska on the INF Treaty MOU list (e.g. Kodiak Launch Complex, Alaska and Poker Flats Rocket Range, Alaska). The MDA's avoidance of discussion on these test launch sites, leaves open the question as to whether or not nuclear material can and will be launched from these test-site locations on future targets, interceptors, boosters, dummy warheads or used in laser systems. The PEIS should include information on the INF Treaty, the INF Treaty MOU test locations, plus any proposed future plans to use nuclear material as part of ground-based or space-based BMDS testing. The MDA is projecting test plans up to the year 2014, so it already knows if nuclear material is part of the BMDS test system (power for space-based platforms, lasers, etc).	The proposed BMDS would use hit-to-kill or directed fragmentation intercept technologies or directed energy weapons to destroy threat missiles. No nuclear materials are proposed for use with the system. Testing of BMDS components would be reviewed for compliance with all applicable arms control treaties, including the INF and START Treaties as appropriate. Because it is the policy of the DoD to ensure that all DoD activities comply fully with U.S. arms control agreements, the MDA would conduct no testing activities that would violate any such agreement.
Treaties	PHO0044-1	There's no examination of treaty restriction on target launches in this EIS, no quantitative information on the liabilities of rocket boosters.	BMDS flight testing is carried out in conformance with all applicable treaties and international agreements. It is not clear what liabilities of rocket boosters the commenter is referring to. All tests receive thorough

Exhibit K-4. Responses to Comments – Miscellaneous

Issue Topic	Comment Number	Excerpt Text	Response
			safety and risk evaluations at the relevant range/test facility from which any test launches are scheduled to occur. This includes flight trajectory and debris impact hazard zone in the event of a non-nominal launch.
Treaties	PHO0046-5	So the Programmatic EIS fails to analyze how the proposed BMDS system will affect the international security environment, how will it impact international laws and treaties such as prohibitions on the weaponization of space. And that's one of the explicit options for the Ballistic Missile Defense System. So that goes against established agreements to keep space for peace.	The PEIS considers the potential environmental impacts of feasible options for proposed BMDS systems implementation including the placement of interceptors in space. The MDA conducts all testing in accordance with all applicable treaties and international agreements.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
Alternatives	E0395-7	Historically, missile defenses have been divided between battlefield-theater defense and strategic defense. All previous administrations kept these two aspects of missile defenses segregated. A fourth alternative could be to develop and integrate theater defenses while postponing defenses to strategic attack.	As noted in Sections 1.4 and 2.6, MDA has evaluated the threat environment and concluded that an effective missile defense should include defense against ballistic missiles in all phases of flight and components based at least on air, sea, and land to meet the threat. Alternatives that provide only one platform or do not address all phases of flight under the current threat would reduce the capability of BMDS to defend the U.S., its deployed forces, allies, or assets from a ballistic missile attack. The proposed alternatives necessarily include a theater or regional defense as the BMDS would better defend against an attack in all phases of flight, not just the terminal phase of the attack. In addition, the U.S. cannot discontinue activities being considered for integration into the BMDS. This would decimate some of the basic defense systems of the U.S. In situations where the proposed action is to integrate existing programs, the no action alternative would be to not integrate the existing programs.
Alternatives	E0427-22, E0439-22	21) Alternative 3: Not developing, or building the BMDS or any of its components and instead renegotating an expanded and verifiable ABM / BMDS treaty: The ABM treaty helped to stabilize and de-escalate the nuclear arms race for all of its 29 years of existence. No country dared attack the US with nuclear missiles, in part because the U.S. would know exactly where the missile came from and have the clear ability to retaliate and bomb them into obivilion. That is certainly still the case. This option would preserve deterrence and peace. Yet it would enable	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		the nuclear nations to abide by the NPT and reduce the overall level of nuclear weapons, in exchange for non-nuclear nations not developing nuclear weapons.	
Alternatives	PHO0023-2	And in addition, theater defenses have a realistic success because the boost phase of a missile is relatively slow and even the descent of a short-range, medium-range missile is much slower than that of the strategic missile, which could be traveling at 10 kilometers per second, which makes it very unlikely to hit. The alternative, it may be politically impossible for you to do this, but I think you should try to have another alternative which would simply be to keep the -- this is probably the presidential candidate John Kerry's position on these matters -- would be to move ahead on theater defenses but to maintain the strategic weapons that the missile defense is -- against long-range missiles to be held in research and development stage. And -- and that would be my suggestion for a true alternative.	See previous response.
Alternatives	E0427-23, E0439-23	22) Alternative 4: Preserving Space for non-military purposes. The MDA should consider the alternative of not militarizing space. The planned US militarization and domination of space as described in the US Space Command Vision for 2020 (http://www.fas.org/spp/military/docops/usspac/lrp/ch02.htm) and as described in the 2002 US defense guidance policy and elsewhere, will certainly create and intensify conflicts over the control of space for years to come. These US policy documents talk about "Full Spectrum Domination", "negating" or "destroying" the enemy's satellites and use of space. As US citizens we would like for the US to protect space from militarization, but do we	The MDA has carefully reviewed and considered all alternatives provided as part of the scoping and public review process for the BMDS PEIS. Please note that Alternative 1 considers the implementation of the BMDS without the use of space-based weapons. Thus, an alternative that does not include the use of weapons in space has been considered in the PEIS. The DoD relies on the use of space-based assets for communication and data collection for a variety of programs include missile defense activities. The DoD has many assets such as satellites already deployed in space. It would not be a reasonable alternative for the DoD to stop using these

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		want the US to dominate space, and to start a series of space wars? Think about how you would feel if you lived in another nation and some one destroyed your satellites. Would such actions be considered an act of war? Additionally how does the BMDS PEIS affect US compliance with the Outer Space Treaty?	military assets. Therefore, the recommended alternative will not be considered as suggested.
Alternatives	E0427-24, E0439-24	23) Alternative 5: Deployment of a much more limited land and or Sea based theatre BMD that would offer protection from attack by short or intermediate range missiles. For example, rather than develop the extensive land, Sea, air and space based system, the US and its allies could instead deploy a currently available Aegis missile cruiser(s) off of North Korea. Such a small, affordable, alternative system would immediately meet the needs of defending Japan against missiles that might be launched by North Korea without invoking fears that it would be used to enable invasions and/or domination of the world and thereby starting a massive global arms race.	An alternative similar to that suggested by the commenter was considered in Section 2.6.2 of the BMDS PEIS. The MDA determined that alternatives that provide only one or two platforms would reduce the capability of the BMDS to defend against an attack and would not provide an integrated layered defense that could have multiple opportunities to destroy a threat missile. Therefore, alternatives that provide for a BMDS using only one or two platforms were not considered further in the PEIS.
Alternatives	F0005-6	In addition, the purpose of the proposed action also influences how the "no action" alternative should be presented. When the purpose is narrow, encompassing distinct federal action on a new project, the "no action" alternative must address the environmental effects of the action not going forward, including the effects of any probable outcomes that will occur without the project. (Forty Most Asked Questions, 46 F.R. 18026, at Answer 3.) Alternatively, when the project is broad, encompassing the next phase of federal action in a continuing project, as here, the "No action" alternative must consider the effects of "no change" from the present course of action. (See also	The PEIS considered the effects of no action as no change from the status quo of developing and testing individual systems versus the integration and integrated testing of the system.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		American Rivers v. Federal Energy Regulatory Commission, 201 F. 3d 1186, 1201; 9th Cir. 1999).	
Alternatives	F0005-7	Here, MDA's interpretation of the proposed project purpose and need is internally inconsistent - in one case narrow, in the other broad. The MDA chooses its alternatives based on the narrow purpose of developing an integrated, multi-layered BMDS while its "no action" alternative allowing for continued research and testing of a non-integrated BMDS, implying that the project supports the general purpose of protecting the United States from foreign missile attacks through any means necessary. (PEIS at pp. 1-1 to 1-8, describing the general history of the government's ongoing development of ballistic missile defense programs.) Consequently, in the PEIS, the MDA sets out two internally contradictory positions. On the one hand, the MDA narrows the purpose of the proposed action, and thus the spectrum of alternatives to be considered, to the creation of a singular, integrated; multi-layered BMDS that is not part of a continuing program to protect the U.S. from ballistic missile attacks. On the other hand, the agency relies on the long history of the U.S.'s missile defense actions to frame its "no action" alternative as a "no change" in an ongoing project with the broad purpose of protecting the U.S. from ballistic missile attacks. On either ground, the PEIS fails to meet the NEPA test - that it interprets its purpose too narrowly in order to develop a very narrow spectrum of alternatives, or that it interprets the purpose too broadly in order to assert a "no action" alternative that allows for continuing, non-integrated action - but not both.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
Alternatives	F0005-8	In determining whether the alternatives analyzed within an EIS are adequate, courts have determined that the range of alternatives an agency must consider, although not "self-defining," is "bounded by some notion of feasibility." (Vermont Yankee Nuclear Power Corp. v. NRDC, 435 U.S. 519, 551 (1978). Accordingly, the alternatives examined by an agency must include only those that are reasonable and feasible - i.e., that are "meaningly possible". However, reasonableness is determined through a fact-specific examination of each proposed project because "what constitutes a reasonable range of alternatives depends upon the nature of the proposal and the facts in each case. A flaw in the PEIS is that the range of alternatives considered by the MDA is not adequate, because the agency unreasonably narrowed the range of alternatives to be examined by narrowly interpreting the purpose of the proposed action as the development of a multi-layered ballistic missile defense system. While courts typically afford agencies some discretion in defining the purpose and need of a proposed project, that discretion is limited by the reasonableness of the agency-defined purpose and need. It is also clear that an agency may not characterize its proposed action purpose so narrowly as to avoid its NEPA obligations (See Friends of Southeast's Future v. Morrison, 153 F.3d 059, 1066; 9th Cir. 1998, and Simmons v. U.S. Army Corps of Engineer 120 F 3d 664, 669-670; 7th Cir. 1997). It seems to LAWS that is exactly what the MDA has done here. We doubt that a reviewing court would condone it, or find that when an agency varies	The purpose and need as described in the BMDS PEIS is reasonably drawn to fulfill national security goals and interests as directed by the Congress, the President and the Secretary of Defense. The goal is to successfully defend the U.S., its deployed forces, allies or assets from a ballistic missile attack. MDA has evaluated the threat environment (e.g., potential launch locations, missile flight paths, and target locations) and concluded that an effective missile defense should include components based on at least the land, sea, and air to provide an adequate defense. To meet this goal, the PEIS presents and analyzes reasonable alternatives, which would provide the nation with a BMDS capability to meet any attack in a successful and timely fashion. Alternatives that do not include the means of accomplishing the goals achieved by an effective missile defense would not be reasonable alternatives. The No Action Alternative presented in the BMDS PEIS is appropriate because the proposed action seeks to change the existing missile defense program to meet current threats. In cases where the Federal agency seeks to change existing programs, the appropriate No Action Alternative is to continue the agency's present course of action. Proposals for a No Action Alternatives, which would involve canceling the development of all ballistic missile defense capability development and testing, would eliminate the capability to defend the U.S., its deployed forces, allies, or assets from a ballistic missile attack (should other deterrents fail), and would not provide the means of meeting the purpose of or need for

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		its interpretation in order to avoid its NEPA responsibilities, the PEIS can be found to meet the NEPA standard.	the proposed action as described in Section 1 of the PEIS.
Alternatives	F0005-9	In this connection, the spectrum of alternatives to be considered must be broader than those considered by the MDA. (See Morton, 458 F.2d at 837) Accordingly, a court could find that consistent with its obligations under NEPA that the MDA should have considered as an alternative the Theater Missile Defense System which has already been developed and, therefore, would not require excessive resources to implement. The MDA should also have considered, and included in the PEIS, alternatives that offer a less than complete solution to the problem. To the extent that it hasn't, the MDA should also have analyzed the BMDS platforms for each component and/or defense environment separately. Other options include an analysis of alternatives that include both weapon and non-weapon components, such as integration of land and sea-based platforms only with increased diplomatic efforts. As the Court said in Morton, an agency cannot restrict its alternatives because it is not part of its jurisdiction. Since the BMDS is part of a broader purpose of protecting the U.S., the MDA should have fulfilled its NEPA obligations by analyzing a much broader spectrum of alternatives to achieve this purpose.	As noted in Sections 1.4 and 2.6, MDA has evaluated the threat environment and concluded that an effective missile defense should include defense against ballistic missiles in all phases of flight and that an effective missile defense should include components based at least on air, sea, and land to meet the threat. Alternatives that provide only one platform or do not address all phases of flight under the current threat would reduce the capability of BMDS to defend the U.S., its deployed forces, allies, or assets from a ballistic missile attack. The proposed alternatives necessarily include a theater or regional defense as the BMDS would better defend against an attack in all phases of flight, not just the terminal phase of the attack. In addition, the previous NEPA analyses considering Theater Missile Defense and NMD were incorporated by reference into this PEIS. However, theater and regional defense were not considered sufficient to meet the purposes of an integrated BMDS and were not reconsidered in this PEIS.
Alternatives	M0046-1	This Alternative 4 would include a return to the United Nations disarmament treaty process (which the current Administration is regrettably blocking), and assumption of a lead role in the continual development of enforceable and universally applied international law consistent with	The MDA has carefully reviewed and considered all alternatives provided as part of the scoping and public review process for the BMDS PEIS. In this instance it was determined that the proposed alternative would not meet the purpose and need for the proposed action as

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		both the UN Charter and the Universal Declaration of Human Rights. The United States would re-enter that process as the most powerful and most militarized nation in the world and would have no substantial military rivals. This is a rare and critical moment in history and the choice is ours: the United States can lead the way toward a world freed from war with sustainable development and human rights for all - or this nation can drag the human race backward with it into a world ruled by war, military domination and the threat (or use) of weapons more powerful than any known before.	described in Sections 1.3 and 1.4 and does not meet the direction of the President and the U.S. Congress. The BMDS would have the capability of defending the U.S. against an attack for which there was no prior warning, such as advance notification of an armed enemy inter-continental ballistic missile (ICBM) on a launch pad.
Alternatives	PHO0014-1	The alternative of a diplomacy-based defense system is not considered. In fact, diplomacy seems to be a -- a foreign concept to the current Administration.	See previous response.
Alternatives	PHW0008-1	This Alternative 4 would include a return to the United Nations disarmament treaty process (which the current Administration is regrettably blocking), and assumption of a lead role in the continual development of enforceable and universally applied international law consistent with both the UN Charter and the Universal Declaration of Human Rights. The United States would re-enter that process as the most powerful and most militarized nation in the world and would have no substantial military rivals. This is a rare and critical moment in history and the choice is ours: the United States can lead the way toward a world freed from war with sustainable development and human rights for all - or this nation can drag the human race backward with it into a world ruled by war, military domination and the threat (or use) of weapons more powerful than any known before.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
Alternatives	PHO0048-4	But, in addition, you'll notice from reading the two alternatives, they're simply variations on a theme, they're one and the same thing.	The alternatives include very different weapons basing platforms and ultimate capabilities. To provide the requisite multi-layered defensive system, land-, sea-, and air-based platforms were considered with the real alternative of adding space-based weapons platforms. The alternatives are very different and involve different requirements for implementation and testing.
Alternatives	PHW0001-3	One alternative not even mentioned in the PEIS would be to cut the spending in half, to allow the testing of a system to determine if it would eventually work against potential adversaries such as North Korea or Iran.	Budget-based alternatives are not appropriately considered in this PEIS as the Congress deliberates and passes the budgetary specifications for the Department of Defense (DoD), specifically including the MDA.
Alternatives	PHW0001-4	Another would be to look at the realistic likelihood that if the US is ever confronted by a nation such as North Korea or Iran with a tested ICBM with a likely nuclear warhead, the option of military necessity would be to destroy such an enemy ICBM on its launchpad with precision-guided missiles if an attack seemed imminent.	The MDA has carefully reviewed and considered all alternatives provided as part of the scoping and public review process for the BMDS PEIS. In this instance it was determined that the proposed alternative is not "reasonable" as intended in NEPA and therefore, the suggested alternative is not considered in the BMDS PEIS. The BMDS would have the capability of defending the U.S. against an attack for which there was no prior warning, such as advance notification of an armed enemy ICBM on a launch pad.
Alternatives	PHW0002-8	Finally, the alternatives considered but not carried forward are deliberately chosen to showcase the BMDS systems that the Bush administration has been pushing for in the best light possible. The first one is to cancel development of BMD capabilities, which is explained as being an alternative that "would rely upon diplomatic and military measures to deter missile threats against the U.S." (p. 2-68) This is exactly what has kept the United States safe from attack to date, and yet it is summarily dismissed out of hand. The other alternative is to focus on a single- or	Increasingly the reliance upon diplomatic and military measures to deter threats against the U.S. has been seen as ineffective without a working defensive system against threat missile attack. The U.S. can be attacked with loss of life and property given the admission of North Korea that they have nuclear weapons and the effectiveness of a BMDS can only serve to augment the effectiveness of military deterrence against such an attack.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		two-platform BMDS. But, per MDA threat assessments that are not given but merely referred to, it has decided that "an effective missile defense should include components based on at least the land, sea, and air," so a more limited missile defense system simply would not do. (p. 2-68)	
NEPA Process	E0427-25	Thus, a non-proliferation analysis is needed for the BMDS PEIS particularly in regard to a genuine no action alternative.	The DOE review was critical because it involved the use of nuclear power, which is not an issue associated with the proposed BMDS. The proposed BMDS as described in the PEIS does not include the use of nuclear materials; therefore, the environmental impacts of use, storage, or transfer of nuclear material are not discussed in this PEIS. A non-proliferation analysis is not within the scope of the PEIS analysis of the environmental consequences of the BMDS.
NEPA Process	E0427-26	A mainly political justification was also given on BMDS PEIS pages 1-14 for not considering scoping comments showing "concern that the BMDS would create an arms race, especially in space" comments showing "opposition to the development of nuclear weapons and concern that missile defense could be a first strike capability for U.S. worldwide military domination". Specifically, the MDA PEIS stated the rationale for excluding these comments is that "Public comments concerning DoD policy, budget and program issues are outside the scope of the Draft BMDS PEIS". These political justifications used by the MDA are insufficient for excluding these and related issues of non-proliferation from analysis in the BMDS PEIS. A non-proliferation analysis is needed for the BMDS. We all	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		want to be safe from missile attack. The non-proliferation analysis is needed to determine if the BMDS is likely to ultimately increase our security, and maintaining environmental quality or result in an out of control arms race that decreases our security and wreaks wide spread environmental destruction. Because of the reasonable foreseeability of increased potential for environmental harm due to proliferation and security risks, I strongly recommend that the MDA prepare a detailed Nonproliferation Impact Review for the BMDS PEIS including a Nonproliferation Impact Review EIS for each BMD component and for each BMD site or location. These reviews will determine the scope and need for a MDA high-level program and the alternative that would cause the least environmental harm. If the BMDS is the best alternative for such a program, these review processes will thoroughly assess the potential proliferation, security and environmental harms and ways to mitigate those potential harms. This will mean that proactive plans to protect the environment, public safety and national security will be developed in advance rather than in response to a problem, accident or crisis.	
NEPA Process	E0427-27	The DOE has set an important precedent by conducting a Programmatic EIS, including a Nonproliferation Impact Review (NIR), for its Civilian Nuclear Energy Research and Development and Isotope Production Missions in the United States, including the Role of the Fast Flux Test Facility in December 2000 and for its Stockpile Stewardship and Management in September 1996. Furthermore, Nonproliferation Analyses were conducted	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		in the following DOE EIS or Site-Wide EIS review documents: Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling (October 1995); Section 1.5.6 Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel, Page 1-10. Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site(August 1998); Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor (March 1999).): 1.3.5 Nonproliferation, Page 1-9 and 1-10. Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex (September 2001): Section 2.2.3 Nonproliferation and National Security, Page 2-7. Following this precedent, the MDA BMDS, in my opinion, necessitates an equally comprehensive review. Such a Nonproliferation Review Should Include Public Hearing, Scoping and Comment.	
NEPA Process	E0427-28	25) I highly recommend that the Nonproliferation Impact Review be conducted like the NEPA process that includes public participation in the scoping phase and a draft	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		document circulated for public comment. This open process is critical because intent really is the biggest differentiating factor between defensive and offensive military research. The participation of individual citizens who live near the proposed facility and have personal concerns such as health and property values, as well as representatives from professional and nonprofit groups who specialize in public health, emergency response, sewage treatment, landfills, water, environment, toxicology, science, medicine and arms control may identify unforseen problems, more cost-effective solutions and new ways to open up the process while maintaining necessary security. This scrutiny and public debate can only improve the quality of the decision-making process and will likely result in more confidence in the final decision on the part of those most directly impacted.	
NEPA Process	E0439-25	Thus, a non-proliferation analysis is needed for the BMDS PEIS particularly in regard to a genuine no action alternative.	See previous response.
NEPA Process	E0439-26	A mainly political justification was also given on BMDS PEIS pages 1-14 for not considering scoping comments showing "concern that the BMDS would create an arms race, especially in space" comments showing "opposition to the development of nuclear weapons and concern that missile defense could be a first strike capability for U.S. worldwide military domination". Specifically, the MDA PEIS stated the rationale for excluding these comments is that "Public comments concerning DoD policy, budget and program issues are outside the scope of the Draft BMDS PEIS".	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		These political justifications used by the MDA are insufficient for excluding these and related issues of non-proliferation from analysis in the BMDS PEIS. A non-proliferation analysis is needed for the BMDS. We all want to be safe from missile attack. The non-proliferation analysis is needed to determine if the BMDS is likely to ultimately increase our security, and maintaining environmental quality or result in an out of control arms race that decreases our security and wreaks wide spread environmental destruction. Because of the reasonable foreseeability of increased potential for environmental harm due to proliferation and security risks, I strongly recommend that the MDA prepare a detailed Nonproliferation Impact Review for the BMDS PEIS including a Nonproliferation Impact Review EIS for each BMD component and for each BMD site or location. These reviews will determine the scope and need for a MDA high-level program and the alternative that would cause the least environmental harm. If the BMDS is the best alternative for such a program, these review processes will thoroughly assess the potential proliferation, security and environmental harms and ways to mitigate those potential harms. This will mean that proactive plans to protect the environment, public safety and national security will be developed in advance rather than in response to a problem, accident or crisis.	
NEPA Process	E0439-27	The DOE has set an important precedent by conducting a Programmatic E1S, including a Nonproliferation Impact Review (NIR), for its Civilian Nuclear Energy Research and Development and Isotope Production Missions in the	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		United States, including the Role of the Fast Flux Test Facility in December 2000 and for its Stockpile Stewardship and Management in September 1996. Furthermore, Nonproliferation Analyses were conducted in the following DOE EIS or Site-Wide EIS review documents: Final Programmatic Environmental Impact Statement for Tritium Supply and Recycling (October 1995); Section 1.5.6 Proposed Nuclear Weapons Nonproliferation Policy Concerning Foreign Research Reactor Spent Nuclear Fuel, Page 1-10. Final Environmental Impact Statement on Management of Certain Plutonium Residues and Scrub Alloy Stored at the Rocky Flats Environmental Technology Site(August 1998); Final Environmental Impact Statement for the Production of Tritium in a Commercial Light Water Reactor (March 1999).): 1.3.5 Nonproliferation, Page 1-9 and 1-10. Final Site-Wide Environmental Impact Statement for the Y-12 National Security __Complex_ (September 2001): Section 2.2.3 Nonproliferation and National Security, Page 2-7. Following this precedent, the MDA BMDS, in my opinion, necessitates an equally comprehensive review. Such a Nonproliferation Review Should Include Public Hearing, Scoping and Comment.	

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
NEPA Process	E0439-28	25) I highly recommend that the Nonproliferation Impact Review be conducted like the NEPA process that includes public participation in the scoping phase and a draft document circulated for public comment. This open process is critical because intent really is the biggest differentiating factor between defensive and offensive military research. The participation of individual citizens who live near the proposed facility and have personal concerns such as health and property values, as well as representatives from professional and nonprofit groups who specialize in public health, emergency response, sewage treatment, landfills, water, environment, toxicology, science, medicine and arms control may identify unforseen problems, more cost-effective solutions and new ways to open up the process while maintaining necessary security. This scrutiny and public debate can only improve the quality of the decision-making process and will likely result in more confidence in the final decision on the part of those most directly impacted.	See previous response.
NEPA Process	F0003-3, M0276-3	c. As suggested by CEQ regulations, MDA has taken advantage of the extensive environmental analyses that already exist for many of the existing components of the proposed BMDS by incorporating these materials into the DPEIS by reference. However, some of these documents are greater than 10 years old. The PEIS should confirm the validity of the information in these documents.	In accordance with 40 CFR § 1502.21, Incorporation by Reference, information that was incorporated by reference in the PEIS has been cited and briefly described in the PEIS and made available during the public review period. The MDA has reviewed the portions of the information from these documents that are incorporated by reference and found them to be valid and relevant to this PEIS.
NEPA Process	F0005-1	For example, Section 1.2 shows that environmental analyses have already been completed for most components, the notable exceptions feeing the Aegis BMD and spacebased weapons. As we understand it,	This PEIS is being prepared to address the potential impacts of alternatives for implementing the proposed BMDS. As described in Section 2.1.3 of the PEIS, the system acquisition process historically has focused on

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		development and testing of most components are well underway and decisions about initial deployment of GBI's and Aegis BMD ships have been made.	the development of independent stand-alone defensive elements. Consistent with this approach, the MDA developed NEPA analyses that appropriately considered the impacts of these stand-alone systems. The MDA is now working to incrementally develop and field a BMDS that layers and integrates defenses to intercept ballistic missiles in all ranges of flight. Therefore, it is now appropriate for the MDA to prepare a PEIS which discusses the environmental impacts of the proposed system as a whole. Future site-specific analyses necessary to support proposes tests or new developments of the BMDS will tier from this PEIS, as appropriate. Therefore, the PEIS is being developed as intended under NEPA as a resource to help MDA decision makers determine the environmental impacts of implementing the BMDS as an integrated system.
NEPA Process	F0005-2	Morever, the spiral development process, which is described on page ES-7 of the PEIS, allows MDA to "consider deployment of a missile defense system that has no specified final architecture and no set of operational requirements." Such a process is apparently intended to preclude any meaningful assessment, and thus far it has succeeded brilliantly, to the detriment of the public interest, the national defense of the United States, and in frustration of the purpose of requiring careful NEPA analysis of major federal actions.	While the Executive Summary does provide a brief summary of the "spiral development process" Section 2.1.3 of the PEIS provides a more detailed look at the MDA's current acquisition approach. This approach allows the MDA to be more flexible in adapting to emerging threats leading to a more successful defensive system. This approach is not intended to nor does it "preclude any meaningful assessment" of the system or its environmental impacts. The MDA will continue to inform and involve the public in the NEPA process for future tiered analyses that are applicable to the BMDS.
NEPA Process	F0006-2	Based on the information provided in the draft PEIS, NOAA Fisheries recommends that the Missile Defense Agency consult with the appropriate NOAA Fisheries Regional Office to determine if listed species under the	On January 14, 2004 MDA representatives met with NOAA Fisheries Service personnel to discuss programmatic consultation pertaining to the BMDS PEIS. If site-specific analyses indicate that BMDS

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		Endangered Species Act (ESA) of 1973 as amended (16.U.S.C. 1531 et. seq.) may be affected by the proposed project. If it is determined that this project may affect a listed or proposed species, the Missile Defense Agency should request initiation of consultation with NOAA Fisheries pursuant to section 7 of the ESA.	activities may affect species listed under the Endangered Species Act of 1973, the MDA will request consultation with the relevant NOAA Fisheries Service Regional Office, as appropriate.
NEPA Process	PHO0011-8	The effects of war are not excluded for the analysis of NEPA.	The interceptors would only be launched in defense of the nation in the event of a ballistic missile attack. The environmental impacts of wartime operations are highly speculative and are not susceptible to meaningful analysis in an EIS. In addition, the effects of war are excluded from analysis under NEPA.
NEPA Process	PHO0048-8	They are using this process to sort of tell people who don't think we have the time to get involved because we're too busy being employed and trying to raise a family, they use this process to cover up the fact that we aren't really making an informed decision, that people are being taken advantage of, and the law is being tweaked and used to their advantage to disempower us. So although they may meet technical requirements of NEPA, we need to make people aware of the fact that they are not meeting the real requirements of NEPA and we aren't making an informed decision. Thank you.	The MDA has made extensive efforts to ensure that the public had adequate opportunity to review and comment on this PEIS. In addition to the public hearings, the MDA developed a publicly accessible web site to provide information on the BMDS PEIS and request comments on the Draft PEIS. The MDA also established toll-free phone and fax lines, an e-mail address, and a U.S. postal service mailbox for submittal of comments and questions. Both the Notice of Availability (NOA) of the Draft PEIS published in the Federal Register (FR) and the BMDS PEIS web site provided instructions on submitting comments on the Draft PEIS. Comments received via any of the methods identified carry exactly the same weight as comments provided orally or in written format to MDA during a public hearing. This PEIS is being prepared to address the potential environmental impacts of alternatives for implementing the proposed BMDS. The PEIS is a resource to help

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
			MDA decision makers determine the environmental impacts of implementing the BMDS as an integrated system. The MDA has fulfilled the requirements of NEPA and has encouraged public participation throughout this process.
NEPA Process	PHO0051-5	The second thing that I would like to talk bout is five minutes. How long did it take you to put this study together? You all only give us five minutes to comment. I don't understand that.	In addition to the public hearings, the MDA developed a publicly accessible web site to provide information on the BMDS PEIS and request comments on the Draft PEIS. The MDA also established toll-free phone and fax lines, an e-mail address, and a U.S. postal service mailbox for submittal of comments and questions. Both the NOA of the Draft PEIS published in the FR and the BMDS PEIS web site provided instructions on submitting comments on the Draft PEIS. Comments received via any of the methods identified carry exactly the same weight as comments provided orally or in written format to MDA during a public hearing. As explained during the public hearing the five minute time limit was provided to ensure that all participants had the opportunity to provide their comments. After all participants had an opportunity to speak for up to five minutes, any commenter who wished to provide additional oral comment was invited to do so.
NEPA Process	PHW0001-1	Here, MDA has ignored the highly controversial nature of the missile defense program; has, over the years, issued a series of separate environmental analyses on smaller parts of the entire system, so as to avoid the cumulative impact test, and the nature of the proposed layered integrated BMDS program described in this PEIS is so substantially different from earlier iterations that any reliance on many	This PEIS is being prepared to address the potential impacts of implementation alternatives for the proposed BMDS. As described in Section 2.1.3 of the PEIS, the system acquisition process historically has focused on the development of independent stand-alone defensive elements. Consistent with this approach, the MDA developed NEPA analysis that appropriately considered

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		of those earlier environmental analyses is misplaced. They simply will not pass muster. And, as the Ninth Circuit instructed another agency in a case involving a controversial proposal, "... the term 'controversial' refers to cases where a substantial dispute exists as to (the) size, nature, or effect of the major federal action rather than to the existence of opposition to a use. Foundation for North American Wild Sheep v. United States Department of Agriculture, 681 F 2d 1172(9th Cir.1982).	the impacts of these stand-alone systems. The MDA is now working to incrementally develop and field a BMDS that layers and integrates defenses to intercept ballistic missiles in all ranges of flight. Therefore, it is now appropriate for the MDA to prepare a PEIS which discusses the environmental impacts of such a proposed system. Future site-specific analyses necessary to support proposes tests or new developments of the BMDS will tier from this PEIS. Both this PEIS and future analyses consider cumulative impacts, as appropriate.
NEPA Process	PHW0002-7	Another issue that is raised and not explored fully is the testing and deployment of missile defense systems abroad, or OCONUS as it is referred to here. The document asserts, "MDA may also develop test beds in other areas such as the Atlantic Ocean, Gulf of Mexico, or outside the continental U.S. to support testing of BMDS components in those areas." (p. 2-28) But it does not say how this would occur, only that "Because NEPA and other environmental laws generally do not apply to OCONUS activities, various EOs and other DoD directives and instructions have been implemented." (p. 4-111) However, nothing specific has been given on how these laws were implemented; rather, the draft PEIS directs the reader to Appendix G, which is a long listing of international treaties and does not explicitly state how the missile defense systems fit into these commitments. Given how unpopular missile defense is amongst the Canadian, British, and Greenlandic publics - the three countries that are the nearest to being incorporated into the BMDS - this should be explained further.	The PEIS considers the potential impacts of BMDS activities on multiple biomes where the BMDS could be implemented. The PEIS is not site-specific and therefore does not consider specific treaties or agreements that would apply at particular sites where the BMDS could be implemented. If specific activities are proposed in locations outside the continental U.S. (OCONUS) including Canada, United Kingdom, and Greenland, the MDA would work with the appropriate authorities to ensure that all applicable requirements are met.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
NEPA Process	PHW0009-1	1) The PEIS appears to be biased towards minimizing the environmental impact of the BMDS. There is an inherent conflict of interest win this report being written by the MDA, which has a stake in the BMDS project proceeding. An independent environmental impact report should be commissions by a nonpartisan panel of scientists with expertise in the field.	Instruction 4715.9, Environmental Planning and Analysis, Presidential EO 12114, Environmental Effects Abroad of Major Federal Actions, and applicable DoD military service environmental regulations that implement these laws and regulations. Section 1506.5(c) of the CEQ NEPA Regulations outlines the lead agency's responsibility with respect to preparing an EIS. This Section states that "…any environmental impact requirements of NEPA shall be prepared directly by or by a contractor selected by the lead agency…" Therefore, the PEIS was prepared appropriately as directed by the CEQ guidelines.
No Action Alternative	E0158-1	I can't support anything but a True "NO ACTION".	As noted in CEQ's "Forty Most Asked Questions", there are two interpretations of the No Action Alternative depending on the nature of the proposal being evaluated. In situations where "no action" is illustrated in instances involving Federal decisions on proposals for project "no action" would mean the proposed activity would not take place. In situations that involve an action such as updating a land management plan where ongoing programs initiated under existing legislation and regulations will continue, even as new plans are developed, "no action" may be thought of in terms of continuing with the present course of action until that action is changed. It is further noted that to construct an alternative based on no management at all would be a useless academic exercise. For this PEIS, because the proposed action involves the integration of existing discrete missile defense systems, the no action alternative would be to continue with existing stand-alone systems; not to scrap all existing systems like the

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
			PATRIOT missile already in use in theater defense by U.S. forces.
No Action Alternative	E0162-2	Another major general deficiency is that the No Action alternative is not considered seriously. It is asserted on page 2-67 that it "would not meet the purpose of or need for the proposed action or the specific direction of the President and the U.S. Congress." Footnote.19 on page 1-6 quotes the part of the 1999 Missile Defense Act which declares a policy to "deploy as soon as is technologically possible an effective NMD system." It is noted on page 1-6 that Pres. Clinton decided in Sept. 2000 not to authorize deployment of an NMD system for reasons including technical uncertainties and unsuccessful flight tests. Two GAO reports in 2003 and a Union of Concerned Scientists report Technical Realities in May 2004 raise serious questions about the readiness for deployment of current NMD components. Therefore, it seems that the No Action alternative (which was essentially U.S. policy until 2002) is preferable until one can demonstrate that an "effective" NMD is "technologically possible." The most recent NMD intercept attempt failed on 11 Dec. 2002, six days before Pres. Bush announced that the U.S. would deploy an initial NMD system. The test results so far and independent analyses suggest that it is at least questionable whether an effective NMD system is possible.	See previous response.
No Action Alternative	E0179-1	I believe that halting the project is the best option.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
No Action Alternative	E0186-1	To continue on with this project as would be the case even under the "no action alternative" is unconscionable. We believe that even if you were to re-do the PEIS, there would be no reasonable alternative other than shutting down the project and calling it the loss it already is.	See previous response.
No Action Alternative	E0204-1	It is my understanding that Alternative 3 means "no change" so that all programs continue as planned. This is not acceptable. The statement must be rewritten to allow for a true "no action" choice....meaning NO R&D or Production of the missile defense program, no weapons in space!	See previous response.
No Action Alternative	E0211-1	The PEIS must be rewritten, because the "No action" alternative is insufficient. The most appropriate choice is to stop all funding of Star Wars Missile defense.	See previous response.
No Action Alternative	E0211-2	I want no more of my tax dollars to support this foolish program. Please rewrite the PEIS to allow the sanest alternative- scrapping this program entirely- to be a choice. The best choice.	See previous response.
No Action Alternative	E0216-1	For all these reasons I believe the "No Action Alternative" is insufficient and the entire PEIS should be rewritten.	See previous response.
No Action Alternative	E0231-1	The definition of no action to me is to STOP WHAT IS NOW BEING DONE!!!	See previous response.
No Action Alternative	E0233-1	None of the three options for PEIS is acceptable! The third is the most dangerous because it is so deceptive, meaning "business as usual." Let's scrap this entire frivilous program and get on with the vital business of remediation of the mistakes of the past four years and prevention of more of the same during the second Bush administration.	See previous response.
No Action Alternative	E0262-1	I am writing in opposition to the three options of the MDA BMDS PEIS, including the No Action option, since it is in	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		reality not a true No Action as it includes continued development of interceptors. I urge you to revise these options with more concern for the environmental damages that will result from these actions.	
No Action Alternative	E0270-1	The"No Action Alternative" is insufficient and the entire PEIS should be rewritten. No nukes in space!!!!!!	See previous response.
No Action Alternative	E0319-27	Regarding the BMDS Draft PEIS and No Action Alternative, the MDA comments: "This alternative would not meet the purpose of or need for the proposed action or the specific direction of the President and the U.S. Congress to defend the U.S. against ballistic missile attack". Perhaps the PEIS could explain exactly what the President and Congress have proposed for the BMDS, because the MDA evidently does not know 'the specifics of the final architecture or operational requirements' otherwise, the information would have been included in the Draft PEIS, so the public would have an Alternative 3 option to comment on that did not include 'exploding' missiles in space or firing space-based lasers at ground targets, which eventually will lead to the U.S. Department of Defense's control of space by the year 2020 (U.S. Air Force, Vision 2020).	See previous response.
No Action Alternative	E0332-1	1. The three alternatives being considered are insufficient and deceptive. "No Action" is an endorsement of the current ABM program which is badly flawed and which should be terminated. The PEIS as it is being conducted does not meet congressional requirements and must be started over with real alternatives.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
No Action Alternative	E0343-1	I am writing to support a real "No Action" alternative to the deployment of a missile defense system. This means no further testing, development, or deployment.	See previous response.
No Action Alternative	E0355-1	Alternative 3, "No Action," which might seem like a logical out for those wanting to suppress this race to destruction, seems to leave things as they are - i.e. would allow continuation of the present programs which we are against! So the PEIS should be rewritten to allow another alternative: Discontinue all work on such systems, and work on getting cooperation throughout the world on disarmament.	See previous response.
No Action Alternative	E0366-1	(5) For all of the above, and many more, we believe that the only acceptable alternative is for NO BALLISTIC MISSILE SYSTEM AS OUTLINED IN THIS PEIS. Note that does not mean the vno action alternative' IT MEANS NO PROGRAM.	See previous response.
No Action Alternative	E0373-1	Since it appears that "no action" in this context means "carry on with the plan", the three alternatives being considered by PEIS are all unacceptable.	See previous response.
No Action Alternative	E0387-6	Yorkshire CND asks that our concerns be taken seriously and considered properly. The PEIS has offered itself three options, none of which is sufficient. As we understand it, the "no action" option simply allows for no change in current developments and the continuation of the project. If this is to be the ultimate step that the MDA is prepared to take then it implies a bias towards the outcome of this PEIS study by not allowing for the possibility that the Missile Defence system is too environmentally destructive to continue with.	See previous response.
No Action Alternative	E0395-4	What is called the "No Action Alternative" is not adequate under NEPA and does not describe a scenario where no	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		action is taken. Rather it describes a situation where the Missile Defense Agency would continue existing development and deployment of missile defense systems unabated. Under the "No Action Alternative" individual systems would continue to be tested and deployed except for integrated system-wide tests. This is hardly no action and would permit an indeterminate missile defense program, especially since, as explained in the draft, "There are currently no final or fixed architectures and set of requirements for the proposed BMDS." Even if MDA agreed to the "No Action Alternative," it would not find its actions constrained for the foreseeable future. The MDA needs to develop new alternatives which meet the intent of NEPA.	
No Action Alternative	E0395-5	Most crucially, the "No Action Alternative" strangely links world events, policy objectives with environmental considerations; unprecedented in an environmental document which is supposed to be grounded in the science of risk assessment. The PEIS reads: "The decision not to deploy a fully integrated BMDS could result in the inability to respond to a ballistic missile attack on the U.S. or its deployed forces, allies, or friends in a timely and successful manner. Further, this alternative would not meet the purpose of or need for the proposed action or the specific direction of the President and the U.S. Congress." Through the MDA's own volition, the document goes beyond environmental considerations and opens a Pandora's Box of analyzing the state of American security,	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		the potential for missile attack, and the appropriate policy responses. Therefore, it is now MDA's responsibility to respond to all public comment on threat and policy, even those challenging the rationale for missile defenses. Now that the Pandora's Box is open on policy, the Missile Defense Agency should, for example, make the case that nuclear deterrents no longer suffice, and MDA should substantiate why BMDS is the preferable security strategy over other Alternatives by which America might be kept safe, such as through United Nations IAEA inspections, international controls on missile sales and missile technology, or diplomacy.	
No Action Alternative	E0395-6	If the agency choices to maintain the current "No Action Alterative" - which we do not support - the final PEIS would need to offer a realistic analysis (and timeline) of missile threats against the American homeland, nor fudge the distinction between theater and strategic threats. Further, the "No Action Alternative" would eliminate systems integration testing, the very testing that would be needed to demonstrate that a layered missile defense system, as ordered by the President, can work. Elsewhere in this PEIS the President's direction is cited as a reason why no further change in the plan is being considered, but in the "No Action Alternative," the President's direction is clearly negotiable.	See previous response.
No Action Alternative	E0402-1	I think the most important issue is that the BMDS PEIS does not contain a real No Action Alternative. Your No Action alternative which many people think is a good option really only states that the entire plan be	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		implemented as already underway with only the exclusion of the new layered additions. A real No Action alternative, stops the implementation of the nuclear missile defense system.	
No Action Alternative	E0402-3	Therefore, given the potential severe environmental damage from both testing and deployment of this program, a true no action policy is preferable.	See previous response.
No Action Alternative	E0423-1	Now for the larger picture. The BMDS PEIS does not include a real "No Action Alternative" of not developing ballistic missile defenses, Like a number of medical treatments, from bleeding people hundreds of years ago to Viox a month ago, the remedy is worse than doing nothing.	See previous response.
No Action Alternative	E0424-3	4) The BMDS PEIS does not include a real "No Action Alternative". Such an alternative that does not include further development testing or deployment of BMDS weapon systems needs to be considered and included in the PEIS. Such a "No Action Alternative" would include strong support for efforts by the UN and nations around the world to enhance security through strengthening inspection and verification protocols of existing treaties, and by re-commitment to arms control and disarmament approaches that to date have served to limit global Weapons of Mass Destruction (WMD) proliferation. As such, the PEIS needs to consider explicitly whether the BMDS would itself encourage the proliferation of WMD, as well as an arms race in space, with examination of the likely response of other nations to the BMDS. As the BMDS is coupled to continued U.S. nuclear weapons	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		programs, will this lead other nations horizontally proliferate for "deterrence" capabilities?	
No Action Alternative	E0427-1	3) The BMDS PEIS does not include a real "No Action Alternative". Such an alternative that does not include further development testing or deployment of these weapon systems needs to be considered and included in the PEIS. The BMDS PEIS has not considered the "No action Alternative" of re-joining the UN and many nations of the world in working to enhance security through treaties and arms control and disarmament approaches, e.g. the approach that has provided us with long-term security to date.	See previous response.
No Action Alternative	E0429-1	Furthermore, the PEIS lacks a genuine "No Action Alternative," even though NEPA requires that such an alternative serve a baseline against which to compare the environmental impacts of the other alternatives. In particular, a No Action Alternative that posits little or no use of rocket propellant is essential if the program's proponents are to minimize releases of pollutants - particularly solid rocket propellant and its byproducts into our nation's water supplies, air, or the upper atmosphere, either by selecting a program alternative or agreeing to binding mitigation measures.	See previous response.
No Action Alternative	E0429-8	The PEIS lacks a genuine, "No Action Alternative," as required under NEPA. It rejects evaluation of the alternative, "Cancel Development of Ballistic Missile Defense Capabilities," because it "does not meet the purpose of or need for the proposed action ..." (page 2-68). This approach misunderstands how NEPA works. It is acceptable to evaluate and reject a No Action Alternative because it doesn't meet the purpose of a program, but the	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		environmental impacts of that alternative must be considered as a baseline against which to compare the environmental impacts of the other alternatives. In particular, a No Action Alternative that posits little or no use of rocket propellant is essential if the program's proponents are to minimize releases of pollutants into our nation's water supplies, air, or the upper atmosphere, either by selecting a program alternative or agreeing to binding mitigation measures.	
No Action Alternative	E0439-1	3) The BMDS PEIS does not include a real "No Action Alternative". Such an alternative that does not include further development testing or deployment of these weapon systems needs to be considered and included in the PEIS. The BMDS PEIS has not considered the "No action Alternative" of re-joining the UN and many nations of the world in working to enhance security through treaties and arms control and disarmament approaches, e.g. the approach that has provided us with long-term security to date.	See previous response.
No Action Alternative	F0005-3	Another major deficiency of the draft PEIS is that it lacks a genuine "No Action Alternative", even though NEPA explicitly requires that such an alternative serve as a baseline against which to compare the environmental impacts of the other alternatives. LAWS is compelled to conclude that the MDA simply did not consider a "No Action Alternative" seriously. For example, the MDA asserts on page 2-67 that "it would not meet the purpose of or need for the proposed action or the specific direction of the President and the U. S. Congress." Further, footnote 19 on page 1-6 quotes the part of the 1999 Missile Defense	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		Act which declares the policy "to deploy as soon as is technologically possible an effective NMD system." The PEIS also notes on page 1-6 that President Clinton decided in September 2000 not to authorize deployment of an NMD system for reasons including technical uncertainties and unsuccessful flight tests. The PEIS does not concede that even if the technology worked perfectly, the systems being deployed are vulnerable to counter-measures that are easier to build than the long-range missile on which they would be placed, another concern that contributed to President Clinton's decision not to deploy the system the Bush Administration is now rushing to deploy.	
No Action Alternative	F0005-4	In addition, two GAO reports in 2003 and a Union of Concerned Scientists report titled 'Technical Realities" released in May, 2004 raise further serious questions about the readiness for deployment of the current NMD components. It seems clear to LAWS that a properly-articulated "No Action Alternative"-which was essentially U.S. policy until 2002 - is vastly preferable until the MDA can persuasively demonstrate that an "effective" NMD is "technologically possible." Recent test results underscore this reality. The most recent NMD intercept attempt failed on December 11, 2002, six days before President Bush announced that the U. S. would deploy an initial NMD system. This rush to deploy an untested system flies in the face of the test results so far, and suggests that the independent analyses that state that it is at least questionable whether an effective NMD system is possible, have been ignored. The policy stakes are far too	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		high, and the $10 billion annual expenditures far too great, to proceed with this global gamble.	
No Action Alternative	F0005-5	The width of the range of alternatives that an agency must identify and analyze in an EIS is based on the purpose of, and need for, the agency action. (See 40 C.FR: Sec. 1502.13,1502.14.) Therefore, a narrow project purpose and need requires a fewer number of reasonable alternatives than a broad project purpose and need, which may have an infinite number of alternatives. (See NRDC v. Morton, 458 F.2d 827, 835; D.C. Cir. 1972)	See previous response.
No Action Alternative	F0005-10	As pointed out above, instead of crafting the PEIS to justify decisions that have already been made, the MDA should have included a genuine "No Action Alternative", as required under NEPA. Such an alternative could have been "Cancel Development of Ballistic Missile Defense Capabilities" because it does not meet the purpose of or need for the proposed action. It is acceptable under NEPA to evaluate and reject a No Action Alternative because it doesn't meet the purpose of a program, but the environmental impacts of that alternative must be considered as a baseline against which to compare the environmental impacts of title other alternatives.	See previous response.
No Action Alternative	M0234-1	The NO ACTION alternative is the only acceptable option, but one in which there would be NO FURTHER RESEARCH OR DEVELOPMENT of "Missile Defense" systems or "Space Based Weapons."	See previous response.
No Action Alternative	M0234-2	So our basic conclusion would be that a NO ACTION alternative, that truly means NO ACTION, cutting off all funding for any further development of BMDS or sub-systems of it.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
No Action Alternative	M0262-1	For all these reasons, I support ending all work on the Missile Defense system. None of the alternatives presented in your Draft Programmatic Environmental Impact Statement includes ending the program. Therefore, I call on you to rewrite and resubmit the PEIS for public comment, including another alternative: ending the Missile Defense System.	See previous response.
No Action Alternative	M0266-1	The existing text for Alternative 3 is not a NO ACTION alternative. The MDA itself rejects it as an inadequate version of the first two alternatives presented.	See previous response.
No Action Alternative	M0266-2	1). Beginning in January 2005 the current Ballistic Missile Defense Program (BMD) would be suspended immediately and in entirety, or a moratorium on deployment, research and development would be declared while a thorough investigation of the program occurs. Congress, the Administration, auditors, scientists, aerospace engineers and the general public would participate in a thorough reconsideration of the costs, workability and desirability of this program in all its aspects.	See previous response.
No Action Alternative	M0274-1	I believe the "no action" alternative is an insufficient brake to further Star Wars developments. I strongly urge a intensive rewriting of PEIS.	See previous response.
No Action Alternative	PHO0007-1	This proposal that we're asked to address tonight does not contain a real No Option Alternative not to build the system, to abandon it. That is what I think most of the people in the United States and the world would affirm.	See previous response.
No Action Alternative	PHO0009-2	The second thing is the PEIS does not evaluate the environmental impact of No Action Alternative; thus, does not comply to the National Environmental Policy Act.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
No Action Alternative	PHO0009-3	The report -- since No Action Alternative was not considered seriously in the impact report, I say it is not an impact report at all. Therefore, it has not complied with the legal requirements; therefore, it should be stopped. Thank you.	See previous response.
No Action Alternative	PHO0011-6	The BMDS does not include a real No Action Alternative. Such an alternative does not include further development and testing and deployment of these weapon systems needs to be considered and included in the PEIS. The PEIS does not consider a No Action Alternative at all. In other words, something that would involve rejoining the UN and -- and many other nations of the world in order to enhance security through treaties and arms control, sovereign approaches; i.e., approaches that provided us with long-term security to date.	See previous response.
No Action Alternative	PHO0013-1	And I suggest an Alternative Number 4, which means scrap the entire PEIS and the whole program that they are presenting here.	See previous response.
No Action Alternative	PHO0018-1	First, I call for a true No Action Alternative, as have others. For example, or specifically, an alternative that goes beyond the failure to integrate anti-ballistic missile system to an alternative that rejects the individual missile defense elements of a BMD System.	See previous response.
No Action Alternative	PHO0018-2	Because of the devastating impacts -- political, environmental, ecological and psychological, as well as merely environmental -- the impacts of a Ballistic Missile Defense Program of any kind, this PEIS must address a true No Action Alternative. The failure of this PEIS to include such a true No Action Alternative violates the requirements of the NEPA process. The absence of a true No Action Alternative allows the PEIS to construct a false	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		comparison with the other alternatives underplaying the different degrees of environmental damage.	
No Action Alternative	PHO0019-1	You have no true No Action Alternative; only build it together or build it a little bit at a time and don't test it together.	See previous response.
No Action Alternative	PHO0019-2	What you should do in your own terms is to consider a true No Action Alternative, which is an analysis of the relative emissions of greenhouse gasses and space debris and toxic chemicals and radiation caused by either (A), blowing things up or (B), pursuing broader implementations of existing treaties, such as the Nuclear Non-proliferation Treaty and the Anti-Ballistic Missile Treaty, which would not produce any greenhouse gasses, any space debris and would not blind any animal or destroy any life on Earth. Thank you.	See previous response.
No Action Alternative	PHO0024-1	This is reason enough for the No Project Alternative CEQ style.	See previous response.
No Action Alternative	PHO0026-2	With respect to the No Action Alternative already mentioned by others, it does not describe a scenario where no action is taken. Rather, it describes a system where the Missile Defense Agency would continue existing development and deployment unabated under the No Action Alternative. And I quote the PEIS here, Individual systems would continue to be tested but would not be subjected to system integration tests, closed quotes. This is hardly no action and allows for indeterminate missile defense program since -- to go back to quoting the PEIS, There are currently no final fixed architectures and no set operational requirements for the proposed BMDS, closed quotes.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
No Action Alternative	PHO0032-2	We would support the No Action Alternative if there had been a legitimate attempt at researching and weighing a true alternative of no action. Such a proposal should have encompassed a suspension of research and development, no testing and no initial deployment. It should have evaluated the cost effectiveness of vigorous pursuit of international cooperation on nuclear disarmament. As it stands, the No Action Alternative does not meet the requirements of the National Environmental Policy Act. For this reason, we consider the Draft PEIS inadequate and insufficient for proceeding with the BMDS.	See previous response.
No Action Alternative	PHO0037-6	And, last, the BMDS PEIS does not really include a No Action Alternative. Your No Action Alternative does not include the option of not deploying any of these, there's just dropping the program right now. And I think that we need to have a true No Action Alternative considered as part of this.	See previous response.
No Action Alternative	PHO0038-1	I, like Jean, am in favor of the No Action Alternative, but would also like a real No Action Alternative, which would save us tens to hundreds of billions of dollars if we didn't deploy the system.	See previous response.
No Action Alternative	PHO0039-1	I'd like to see something quite a bit less than the No Action Alternative, I'd really like to see something rolled back in a way and dismantling and using these resources, the financial resources that were wasted on this on much more pressing needs in this country.	See previous response.
No Action Alternative	PHO0044-6	The No Action Alternative is not seriously considered. It is claimed not to be at the direction of Congress, presumably the 1999 Missile Defense Act. This Act states	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		U.S. policy is to deploy as soon as is technologically possible an effective NMD system, but the EIS has no discussion about NMD effectiveness and whether that criteria is satisfied.	
No Action Alternative	PHO0045-1	We support a real No Action Alternative to the deployment of a missiles defense system. This means no further testing, development or deployment.	See previous response.
No Action Alternative	PHO0046-1	I think that you have inadequate alternatives. You only have three alternatives and there ought to be a fourth one which includes not deploying, developing the Ballistic Missile Defense System, and actually reducing the scope of existing programs.	See previous response.
No Action Alternative	PHO0048-3	NEPA requires the alternatives to be considered, including the No Action Alternative, as has already been stated.	See previous response.
No Action Alternative	PHO0048-5	And the reason for this, the reason why this is justified is because they're getting off on a technicality, because they stated that the purpose of this program or this project is to implement a Ballistic Missile Defense System. It's misleading, because really what this project is supposed to do, like the overriding principle, is to provide for the defense of the United States.	See previous response.
No Action Alternative	PHO0049-2	Then, finally, I wanted to say that in your EIS I think you're misleading all of us by putting No Action as a third alternative. I think you need to be more honest and state specifically that No Action means to keep on testing as is without the integration.	See previous response.
No Action Alternative	PHO0049-3	I think that some of the people here felt like No Action meant that you were going to start dismantling the missile defense system, which, of course, should have been stated as another alternative, which you didn't even give us a chance to put down.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
No Action Alternative	PHO0049-4	And please give us another alternative which says stop Star Wars, dismantle the missile defense system, start helping the people who really need the help, and let's bring peace instead of more destruction.	See previous response.
No Action Alternative	PHW0001-5	The PEIS is defective to the extent that it fails to meet the CEQ guidance on the range of alternatives agencies must consider. Here, the MDA has failed to propose a real no action alternative, and the so-called no action alternative set out at PEIS 2-67 is not a true no action alternative because under it all the individual components of the system would continue to be tested to determine the adequacy of their stand-alone capabilities. Such an alternative could easily have been Alternative 3, but the MDA should also have clearly set out a real no action alternative so that the public could comment on it, instead of being caught in the Catch-22 this PEIS poses. It is difficult not to conclude that the agency's choice of alternatives was dictated by the end result it desired. While there may be portions of the CEQ guidance where reasonable people may differ, surely this is not one of them. And LAWS submits that a reviewing court would find the range of alternatives set out in the PEIS inadequate, in view of all the circumstances.	See previous response.
No Action Alternative	PHW0002-1	To begin with, the so-called "No-action alternative" examined in this document is misleadingly named. It does not detail a scenario where no action is taken. Rather, it describes a system where "the MDA [Missile Defense Agency] would continue existing development and testing of discrete systems as stand-alone missile defense capabilities. Individual systems would continue to be tested but would not be subjected to system integration	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		tests." (p. ES-8) This is hardly no action and allows for an indeterminate amount of missile defense development, since "There are currently no final or fixed architectures and no set operational requirements for the proposed BMDS." (p. 1-9) The way this draft PEIS is structured, even if MDA was limited to the No-action alternative, it would not find its actions very much constrained.	
No Action Alternative	PHW0004-1	Furthermore, the PEIS lacks a genuine "No Action Alternative," even though NEPA requires that such an alternative serve a baseline against which to compare the environmental im¬pacts of the other alternatives. In particular, a No Action Alternative that posits little or no use of rocket propellant is essential if the program's proponents are to minimize releases of pollutants-particularly solid rocket propellant and its byproducts-into our nation's water supplies, air, or the upper atmosphere, either by selecting a program alternative or agreeing to binding mitigation measures.	See previous response.
No Action Alternative	PHW0004-8	The PEIS lacks a genuine, "No Action Alternative," as required under NEPA. It rejects evaluation of the alternative, "Cancel Development of Ballistic Missile Defense Capabilities," because it "does not meet the purpose of or need for the proposed action ..." (page 2-68). This approach misunderstands how NEPA works. It is acceptable to evaluate and reject a No Action Alternative because it doesn't meet the purpose of a program, but the environmental impacts of that alternative must be considered as a baseline against which to compare the environmental impacts of the other alternatives.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		In particular, a No Action Alternative that posits little or no use of rocket propellant is essential if the program's proponents are to minimize releases of pollutants into our nation's water supplies, air, or the upper atmosphere, either by selecting a program alternative or agreeing to binding mitigation measures.	
No Action Alternative	PHW0005-2	We would support the "No Action Alternative," if there had been a legitimate attempt at researching and weighing a true alternative of "no action/' Such a proposal should have encompassed a suspension of research and development, no testing, and no initial deployment. It should have evaluated the cost-effectiveness of vigorous pursuit of international cooperation on nuclear disarmament. As it stands, the "No Action Alternative" does not meet the requirements of the National Environmental Policy Act. For this reason, we consider this draft PEIS inadequate and insufficient for proceeding with the BMDS.	See previous response.
No Action Alternative	PHW0006-2	2. The PEIS does not evaluate the environmental impact of the no action alternative, and thus does not comply with the intent of the National Environmental Policy Act. Without this evaluation there is no way to compare the environmental impact of the program to the impact of the no action alternative, and thus violates both the letter and the spirit of NEPA.	See previous response.
No Action Alternative	PHW0009-2	4) The "No Action Alternative" is not fairly presented or considered. The alternative of the worldwide elimination of ICBM's through diplomatic means and international cooperation, including worldwide imposition of UN arms inspections.	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
Procedural	E0319-28	Most likely, Volume 1 of the BMDS PEIS has already been printed and the MDA is waiting to receive and include public comments before releasing it and publicly announcing to the news media that the BMDS is 'deployed'.	MDA considered all comments received during the public comment period and made changes to the document as appropriate. Any modifications based on comments are outlined in this appendix.
Procedural	E0395-3	The timeline to release the Final PEIS - cited on the MDA web-site and announced at the October 19, 2004 public meeting - a mere two to six weeks after the comment period deadline portends that MDA will not fully consider and respond to public testimony. PSR-LA emphatically suggests that MDA take the time to consider and respond in full to all comments and critiques.	Based on the number of comments received, MDA extended the original release date of the Final PEIS in order to adequately consider public comments.
Procedural	PHO0023-1	Most notably, I would like to point out that the timeline of potentially releasing the final document but two weeks after the oral testimony, as well as what anyone else could offer in writing and -- or even six weeks later into -- in the end of January of '05 strikes me that you very well may not take too seriously what we have to say. I would strongly suggest that you factor a time when you can actually take into account the things that the public are suggesting.	See previous response.
Procedural	PHW0001-7	As LAWS and PSR pointed out in their Vandenberg EA comments, "The issues are too important, and the priority accorded this program would suggest to a reviewing court that rather than risk extended delays inherent in legal challenges to the sufficiency of this (PEIS), the MDA would be well advised to take the time and make the effort to prepare a comprehensive (PEIS) that fully meets all the legal requirements of NEPA." That is still good advice. While the PEIS is an improvement in some respects, it remains fatally flawed. LAWS and PSR and others will	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		spell out these fatal flaws in the written comments that are due November 17, 2004.	
Procedural	PHO0037-1	Three, NEPA does not seem, to me, to be a big enough vehicle to evaluate the program. It should include international input because the implications of this project are global. And I noticed on your map out there Antarctica is not included on the map. I'm sure you looked at it but.....	The PEIS addressed the international scope of the BMDS program by describing world environments in terms of global biomes. Appendix G also discusses compliance with applicable international environmental and safety regulations. Antarctica was not included on the map or in the analysis because there are no reasonably foreseeable BMDS actions proposed to take place in Antarctica. If there were future BMDS activities proposed in this area, they would be addressed in site-specific environmental documentation.
Procedural	PHO0051-6	The other thing is, and people have already commented that you don't have any person here that can translate our language.	Attendees at the public hearing were given the opportunity to provide testimony in both Hawaiian and Marshallese languages. A court reporter recorded the proceedings and the audiotapes were later translated by certified translators. Transcripts from the hearings, including the translated Marshallese and Hawaiian oral testimony, can be found in Appendix B of this PEIS.
Procedural	PHO0055-1	KELI'I COLLIER: Okay. Not much. So when you say that you weigh the written testimony as heavy as the oral testimony, that premise alone is a fault of yours, it's a fault of your thinking, it's a fault of your understanding of where you are, this context of Hawaii. These people can barely feed themselves half the time. They can barely send their kids to school with slippers. So that's something you got to wake up to fast.	Approximately 8,500 comment documents were received on the Draft BMDS PEIS. Comments received via any of the methods identified carry exactly the same weight as comments provided to MDA orally during a public hearing.
Proposed Action	E0347-3	The long-established US satellite-surveillance downlink and relay Bases, such as Menwith Hill and Pine Gap,	The proposed action analyzed in this PEIS includes analysis of various components that could be integrated

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		positioned around the world for the purpose of intelligence gathering, are necessary components of the US Missile Defense System, as they would be used to monitor in advance, the preparations for the launch of a rocket. These facilities comprise part of the US Missile Defence system package and exclusion from the US Missile Defence Agency's Programmatic Environmental Impact Statement deliberations cannot be justified.	into the BMDS. The PEIS analyzes components rather than elements because the MDA acquisition strategy has changed significantly as described in Section 3.1.2 of the PEIS. The components of the various elements deployed at locations around the world are analyzed as part of this PEIS.
Proposed Action	PHO0046-6	So I say that that needs to be considered. The opportunity costs of ballistic missile defense is one of the impacts that we have to deal with and our children have to deal with, and it needs to be considered in your Environmental Impact Statement, and I didn't see it listed there.	This PEIS is being prepared to consider and analyze the potential environmental impacts of alternatives for implementing the proposed BMDS. The PEIS is a resource to help MDA decision makers determine the environmental impacts of implementing the BMDS as an integrated system. Cost associated with system development and testing is addressed by the Congress during the budgeting process and is not relevant to this environmental analysis.
Public Involvement	E0319-1	The MDA did a very poor public relations job in regard to getting the word out on the availability of the Draft PEIS and on the October 2004 public hearings in what will be the affected BMDS test communities. The public cannot make comments on something they do not know exists if it is not well advertised in advance (e.g. notices in newspapers). Holding public hearings in Anchorage, Alaska when the BMDS test site is located on Kodiak Island, Alaska, and in Sacramento, California when the test site is at Vandenberg AFB near Los Angeles, showed the MDA's intent was to make it as difficult as possible for members of the public to travel to the meeting places to testify and give their comments on the Draft PEIS. The MDA put a public notice in the Kodiak Daily Mirror and	The PEIS is a programmatic level NEPA analysis that considers implementation alternatives for an integrated BMDS and as such does not address specific sites or specific activities at those sites, but rather considers the program as a whole to allow tiering of subsequent site-specific analyses from the PEIS. MDA planned to hold its public hearings on the Draft PEIS in the same locations at which scoping meetings were held. Notification of the BMDS PEIS scoping meetings was published in the Kodiak Daily Mirror on April 30, 2003 and May 2, 2003 and notification of the BMDS PEIS public hearings was published in the Kodiak Daily Mirror on October 13, 2004 and October 15, 2004. A

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		sent a copy of the Draft PEIS to the Kodiak Island Borough's office only after being urged by local residents. Otherwise, local officials and community members would not have known of its existence. This repetitive MDA behavior is unacceptable.	scoping notification letter was sent to Mayor Carolyn Floyd in April 2003 and a copy of the Draft PEIS was provided to Mayor Floyd in September 2004.
Public Involvement	E0395-2	Communities most impacted by BMDS have been largely excluded from the environmental review process. For example, communities near Vandenberg AFB will disproportionately bear the burden of the proposed 515 launches over the next ten years. And, the PEIS has not sufficiently dealt with the effect of cumulative effects in Southern California, as many of the region's contractors are working on the weapon system. Simply, there needs to be additional hearings in potentially impacted areas of the nation.	It is not possible to hold public hearings at all locations where activities associated with implementing the BMDS may occur. MDA planned to hold its public hearings on the Draft PEIS in the same locations at which scoping meetings were held. The PEIS is a programmatic level analysis that considers implementation alternatives for an integrated BMDS and as such does not address specific sites or activities at these sites, but rather considers the program as a whole to allow tiering of subsequent site-specific analyses from the PEIS. In addition to the public hearings, the MDA developed a publicly accessible web site to provide information on the BMDS PEIS and request comments on the Draft PEIS. The MDA also established toll-free phone and fax lines, an e-mail address, and a U.S. postal service mailbox for submittal of comments and questions. Both the NOA of the Draft PEIS published in the FR and the BMDS PEIS web site provided instructions on submitting comments on the Draft PEIS. Comments received via any of the methods identified carry exactly the same weight as comments provided orally or in written format to MDA during a public hearing.
Public Involvement	PHO0025-4	Southern California is bearing a disproportionate impact of missile defense development and its effects on the environment. The midcourse interceptor is being tested	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		and deployed at Vandenberg Air Force Base in Santa Barbara County. The Airborne Laser is being tested at Edwards Air Force Base in Los Angeles County. The space-based and Airborne Lasers are being developed by Northrop Grumman in the South Bay and San Juan Capistrano. Lockheed Martin, Boeing and Raytheon are deeply involved in developing the midcourse interceptors and other systems. At a minimum, there should be additional hearings near the areas most effected by missile defense developing.	
Public Involvement	PHO0029-1	But now I don't think so anymore because I'm noticing that there were only four locations at all where public testimony has been invited: Virginia, Sacramento, California, Hawaii and Alaska. That seems to me to be not nearly enough public input. That point has already been made. I would like to talk about Exhibit ES-3, which is part of the Executive Summary. If you want to go along with me, that exhibit shows the effected environment. This is about environment that we're talking about here today. I looked at that to see what the affected environment was. All of the environment that can be affected is divided into nine biomes, as well a broad ocean area and the atmosphere. I went through that and I saw the following. I saw that we're talking about the Arctic regions, North Atlantic Ocean, Pacific Ocean, Alaska, Canada and Greenland. Then some more Arctic regions and also Alaska, deciduous forest and Eastern and North Western U.S. and	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		Europe, Chaparral. That is California Coast, Mediterranean from the Alps to the Sahara Desert, from the Atlantic Ocean to the Caspian Sea. This is a lot of area here. And these are areas that are labeled as "affected areas." Oh, the Grasslands. That is the whole prairie of the Midwest. The desert. Oh, the arid Southwest. New Mexico, Arizona, Utah and the Rocky Mountains, as well as the Alps, Pacific Equatorial Islands, which I don't know. Maybe that is why we're going to be in Hawaii. Northern -- you've got to turn the page. Northern Australia. And then how about the broad ocean area. That has no particular latitudinal range and that's the Pacific, Atlantic and Indian Ocean. And then the really big one, the atmosphere, which is the atmosphere which envelops the entire earth. That looks to me like a global environmental impact. And it seems to me only fair and some kind of rule that I think is codified in lots of different places that the people that are effected by legislation and -- and programs get to talk about it, get to respond. Well, that is going to be a lot more than the people in the U.S. Even if you say four hearings is enough in the U.S. -- this is a global environmental impact, this Star Wars Program. And, therefore, I'm not impressed with the hearing anymore. I think four is completely minimal.	
Public Involvement	PHO0047-1	Conduct one hearing in the Marshall Islands. After all, that's where the missile testing is taking place.	See previous response.
Public Involvement	PHO0047-2	How come I'm reading here that the request was given to have the hearing posed or made on Kauai, Maui, and the	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		Marshall Islands, and it was refused? These are the most affected places that are going to be most impacted.	
Public Involvement	PHO0048-2	In addition, as everyone has stated, there should be more hearings held. The three on the continent and the one here are just not sufficient.	See previous response.
Public Involvement	PHO0050-2	Finally, I think if it's true that the Missile Defense Agency refused to have public meetings on Kauai where PMRF is and in the Marshall Islands, to me that's a very deep flaw.	See previous response.
Public Involvement	PHO0051-2	And it's amazing to me that you don't have a meeting scheduled in Kauai with almost half of an island impacted by the missile range facility there.	See previous response.
Public Involvement	PHO0058-1	In addition to my own opposition to the proposed ballistic defense system, I come here with words from people who were not offered the opportunity to testify this evening because there was no hearing on the island where they reside and where the impacts will take place.	See previous response.
Public Involvement	PHO0059-1	You really need to hold hearings on Kauai, other places also, but especially Kauai where the Pacific Missile Range Facility is located, who are really greatly impacted by this. And I, too, have friends on Kauai who didn't know about it and want the opportunity to testify.	See previous response.
Public Involvement	E0428-1	The following comments on the environmental and political effects caused by the proposed Ballistic Missile Defense System (MDS) are submitted a day late. I respectfully request that the deadline for submittal of comments be extended for cause. The cause is that there was very little notice to the general public, and only those versed as to the ADAMS or government notice agencies or methods were privy to the proposed invitation to comment.	Comments received through December 1, 2004 are considered in the Final PEIS. Comments received after December 1, 2004 have been included as part of the administrative record; however are not specifically addressed in this response appendix. In addition to the NOA, the MDA developed a publicly accessible web site to provide information on the BMDS PEIS and request comments on the Draft PEIS.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
Public Involvement	PHO0032-1	There's been no widespread publicity in California that we're aware of regarding this hearing today in Sacramento. Is this some sort of the stealth strategy to limit public input on such critical issues. The question is: Can the Draft PEIS be legitimate if there is not adequate notice of the document in the hearings on this matter?	Notification of the public hearings for the Draft BMDS PEIS was released in the NOA, which was published in the FR on September 17, 2004. In addition to the NOA, the MDA placed paid legal notices in the Sacramento Bee (October 13, 2004 and October 16, 2004) and the Lompoc Record (October 13, 2004, October 14, 2004, and October 15, 2004). The BMDS PEIS web site also listed the times and locations of the public hearings.
Public Involvement	PHW0005-1	I am here on behalf of Sacramento Area Peace Action and our 4,000 supporters, both to comment on the PEIS, and to register a complaint with the manner in which this hearing was scheduled. There has been no widespread publicity in California that we are aware of regarding this hearing today in Sacramento. Is this some sort of stealth strategy to limit public input on this crucial issue? We question if a Draft PEIS can be legitimate if there is not adequate notice of the document and the hearings on this matter.	See previous response.
Public Involvement	PHO0046-2	Again, I think that these processes have typically discouraged public participation. Whether that's by design or just by negligence, I think that it needs to be noted that there haven't been adequate efforts to reach out to the public, to provide accessible venues and opportunities for people to testify.	In addition to the public hearings, the MDA developed a publicly accessible web site to provide information on the BMDS PEIS and request comments on the Draft PEIS. The MDA also established toll-free phone and fax lines, an e-mail address, and a U.S. postal service mailbox for submittal of comments and questions. Both the NOA of the Draft PEIS published in the FR and the BMDS PEIS web site provided instructions on submitting comments on the Draft PEIS.
Public Involvement	PHO0046-3	As I said earlier, as Terri Kekoolani said earlier, Hawaiian translation is essential, the native Hawaiian language, Olelo Hawaii, is one of the official languages of Hawaii, and that should be honored in these proceedings so that when Hawaiian words are expressed, they are captured	Attendees at the public hearing were given the opportunity to provide testimony in both Hawaiian and Marshallese languages. A court reporter recorded the proceedings and the audiotapes were later translated by certified translators. Transcripts from the hearings,

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		correctly and not noted as inaudible or unintelligible, which is often the case.	including the translated oral Marshallese and Hawaiian testimony, can be found in Appendix B.
Public Involvement	PHO0046-4	Second, the question of native Hawaiian culture being an oral tradition, it's very important that you provide opportunities for people to give live testimony where they can look you in the eye and express what they are feeling. When you say that often written testimony or e-mail testimony is adequate, you effectively discriminate against a whole group of people who are actually one of the groups that are disadvantaged and should be considered as part of the environmental justice analysis of your Environmental Impact Statement.	Approximately 8,500 comment documents were received on the Draft BMDS PEIS. Comments received via any of the methods identified carry exactly the same weight as comments provided to MDA orally during a public hearing.
Public Involvement	PHO0048-1	First, notice and public hearing were inadequate. Although it's true that NEPA doesn't require them to hold a public hearing, it does require that the notice be on par with the extent of the program. And as they've clearly shown on their beautiful screen, this is supposed to have worldwide effect, yet we're only having, what, thirty of us here? I mean, this is affecting not only all of Hawaii, but all of the pacific and all of the entire world, and where was this hearing noticed in? Was it noticed on TV? Where did you guys hear about it? Word of mouth. I don't think notice was sufficient in this case, especially given the extent of this project.	The PEIS is a programmatic level NEPA analysis that considers implementation alternatives for an integrated BMDS and as such does not address specific sites or specific activities at those sites, but rather considers the program as a whole to allow tiering of subsequent site-specific analyses from the PEIS, as appropriate. The MDA planned to hold its public hearings on the Draft PEIS in the same locations at which scoping meetings were held. Notification of the public hearings for the Draft BMDS PEIS was released in theNOA, which was published in the FR on September 17, 2004. MDA also placed paid legal notices in various newspapers, which are outlined in Appendix B.
Public Involvement	PHO0051-1	First of all, the first comment I want to make has to do with the process. It is very deeply flawed. If what you are planning goes through, then obviously all islands will be impacted. Therefore, to properly inform our people here in Hawaii, you must have all people from all islands being	The PEIS is a programmatic level NEPA analysis that considers implementation alternatives for an integrated BMDS and as such does not address specific sites or specific activities at those sites, but rather considers the program as a whole to allow tiering of subsequent site-specific analyses from the PEIS, as appropriate.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		fully informed, which would include the Big Island, Maui, Molokai, Lanai, Ni'ihau, and Kauai.	
Public Involvement	PHO0051-3	Also, just alone coming on Oahu, you're having a meeting in a very small hotel, in a small room. The capacity of the room is sixty people.	Based on input provided during scoping, the public hearing location in Honolulu, Hawaii was determined based on availability of parking. The size of the conference room was adequate for the number of attendees.
Public Involvement	PHO0051-4	And so what it looks like is that you're kind of hiding, and that you are not looking for a way to actually get a lot of people to participate in this process.	Approximately 8,500 comment documents were received on the Draft BMDS PEIS during public hearings and via e-mail, mail, phone, and fax throughout the public comment period. The MDA has considered each comment in the development of the Final PEIS.
Public Involvement	PHO0058-2	Finally, I would like also to present the testimony of 1,330 people who signed petitions opposing the expansion of military in Hawaii. And these people need to be included in the process. They need to be notified of the Record of Decision.	MDA appreciates the participation of the petitioners in the BMDS PEIS public comment process. All public comments were taken into account during the preparation of the Final BMDS PEIS and have been included in the administrative record. MDA will place an advertisement in the Honolulu Adviser and the Honolulu Star Bulletin as a Notice of Availability of the Final BMDS PEIS. A copy of the Final PEIS will be posted on the MDA web site: http://www.mda.mil/mdalink/html/mdalink.html. The Record of Decision will be available in the Federal Register no less than 30 days after the publication of the final document.
Site Specific	E0319-3	5. A listing of the Test Sites where target missiles will be launched to be intercepted by the Airborne Laser	Site-specific environmental analyses have been prepared for past MDA activities and will continue to be prepared as appropriate. These future site-specific analyses will tier from this PEIS. Several NEPA documents have been prepared to address proposed activities at the PMRF and consider potential impacts to cultural

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
			resources. These analyses include but are not limited to the EIS for the Strategic Target System, the Kauai Test Facility EA, the PMRF Enhanced Capability EIS, and the North Pacific Targets Program EA. Analyses for site-specific MDA actions taking place OCONUS would consider environmental impacts per EO 12114, Environmental Effects Abroad of Major Federal Actions, as well as DoD established Final Governing Standards for environmental compliance requirements for military activities overseas, which take into account the DoD's Overseas Baseline Guidance Document and applicable host-national or international environmental standards. Testing is carried out at appropriate test facilities, ranges and other government installations as determined after considering and evaluating environmental, safety, logistical, cost, schedule, and other technical feasibility issues as well as the test objectives. NEPA analyses of environmental impacts of specific subsequent test activities at sites would be tiered from the PEIS, as appropriate.
Site Specific	E0347-2	The Missile Defense Agency's Programmatic Environmental Impact Statement must acknowledge and include Environmental Impact Assessments for each and every US Missile Defence Base proposed to be sited on land in nations with British or British Commonwealth status, and also in other independent sovereign nations (e.g. Denmark's sovereignty over Thule).	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
Site Specific	E0387-1	We are disappointed however that the PEIS will only be undertaken for component bases in the United States and not for overseas bases integral to the system, such as Fylingdales. From our experience of talking to the residents close to the Fylingdales base, we are aware of a constant concern about its role in the "Son of Star Wars" program and a desire for more information and accountability from the developers of the system. The local population in the vicinity of this base has both environmental and security concerns regarding the base's role in Missile Defence that ought to be addressed in such a study. The same also applies for Menwith Hill - considered highly likely to play a key role as the Ground Based Relay Station for the Space Based Infra Red System - and these concerns will grow if the United States is granted permission to use the base for Missile Defence by the UK Government.	See previous response.
Site Specific	E0387-2	Furthermore, there exists a large, informed section of society, not necessarily within the vicinity of these particular bases, that is also legitimately concerned as to the potential impact on UK and global security as a result of the Missile Defence system. Despite the UK's involvement in the system this group too will not be represented by this study.	See previous response.
Site Specific	E0387-3	Despite the fact that the PEIS has currently declared that it will only consider component bases of Missile Defence based in the US, we will refer to the Yorkshire bases both in the hope that the PEIS will recognise the importance of expanding its remit to cover Missile Defence bases beyond the USA mainland, and partly because the	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		concerns that surround these bases can be equally applied to their US-based equivalents.	
Site Specific	F0004-1	1 Take this whole program out to the Aleutian Islands! That's were all this experimental D.O.D. stuff should have been put all along. This is all testing. The Kodiak people + flora + fauna should not be used this way. Take it West to Adak + Shemya where the D.O.D. has been set-up doing "there thing" since prior to WWII! Just by the Adak base back from the Native Corp. (It should have never been sold to them in the first place!) You have all your infrastructure already there too. You can do lots of experiments out there with lil effects on US citizens if done correctly.	See previous response.
Site Specific	F0004-6	5 You do not need to let the AADC gobble-up any-more land to use for this program. The additional 14,000 Acres is our only area on the Kodiak Road System we (the citizens) have that is open for public use. All the other land is private (Native Corps and 3/4 of the Island is in the Kodiak Island National Wildlife Refuge. Please DO NOT take control of these lands. No more land to USE. (the 3,800 Acres you use now is enough. No more ok.	See previous response.
Site Specific	PHO0051-9	That is already taking place right now on Kauai. You folks have missile launching pads over there on top of an ancient burial ground.	See previous response.
Site Specific	PHO0051-10	And also there are now people being denied access to beach fronts that have traditionally always been accessible by our people.	See previous response.
Site Specific	E0319-5	7. If missiles are being proposed for launch from Fort Greeley, Alaska	MDA conducted a preliminary study looking at the technical feasibility of test launching GBIs from Fort Greely in April 2004, but has not yet decided on a proposed test action, thus a NEPA process has not yet

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
			begun. Specifically, MDA performed a feasibility study of possible flight trajectories from Fort Greely considering the operationally realistic engagements, target launch sites, and safety. MDA then conducted a range safety assessment of the most feasible GBI trajectories. This study identified three potential flight corridors that if subjected to a more refined and rigorous flight safety analysis could pass range safety standards. Results of this additional study could be used as inputs to MDA's subsequent environmental studies. MDA also is building a Geographic Information System (GIS) to facilitate our analysis by mapping Alaska region data. This GIS analysis will assist MDA planners in developing potential flight test that would be subjected to safety and environmental analysis if MDA considers continuing planning towards a decision for test launches from Fort Greely.
Site Specific	E0319-7	NOTE: Regarding Fort Greeley, Alaska- is the MDA proposing to launch future 'interceptors' in a 'north trajectory' (or south trajectory), over Alaska native villages from that location? If so, the PEIS should list all safety drop-zones for falling booster stages and proposed trajectory launches, along with what safety steps will be taken to protect natives in their villages. Also include potential cumulative environmental damage to the tundra from falling boosters.	See previous response.
Site Specific	E0319-6	8. Information on proposed BMDS launches from Poker Flats Rocket Range, Alaska	At the time this PEIS went to print, there were no planned BMDS launches from Poker Flats Rocket Range, Alaska in the near future. However, should BMDS activities be required at Poker Flats, site-specific

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
			environmental analyses would be prepared. These future site-specific analyses would tier from this PEIS.
Site Specific	E0319-9	There has not been an environmental assessment since 2001 (that the public is aware of) regarding the reliability of the STARS missile to justify the continuation of this launch vehicle. The November 2001 STARS launch from the Kodiak Launch Complex resulted in failure (the missile 'exploded' 7 miles off Kodiak's shores after launch and the MDA attempted to cover up the accident). No public reports were released on this launch failure. The STARS missile has not been improved since the early 1990's launch failures from Kwajalein Atoll. This program should be discontinued due to its unreliability, safety hazards, and pollution to air and water.	Testing is carried out at appropriate test facilities, ranges and other government installations as determined after considering and evaluating environmental, safety, logistical, cost, schedule, and other technical feasibility issues as well as the test objectives. This PEIS provides a roadmap for site-specific analyses of the environmental impacts of BMDS activities. There are inherent risks with any missile testing activity; however, protection of life and property, on and off range, is the prime concern of Range/Mission Safety personnel. The RCC Common Risk Criteria for National Test Ranges (RCC 321-02) sets the requirements for minimally acceptable risk criteria to occupational and non-occupational personnel, test facilities and nonmilitary assets during range testing operations. Under RCC 321-02, individuals of the general public shall not be exposed to a probability of fatality greater than 1 in 10 million for any single mission and 1 in 1 million on an annual basis. Range Safety personnel also apply launch window criteria that consider various weather and climatic conditions, as appropriate.
Site Specific	E0319-12	The Alaska Aerospace Development Corporation (a.k.a. Missile Defense Agency) has requested jurisdiction over an additional 14,000 acres of Narrow Cape 'public' land on Kodiak Island, Alaska, over and above the 3,800 acres it already has jurisdiction over. The PEIS should include what type of BMDS testing/activity is being proposed for the Kodiak Launch Complex that would require almost 18,000 acres of public land. Since the request was made	As described in the previous response, protection of life and property, on and off range, is the prime concern of Range/Mission Safety personnel. For this reason, temporary closures of public lands and roads during launch activities may be necessary for safety and security reasons. The Alaska Department of Natural Resources Division of Mining, Land and Water authorized periodic, temporary closures of Narrow Cape in April 2005 after a

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		after the release of the July 2003 Ground-Based Midcourse Defense (GMD)-Extended Test Range FEIS, the reason for the request should have been included in the BMDS Draft PEIS.	thorough public review. The Alaska Aerospace Development Corporation made the request for this ability to close public lands as an additional safety buffer for its own operational reasons; MDA did not make this request. However, if similar issues arise in the future as a result of MDA activities at KLC they will be considered in site-specific documentation tiered as appropriate from this PEIS. The MDA understands the sensitivity of closing public lands even for a short period and every effort would be made to ensure that such closures do not create undue burden on local residents.
Site Specific	E0319-15	Kodiak Launch Complex and Kodiak Island issues that should have been discussed in detail in the BMDS Draft PEIS are: 1. Island-wide areas that will be evacuated for BMDS activity 2. Health and Safety procedures for exposure to launch debris-especially for potentially affected populated native villages such as Old Harbor and Akhiok 3. Doing a site-specific operating document (referred to in Volume 2, page H-13) 4. The potential electromagnetic explosive devices, ionizing and non-ionizing radiation hazards 5. Hazards and trajectories of interceptors 6. Special Use Airspace and Domestic Warning Areas	As stated throughout the PEIS, this document is intended to serve as a tiering document from which future site-specific NEPA analyses will be tiered. These analyses can consider the potential impacts of specific safety plans and trajectories of interceptors for individual tests. Section 4.1.1.2 of this document provides an overview of Health and Safety Procedures, special use airspace and warning areas, as well as potential impacts of the use of missile launches.
Site Specific	E0319-16	'Generally, sites where activities for the proposed BMDS activities may occur are located far from towns and population centers and are surrounded by open space' (PEIS Volume 2, page H-14). This does not apply to the Kodiak Launch Complex. The test site is located only a few miles from a populated and State of Alaska	Existing site-specific environmental analyses for activities at Kodiak Launch Complex (KLC) include the GMD ETR EIS, the EA for USAF Atmospheric Interceptor Technology Program, the Final EA for USAF Quick Reaction Launch Vehicle Program, the North Pacific Targets Program EA and the FAA EA for the

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		recreational area. Cabins, homes, bed and breakfast accommodations are located near the Pasagshak River, which is highly frequented by fishermen and tourist during summer months, and hunters and recreational users during the winter months. Cabins and homes are in year-around use in the winter unless the roads are impassable due to snow coverage. However, this is not expected to be a problem since the road to the launch site has to be accessible to workers (especially in preparation for an upcoming launch). The PEIS needs to discuss proposed BMDS activity on Kodiak Island in detail.	KLC, Kodiak Island. Further, the PEIS is intended to provide a programmatic analysis of the potential impacts associated with the development, testing, deployment, and decommissioning of the BMDS. The PEIS is not a site or component specific environmental analysis, and therefore does not provide specific information about particular components or their operation at various facilities. As specific test requirements become known NEPA analyses will be prepared, appropriately tiered from this PEIS.
Site Specific	E0319-11	The PEIS should include all proposed laser test sites including the BOA, and, what experiments will take place at each site, and the total amount of acreage needed as a safety zone. For example, will the Airborne Laser 'test fire' at targets or interceptors launched from Vandenberg AFB, Kwajalein, Kodiak Island, Fort Greeley, or Poker Flats Rocket Range, Alaska?	The MDA process for selecting BMDS test locations is based upon criteria developed by the MDA system engineering team (e.g., Systems Engineering and Force Structure Integration and Deployment, and the Elements) to include engagement sequence groups, system test objectives, and overall system design. The team develops a System Event Test Program based on simulation models, pre-test analysis, post-test evaluation (verification of objectives) and produces a requirements matrix for each Test Bed Block. The test requirements are tailored to the availability and capability of test assets and the configuration constraints imposed by the test ranges. From the Test Bed Block Matrix, test objectives and range requirements are derived for each BMDS test event which undergoes a formal coordination process. SE delivers the final test objectives and range requirements to the Combined Test Force (CTF) for execution.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
			The CTF, through the PRST, assists the program element/mission test director in further defining the required range support. The PRST consolidates the personnel resources, range assets and instrumentation and capabilities necessary to efficiently conduct end-to-end BMDS-level flight testing in the Pacific. The PRST then recommends the test range(s) best suited to achieve the test objectives.
Site Specific	E0347-1	Crucial to the US Missile Defence programme is the stationing of 'forward surveillance' facilities located outside the continental USA at US Bases on land it is permitted to use by host nations. The political structure of such nations may be very different from the Federal Government (e.g. Britain is a Monarchy: q.v. 'Crown Defence Land'). The legislation regulating environmental controls in other countries may be very different, possibly more stringent, than that which obtains within the USA. It is incumbent on the Missile Defense Agency to apprise itself of, and publish an undertaking to comply with, mandatory statutory requirements wherever on the Earth it proposes to site Missile Defence facilities.	The PEIS analyzes the programmatic development, testing, deployment, and planning for decommissioning activities for an integrated BMDS. Site-specific actions would be analyzed in subsequent NEPA analyses that would tier from this document, as appropriate. Analyses for site-specific MDA actions taking place OCONUS would consider environmental impacts per EO 12114, Environmental Effects Abroad of Major Federal Actions, as well as DoD established Final Governing Standards for environmental compliance requirements for military activities overseas, which take into account the DoD's Overseas Baseline Guidance Document and applicable host-national or international environmental standards.
Site Specific	E0427-29, E0439-29	26) Which government and university institutions in the State of California will be conducting research to support the BMDS research and development and, if so, please describe their roles, responsibilities and the specific projects they will be involved in? Specifically, will Lawrence Livermore National Laboratory, Lawrence Berkeley National Laboratory, Sandia National Laboratory - Livermore, or the University of California at Berkeley, Davis or Los Angeles be conducting research or development on the BMD for the MDA or DoD and, if so,	The PEIS analyzes the programmatic development, testing, deployment, and planning for decommissioning activities for an integrated BMDS. Specific facilities that would be used to carry out subsequent activities comprising the life cycle phase testing would be analyzed in site-specific documents. These subsequent NEPA analyses could tier from this PEIS as appropriate.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		what specifically will each that is involved be doing? This is important for people in these areas to know in order to understand, consider and evaluate the possible environmental, health, and safety impacts on their communities.	
Site Specific	F0004-2	1 The planned rocket trajectories that go over Kodiak Island + skirt very close to the East Side are just totally unacceptable! We have to many Native Villages + Bush people who live there year round. NOT to mention all the wildlife (Bears! Rare Kodiak Brown Bears!) that live there too. It is just to damn dangerous to launch over the Island. Period! That can NOT proceed	As stated in Section 4.1.1.2, Health and Safety, launch activities would be conducted when trajectory modeling verifies that launch-related debris would be contained within predetermined areas, all of which would be located away from populated areas.
Tiered Analyses	E0429-11	Waiting for site-specific analysis in the indefinite future condemns project sites to acid precipitation. There is no hint of how such an environmental impact might be mitigated. The proper analysis, at this stage, is to consider how the missile defense program might develop and test alternate launch technologies that are not so environmentally destructive. That is, the best solution is not likely be site-specific, so the PEIS itself should evaluate this impact.	The BMDS PEIS considers the use of a wide variety of propellants including three types of boosters, pre-fueled liquid propellant, non-pre-fueled liquid propellant, and solid propellant boosters. The environmental impacts of each of these three types of boosters have been considered and are presented in Section 4.1.1.2 of the PEIS. However, it is appropriate to analyze the potential impacts of launching specific test vehicles from particular sites in subsequent tiered site-specific NEPA documentation, and the MDA will consider the environmental impacts of conducting test launches in such documentation, as appropriate.
Tiered Analyses	PHW0004-11	Waiting for site-specific analysis in the indefinite future condemns project sites to acid precipitation. There is no hint of how such an environmental impact might be mitigated. The proper analysis, at this stage, is to consider how the missile defense program might develop and test alternate launch technologies that are not so environmentally destructive. That is, the best solution is	See previous response.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		not likely be site-specific, so the PEIS itself should evaluate this impact.	
Tiered Analyses	E0429-21, PHW0004-21	Overall, the PEIS puts off consideration of the challenge of waste decommissioning, stating, "The environmental impacts associated with decommissioning of specific components would be more appropriately addressed in subsequent tiered environmental analysis..." (ES-20) This is unacceptable. It can only lead to "end-of-pipe" solutions, even though the Defense Department's own environmental managers and specialists agree that environmental protection should be integrated into acquisition and even research and development. The 2001 Munitions Action Plan, for example, states: The current emphasis in acquisition of munitions of all types (air delivered, ground launched, and sea launched) is on improving accuracy, reliability and increasing distances between firing or launch points and targets (i.e., so-called standoff ranges). At the same time, the public and regulatory bodies are raising concerns about safety and the environmental effects of munitions. The DoD is also becoming more aware of the cleanup and environmental compliance costs associated with training, testing, demilitarization, and unexploded ordnance (UXO) responses. These developments have highlighted the need for DoD to address environmental and safety concerns, and costs, throughout the munitions life cycle. This cycle starts from the technology development and design phase to the end-	Section 4.0 of the PEIS provides a roadmap for considering impacts of decommissioning for each component. However, as stated in the BMDS PEIS, the environmental impacts of demilitarization and disposal are more appropriately considered in subsequent tiered analyses. The MDA is actively engaged in considering and evaluating ways to minimize environmental impacts in the design, test, and development of the BMDS. Specifically Appendix M of the PEIS considers the demilitarization, reclamation, declassification and disposal of solid rocket propellant.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		state of use, UXO and munitions constituents cleanup on ranges, or demilitarization. Addressing these concerns early in the life cycle (during requirements definition and acquisition) has the potential to significantly reduce costs and avoid problems later. [Footnote 16: Munitions Action Plan: Maintaining Readiness through Environmental Stewardship and Enhancement of Explosives Safety in the Life Cycle Management of Munitions, U.S. Department of Defense Operational and Environmental Executive Steering Committee for Munitions (OEESCM), November 2001, page 16.] That is, if the review of the potential environmental impacts of a system such as the BMDS finds the potential for significant negative environmental impacts, then those designing the system, selecting programmatic alternatives, and managing its testing and deployment should continuously evaluate ways to minimize those impacts, from the beginning.	
Tiered Analyses	F0005-13	II. The draft PEIS fails to analyze what would be required to develop a space-based test bed; dismissing the suggestion as "too speculative." But that is precisely what the PEIS is supposed to - to examine the environmental effects of the proposed action. Accordingly, the draft PEIS is flawed for not looking at the effect of space-based interceptors in lieu of terrestrial-based ones - it simply suggests that future studies may be required. This dismissive attitude toward NEPA would not survive judicial scrutiny.	Alternative 2 includes the use of weapons from land-, sea-, air-, and space-based platforms. The use of space-based weapons is analyzed in Section 4.2; specifically, Section 4.2.1 analyzes the use of interceptors, including the impacts from launch/flight and debris, from a space-based platform. However, as stated in the PEIS the analysis of a space-based test bed is not mature enough for NEPA analysis at this time.
Tiered Analyses	F0005-19	(5) The PEIS should review the testing, of future laser weapons systems and specify testing plans for other high-	Appendix F of this PEIS describes various advanced systems that are currently under review by the MDA.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		power laser weapons and other energy-directed weapons. It does not.	The PEIS is intended to provide a programmatic analysis of proposed BMDS activities. The PEIS considers the potential impacts of the BMDS as currently envisioned. Specific testing programs of undeveloped directed energy weapons are not yet known and cannot be analyzed in environmental analyses. As the technology for these programs matures and the MDA develops testing scheduled for such advanced directed energy weapon systems, appropriate environmental analyses will be conducted.
Tiered Analyses	M0268-1	The MDA knows at present from where ground based interceptors will be launched, and site specific studies should be absolutely required in the PEIS.	The MDA analyzed the impacts of constructing and operation of GBI sites at Vandenberg AFB in the GMD Vandenberg Air Force Base IDOC EA and at Fort Greely in the GMD Validation of Operational Concept (VOC) EA. The PEIS is a programmatic analysis and is intended to serve as a tiering document for future site-specific analyses. Future actions involving the construction and operation of interceptors from specific locations would be addressed in subsequent site-specific analyses tiered from the PEIS as appropriate.
Tiered Analyses	M7903-1	My perspective is that of a long time resident of Interior Alaska familiar with the Fort Greely area where one of the missile sites is currently under development. Unfortunately, the selection of this site was not adequately evaluated in relation to the environmental sensitivity of this area. Inadequate consideration was given to the fact that the site sits on top of the flowage of a unique aquifer that flows through the glacial outwash gravels from the Alaska Range mountains to the south, under Fort Greely, and emerges as springs that feed the Delta Clearwater River and lake system. Because of the upwelling water of	The MDA analyzed the activities at Fort Greely in the GMD VOC EA. The PEIS is a programmatic level analysis that addresses the implementation alternatives for an integrated BMDS and as such does not consider specific sites or activities at specific sites. Any future site-specific activities occurring at Fort Greely or other sites in Alaska would consider potential environmental impacts from spills of contaminants or fuels in subsequent tiered analyses, as appropriate.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
		the Delta Clearwater system it is one of the most productive salmon spawning complex and young salmon rearing area on the entire Yukon-Tanana River system. Any significant leakage or spill of contaminants, inclusive of fuels, and radioactivity contaminated water or other materials would have the potential for devastation to both the commercial and subsistence fisheries of the Yukon River and [sic] Bering Sea through direct affects on the fish, as well as the thousands of people dependent upon the fish for their nutrition, health, and economy. Additional studies need to be done to assess this potential threat to the Alaska environment and its people and to assess the possible need for mitigative planning, spill contingency development, and testing for background leakage levels from the post World War II use of Fort Greely as a biological and chemical warfare testing site.	
Tiered Analyses	PHO0038-3	I'm really concerned about the aborted launch that happened at Kodiak, I believe it was two years ago November and Kodiak itself is a significant enough population center to be concerned about it, but if we start launching missiles from Fort Greeley, which is near Fairbanks, near Delta Junction, that have to be aborted, there's significant population centers there, not to mention the TransAlaska Pipeline.	The PEIS is a programmatic level analysis that addresses the implementation alternatives for an integrated BMDS and as such does not consider specific sites or activities at specific sites, such as the KLC or Fort Greely. Prior activities have been analyzed in NEPA analyses as cited in the PEIS. Future activities would be analyzed in subsequent tiered analyses. In addition, as stated in Section 4.1.1.2, launch hazard areas would be determined before a test launch is conducted from a site. Potential impact zones for launch debris would be delineated based on detailed launch planning and trajectory modeling. Flights would be conducted when trajectory modeling verifies that launch-related debris would be contained within predetermined areas, all of which would be located away from populated areas.

Exhibit K-5. Response to Comments – Proposed Action and Alternatives

Issue Topic	Comment Number	Excerpt Text	Response
Tiered Analyses	PHO0038-4	It's unclear from the PEIS, and I'm looking at Section 2.242, whether or not the Kodiak Launch Complex is going to be a launch test and defensive operational asset or if it's going to launch things into orbit, or if it's just a test center. So it's confusing for the folks on Kodiak and for us here in Alaska what is actually going to happen out on the island. It talks about a safety zone that would be established around the laser during activation. This is also in the PEIS, Pages 250 to 254. There's a lot of small plane traffic and a lot of small boat traffic around Kodiak and other places in Alaska. It has us concerned about the laser and its effects on our economy and on the human resources, or humans, I should say, of Alaska.	The PEIS is a programmatic environmental analysis. The PEIS does not consider the testing or operation of specific components at specific locations. The KLC is currently licensed by the FAA to conduct up to nine launches of vehicles weighing less than 500,000 pounds total with SRM primary stages with less than 369,000 pounds of Class I, Division 3 explosives. If additional launches in support if MDA testing were proposed, these activities could be analyzed in subsequent analysis tiered from the PEIS. In addition, the impacts to plane and boat traffic in Kodiak from the establishment of a safety zone for potential future laser activities would be analyzed in additional NEPA documentation, as necessary.
Tiered Analyses	PHW0002-3	This draft PEIS also does not look at what would be required to develop a space-based test bed, dismissing the concept as being "too speculative to be analyzed in this PEIS." (p. 2-29) It does not say when such a concept would be analyzed. Finally, this document admits, "If Alternative 2 were selected, additional environmental analysis could be needed as the technologies intended to be used became more defined and robust." (p. 4-116) But again, that is what this document is supposed to do: examine the environmental effects of the proposed action. By sweeping it under the nebulous responsibility of future studies, it relieves the MDA of liability of negative consequences stemming from SBIs.	The PEIS analyzes the use of space-based weapons as discussed in Section 4.2. Specially, Section 4.2.1 analyzes the use of interceptors, including the impacts from launch/flight and debris, from a space-based platform. However, as stated in the PEIS the analysis of a space-based test bed is not mature enough for NEPA analysis at this time.

K.5 Federal Agency Comment Documents

This section addresses comment documents submitted by Federal Agencies. All comment documents submitted by Federal Agencies are reproduced in Section K.5.1. Responses to specific comments submitted by Federal Agencies are provided in Section K.5.2. Section K.5.2 includes the comment document number and sequential number of the comment, the resource area addressed by the comment, the text of the comment, and MDA's response. Where appropriate, revisions to the Final BMDS PEIS were made in response to these comments.

K.5.1 Reproductions of Federal Agency Comment Documents

DC_E0403

Johnson, Kathryn

From:	Ramona Schreiber [Ramona.Schreiber@noaa.gov]
Sent:	Wednesday, November 17, 2004 4:09 PM
To:	mda.bmds.peis
Subject:	NOAA Comments on Draft BMDS PEIS

Ramona.Schreiber.vcf (441 B)

Dear Project Manager:

The National Oceanic and Atmospheric Administration is composing its comments on the Draft BMDS PEIS. As a thorough review under the Magnuson Stevens Act Essential Fish Habitat requirements, Endangered Species Act, and Marine Mammal Protection Act is involved, our comments may be delayed. We anticipate providing them within the week. Please accept them in that format as we are a Federal partner of yours.

Thank you in advance,
Ramona Schreiber

DC_F0003

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF ENFORCEMENT AND COMPLIANCE ASSURANCE

November 17, 2004

Missile Defense Agency
Ballistic Missile Defense System PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Mr. Lehner:

In accordance with our responsibilities under Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the Environmental Protection Agency (EPA) has reviewed the Missile Defense Agency's (MDA) Ballistic Missile Defense System (BMDS) Draft Programmatic Environmental Impact Statement (DPEIS) (CEQ # 040438).

The DPEIS identifies, evaluates and documents, at the programmatic level, the potential environmental impacts of activities associated with the development, testing, deployment, and planning for the eventual decommissioning of the BMDS. It considers the current technology components, support assets, and programs that make up the proposed BMDS as well as the development and application of new technologies.

EPA commends the efforts that MDA has commenced in producing such a comprehensive and well organized document. We also appreciate your efforts in utilizing the extensive environmental analysis that is available for many of the existing components of the proposed BMDS. Based on our review of the DPEIS, we have rated the document as LO - Lack of Objections (see attached "Summary of EPA Rating System"). Although EPA has no objections to the proposed action, there are a few issues that should be clarified.

DC_F0003

1) General Comments:

a. To assess the impacts of implementing the proposed BMDS, the DPEIS characterized the existing condition of the affected environment in the locations where various BMDS implementation activities are proposed to occur. MDA has determined that activities associated with the proposed BMDS might occur in locations around the world. Therefore, the affected environment has been considered in terms of global biomes, broad ocean areas, and the atmosphere. This has resulted in the DPEIS being very conceptual and general in nature. EPA understands that once potential BMDS locations are determined, more detailed site-specific documents will be prepared. Through the discussions on the "block approach" or the "block development process", the DPEIS has given clear indications of when follow-on NEPA analysis will occur. We agree with this approach. However, while the documents give representative examples of past, current, or proposed locations where proposed activities may occur within each biome, EPA recommends that the EIS discuss the criteria that MDA will use in making future decisions for site-specific locations.

b. The resource areas considered in this analysis are those resources that MDA believes can potentially be affected by implementing the proposed BMDS. EPA agrees that some resource areas are site-specific or local in nature and, therefore, cannot be effectively analyzed in this type of programmatic document and that the potential impacts on these resources are more appropriately discussed in subsequent site-specific documentation tiered from this PEIS. However, EPA recommends that the final document discuss the existence of multiple species habitat conservation planning efforts that are proximate to DoD lands and the potential impacts of debris on marine and aquatic ecosystems.

c. As suggested by CEQ regulations, MDA has taken advantage of the extensive environmental analyses that already exist for many of the existing components of the proposed BMDS by incorporating these materials into the DPEIS by reference. However, some of these documents are greater than 10 years old. The PEIS should confirm the validity of the information in these documents.

2) Perchlorate Comment: Because there have been differing interpretations of the science associated with the impact on human health from low level exposure to perchlorate and in the interest of resolving scientific questions, EPA, the Department of Defense, the Department of Energy, and the National Aeronautics and Space Administration - members of a broader Interagency Working Group on Perchlorate led by the Office of Science and Technology Policy - have referred scientific issues and EPA's 2002 Draft Health Assessment on Perchlorate to the National Academy of Science (NAS) for review. NAS is currently conducting a study to determine the best science and model to use for determining the health impacts and standards for perchlorate. A report on this study is expected to be completed by the end of 2004. EPA recommends that the results of the report be incorporated into the FPEIS.

DC_F0003

We appreciate the opportunity to review this DPEIS. We also look forward to reviewing the FPEIS related to this project. The staff contact for the review is Marthea Rountree and she can be reached at (202) 564-7141.

Sincerely,

Anne Norton Miller
Director
Office of Federal Activities

Enclosure: Summary of Rating Definitions

DC_F0003

SUMMARY OF EPA RATING SYSTEM

Rating the Environmental Impact of the Action

- **LO (Lack of Objections)** The review has not identified any potential environmental impacts requiring substantive changes to the preferred alternative. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposed action.
- **EC (Environmental Concerns)** The review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact.
- **EO (Environmental Objections)** The review has identified significant environmental impacts that should be avoided in order to adequately protect the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). The basis for environmental objections can include situations:
  1. *Where an action might violate or be inconsistent with achievement or maintenance of a national environmental standard;*
  2. *Where the Federal agency violates its own substantive environmental requirements that relate to EPA's areas of jurisdiction or expertise;*
  3. *Where there is a violation of an EPA policy declaration;*
  4. *Where there are no applicable standards or where applicable standards will not be violated but there is potential for significant environmental degradation that could be corrected by project modification or other feasible alternatives; or*
  5. *Where proceeding with the proposed action would set a precedent for future actions that collectively could result in significant environmental impacts.*
- **EU (Environmentally Unsatisfactory)** The review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposed action must not proceed as proposed. The basis for an environmentally unsatisfactory determination consists of identification of environmentally objectionable impacts as defined above and one or more of the following conditions:
  1. *The potential violation of or inconsistency with a national environmental standard is substantive and/or will occur on a long-term basis;*
  2. *There are no applicable standards but the severity, duration, or geographical scope of the impacts associated with the proposed action warrant special attention; or*
  3. *The potential environmental impacts resulting from the proposed action are of national importance because of the threat to national environmental resources or to environmental policies.*

Adequacy of the Impact Statement

- **Category 1 (Adequate)** The draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.
- **Category 2 (Insufficient Information)** The draft EIS does not contain sufficient information to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the proposal. The identified additional information, data, analyses, or discussion should be included in the final EIS.
- **Category 3 (Inadequate)** The draft EIS does not adequately assess the potentially significant environmental impacts of the proposal, or the reviewer has identified new, reasonably available, alternatives, that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. The identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. This rating indicates EPA's belief that the draft EIS does not meet the purposes of NEPA and/or the Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS.

DC_F0006

Program Planning & Integration
National Oceanic and Atmospheric Administration
U.S. Department of Commerce
13155 East West Highway
SSMC-3
Silver Spring, MD 20910

Assistant Administrator
Mary Glackin - 301-713-1632

Acting Director, Strategic Planning Office
James H. Butler – 301-713-3318
FAX: (301) 713-0585 or
(301) 713-3324

TO: MDA BMDS PEIS c/o ICF CONSULTING
FAX: 877-851-5451
FROM: RAMONA SCHREIBER
Tel.: 301-713-1622 x190
Number of Pages: (including cover sheet) 4

MESSAGE:

NOAA COMMENTS ON BMDS PEIS

UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
PROGRAM PLANNING AND INTEGRATION
Silver Spring, Maryland 20910

NOV 17 2004

MDA BMDS PEIS
C/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Project Leader:

Thank you for the opportunity to review the Missile Defense Agency Ballistic Missile Defense System Programmatic Environmental Impact Statement. On behalf of the National Oceanic and Atmospheric Administration (NOAA), provided here are comments developed by NOAA's National Marine Fisheries Service (NOAA Fisheries). NOAA's responsibilities include conservation of resources under the Magnuson-Stevens Act Essential Fish Habitat provisions, Endangered Species Act, and Marine Mammal Conservation Act.

Should you have questions and when you are ready to consult further with NOAA regarding requirements under the above statutes, please contact the NOAA Fisheries Southwest Regional Office at 562-980-4000.

Sincerely,

Ramona Schreiber
For Susan A. Kennedy
Acting NEPA Coordinator

Attachment

NOAA Fisheries Southwest Region's comments for inclusion in a NOAA response for the Missile Defense Agency's proposed Ballistic Missile Defense System

The Southwest Region, National Marine Fisheries Service (SWR) has reviewed the September 1, 2004, draft Programmatic Environmental Impact Statement (draft PEIS) for the Missile Defense Agency's proposed Ballistic Missile Defense System (BMDS). The purpose of the proposed action is for the Missile Defense Agency to incrementally develop and field a BMDS that layers defenses to intercept ballistic missiles of all ranges in all phases of flight. The BMDS is proposed to be a layered system of defensive weapons that have the potential to impact particular trust resources of NOAA during activities associated with the development, testing, deployment, and planning for decommissioning of the BMDS. This memo letter the SWR's comments on the proposed action under purview of the Essential Fish Habitat (EFH) provisions in the Magnuson-Stevens Fishery Conservation and Management Act (16 U.S. C. 1855, *et. seq.*), and protected resource provisions in the Marine Mammal Protection Act (16 U.S.C. 1361 *et. seq.*), and the Endangered Species Act (16 U.S.C. 1531 *et. seq.*).

<u>Essential Fish Habitat Conservation Recommendations</u>
Pursuant to 16 U.S.C. § 1855(b)(2) of the Magnuson-Stevens Act, Federal agencies are required to consult with the Secretary of Commerce (delegated to NOAA Fisheries) with respect to "any action authorized, funded, or undertaken, or proposed to be authorized, funded, or undertaken, by such agency that may adversely affect any essential fish habitat identified under this Act." In addition, the Magnuson-Stevens Act also requires the Secretary of Commerce recommend to the federal action agency particular measures that can be taken by such agency to conserve fish habitat (16 U.S.C. § 1855(b)(4)(A).

This consultation involves the EFH of anadromous and marine species managed by the Pacific Regional Fishery Management Councils within the Exclusive Economic Zone of the United States for the Pacific Salmon Fishery Management Plan (FMP), the Coastal Pelagic Species FMP, the Pacific Groundfish FMP, and the Highly Migratory Species FMP. These species utilize various habitats that include riverine, estuarine, and marine systems and these habitats may be adversely affected by some of the activities associated with the development, testing, deployment and planning for decommissioning of the BMDS. Primarily, the agency is concerned about potential release of hazardous materials (e.g., chemicals, propellants, propellant by-products, launch emissions) that potentially could be released directly and indirectly to the habitat types listed above during various phases of the BMDS. In order to minimize these potential impacts, the SWR advises the following:

1. NOAA Fisheries recommends that the Missile Defense Agency be responsible for handling and disposing of all hazardous materials or hazardous wastes in all phases of the proposed action in accordance with applicable Federal, state, and local laws, utilizing best management practices at all life cycle activities of the proposed action and through appropriate project planning and design measures including appropriate spill prevention, control and contingency plans (e.g., Oil Discharge Prevention and Contingency Plan, Storm Water Pollution Prevention Plan) for each site.

Endangered Species Act

Based on the information provided in the draft PEIS, NOAA Fisheries recommends that the Missile Defense Agency consult with the appropriate NOAA Fisheries Regional Office to determine if listed species under the Endangered Species Act (ESA) of 1973 as amended (16.U.S.C. 1531 *et. seq.*) may be affected by the proposed project. If it is determined that this project may affect a listed or proposed species, the Missile Defense Agency should request initiation of consultation with NOAA Fisheries pursuant to section 7 of the ESA.

Marine Mammal Protection Act

Whales, dolphins, seals, and sea lions are protected under the Marine Mammal Protection Act (MMPA). Under the MMPA, "take" of a small number of marine mammals is permitted by NOAA Fisheries under an Incidental Harassment Authorization (IHA) when the specified activity is incidental, but not intentional. "Take" is defined as harassing, hunting, capturing, or killing, or attempting to harass, hunt, capture, or kill any marine mammal. "Harassment" is defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal in the wild, or has the potential to disturb a marine mammal in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. Based on the information included in the draft PEIS, the proposed project may cause take of marine mammals under the jurisdiction of NOAA Fisheries. NOAA Fisheries recommends that the Missile Defense Agency consult with the appropriate NOAA Fisheries Regional Office when conducting the site-specific analyses for potential impacts to marine mammals.

United States Department of the Interior
OFFICE OF THE SECRETARY
Washington, DC 20240

TAKE PRIDE IN AMERICA

NOV 18 2004

ER 04/701

MDA BMDS PEIS
C/O ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Ladies/Gentlemen:

The United States Department of the Interior has reviewed the Department of the Defense, Missile Defense Agency's (MDA) draft programmatic environmental impact statement (DPEIS) for the Ballistic Missile Defense System (BMDS) and offers the following comments.

Air Quality and Pollution

The Department's National Park Service (NPS) commends the MDA for recognizing that review requirements under the National Environmental Policy Act (NEPA) are not the same as those involving conformity and its willingness to comply with both NEPA and the conformity regulations. The Department also commends the MDA for examining potential impacts on air quality, including its recognition of visibility as an important issue, and looks forward to future reports that include an examination of visibility impacts.

Section 3.1.3 Biological Resources

Pages 3-16 to 3-17: The portion titled "Definition and Description" emphasizes consideration of Federal and State listed species, or species proposed for listing. However, NEPA requires that other species that may be impacted by the proposed activity must also be evaluated throughout the DPEIS. See also page 4-42, subportion "Launch/Flight Activities," where impacts to only species of concern are addressed. We recommend that the DPEIS address all applicable species.

Pages 3-17 to 3-18: In the portion titled "Impact Assessment," we recommend the following text be inserted to address requirements in the referenced laws:

> If the proponent of the proposed activity determines that migratory bird species may be adversely impacted, then the proponent should confer with the Department's Fish and Wildlife Service's (FWS) Regional Migratory Bird Program to ensure

> compliance with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act, where applicable. Under the MBTA, the taking of migratory birds is not authorized without a permit. The project proponent should also confer with the Service to determine if conservation measures may be implemented to minimize or avoid take of migratory birds.

Page 3-19: In the subportion "Determination of Significance," we recommend that reference to the MBTA be incorporated. We also recommend that the final PEIS indicate that military readiness activities implemented in the future by the MDA should be in compliance with the rule currently being finalized by the Service, "Migratory Bird Permits: Take of Migratory Birds by DoD."

Section 3.1.9 Land Use

Page 3-31: In the portion titled "Impact assessment," we suggest referencing the Service National Wildlife Refuges.

Section 4.1.1.1 Weapons – Lasers

Page 4-26: In the portion titled "Biological Resources," under the subportion "Land and Sea Operating Environments," we recommend adding text that indicates that hydrochloric acid could have an effect on shorebirds and waterbirds (in addition to waterfowl, which are already referenced).

Page 4-27: In the last paragraph under the subportion referenced above, we recommend that the text specify the maximum noise level, if available, for which animals "generally return to normal activities within a short time following noise disturbance." Most wildlife has a limited tolerance to noise. We recommend specifying the threshold at which this tolerance level would generally be exceeded and when adverse effects may occur. See also page 4-43 where impacts to birds from noise disturbance are discussed in greater detail. These two sections should be in agreement with each other. The statement on page 4-27 is not in concurrence with the discussions on page 4-43, which indicate there may be more than minor disturbances.

Section 4.1.1.3 Sensors – Radars

Page 4-64 to 4-65: We believe the analysis of impacts on birds from radar in the "Biological Resources" portion is outdated and inadequate. The first paragraph of this portion does not address the potential effects of radar on very large flocks of migrating birds. Even if a bird is not "within the most intense area of the beam for any considerable length of time," there is insufficient evidence to support the statement that no significant adverse impacts to birds would occur. The 1993 report that is referenced to support this conclusion is outdated.

We recommend the analysis describe what constitutes a "relatively small" beam size. A beam going through a dense flock could have an adverse effect on birds, particularly for those species which are already significantly in decline. We recommend that this potential adverse effect be described.

We recommend that this section discuss the potential of using NEXRAD (Next Generation Weather Radar) to help evaluate when large flocks may be in the testing area. NEXRAD could provide valuable information regarding times when testing should not occur to reduce biological impacts. This technology is currently being used by the Air Force to reduce the potential for air strikes and by the Department of Defense to identify important stopover habitat in relation to Department of Defense installations.

We recommend that an avian physiologist, particularly one very knowledgeable of electromagnetic radiation, carefully review the effects of this proposed activity.

In reference to the Cobra Dane study, it should be noted in the DPEIS that arctic foxes, which are very efficient predators, are present on Shemya and other Aleutian Islands, and would quickly remove evidence of any bird kills. Lack of evidence of bird die-offs under these conditions does not provide solid evidence that they aren't occurring.

Bird collisions with radar equipment, particularly towers, can have significant impacts on birds. Estimated annual bird kills from collisions with communication towers (radio, television, cellular, and microwave) range from four- to five-million, both from direct collisions with the towers themselves and with guy wires. Tall radar towers, i.e., those above 199 feet MSL (mean sea level), are of particular concern. The greatest impact occurring from towers illuminated at night with solid or pulsating incandescent red lights. In addition, the potential for tower collisions significantly increases at night under cloudy or otherwise low visibility conditions.

Because of these impacts, the MDA should follow the FWS's "Interim Guidelines For Recommendations On Communications Tower Siting, Construction, Operation, and Decommissioning - 2000," for both existing and proposed radar towers. These guidelines should be referenced in the DPEIS as applying to radar equipment. They also should be applied to Re-Radiation Towers discussed in the second paragraph on page 4-77.

Section 4.1.1.5 Sensors - Laser Sensors

Page 4-73: Under the portion titled "Biological Resources," we have similar concerns for potential impacts on migratory birds from laser sensors as those stated above for radar equipment. This is particularly true for the use of land and sea-based lasers and in situations where large flocks may be present. Although the lasers may not directly hit birds or other wildlife on the ground, impacts to birds in the air could be significant. We recommend that these potential impacts be described.

Regarding the Nominal Ocular Hazard Distance, the DPEIS concludes that impacts to wildlife from a space-based laser sensor would be insignificant because it is unlikely that the laser would be directed towards the Earth's surface and, if it were, distortion from atmospheric conditions would reduce the radiance level. It further concludes that the Earth's surface would likely be beyond the Nominal Ocular Hazard Distance. This conclusion is not well supported. We recommend that the DPEIS identify how "likely" it is that the Earth's surface would <u>not</u> be beyond this specified distance.

Section 4.1.1.9 Support Assets - Infrastructure

Page 4-89 to 4-90: In reference to the first paragraph under "Biological Resources," we note that the construction of infrastructure, depending upon its extent, can significantly increase surface runoff. This can negatively impact surrounding habitats, particularly wetlands and other sensitive habitats. Impacts to fish, wildlife, and plants from pollutants could be more than temporary depending upon the pollutant and length of exposure. Depending upon the species in the project area, construction could have a larger area of disturbance than 50-feet, particularly for nesting bird species. We recommend that this section describe these possible impacts.

We recommend that the second paragraph indicate that site preparation and installation could negatively impact waterbirds utilizing the shore environment, particularly during breeding season.

In the third paragraph, we recommend that the description of behavioral responses to construction include nest abandonment and alteration of migration routes of larger mammals.

We recommend that the fifth paragraph list compliance with the Marine Mammal Protection Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act as required, where applicable. These regulatory references should also be inserted in the portion titled "Biological Resources" under Section 4.1.1.10 Support Assets - Test Assets.

Section 4.1.2.3 Biological Resources

Page 4-105: Under "Integrated Ground Tests," we believe that the conclusion of insignificant impacts is not sufficiently justified or supported. This section lacks information regarding the size and orientation of the operating radar sensors. It also does not describe the anticipated increased number of these operating radar sensors.

Section 4.4 Adverse Environmental Effects That Cannot Be Avoided

Page 4-133: As stated above, we believe that statements of no significant impact are not sufficiently justified or supported. This section indicates Best Management Practices would be implemented to mitigate adverse effects. However, the DPEIS does not provide sufficient information regarding what these measures might be or what would be recommended. In addition, the conclusion that "those [effects] that could not be avoided should not result in a significant impact to the environment" could be viewed as arbitrary since those effects are insufficiently described.

Appendix H Biome Descriptions

Page H-106: We suggest expanding the discussion of "environmentally sensitive habitat" for the savanna biome. Currently, the discussion consists only of the following two sentences: "National parks and reserves have been established to preserve and protect threatened vegetative

and wildlife species in the Savanna Biome. There are several National Wildlife Refuges along the Gulf Coast."

Technical Comments and Suggested Corrections:

Appendix G Applicable Legal Requirements

Page G-10:

- Under the heading United States, in the first line and after the phrase "The Endangered Species Act of 1973" add, "as amended."
- After the phrase "requires all Federal," delete "departments and" so the line reads "requires all Federal agencies to seek."
- In the second line, delete the word "species" after "endangered."
- In the third line, after the phrase "The Secretary of the Interior was directed," insert "by the Endangered Species Act,"
- In the fourth line, after the phrase "Endangered species" replace "designation" with "listing."
- In the second paragraph, last line, delete "an adequate" and insert "integrated"; delete the phrase "in place at the sites" and replace it with "determined to be of benefit to the species", so the line reads … "from critical habitat designations if an integrated natural resource management plan is determined to be of benefit to the species."

Appendix H Biome Descriptions

Page H-7:

- The scientific name of the northern sea otter is *Enhydra lutris*, not *Eumetopias jubatus*.

Page H-39:

- In a discussion of the deciduous forest biome in the northeastern States, red spruce and balsam fir forest types are listed. We note that spruce and fir are evergreen conifers, and forests dominated by them are not generally considered components of a deciduous forest biome. We also note that the preceding description of the taiga biome on pages H-16 through H-29 does not refer to balsam fir, its most prevalent tree species.
- Tropical and subtropical moist broadleaf forests are described as components of the biome; as the text notes, these forests are "dominated by semi-evergreen and evergreen tree species" and thus may be out of place in discussion of a deciduous forest biome.

- A list of examples of "threatened and endangered vegetation [sic]" in this biome includes three species from the eastern and southern U.S. and a species of moss endemic to evergreen (not deciduous) forest on the island of Madeira, which may not be the best grouping of examples to illustrate listed species in the "inland deciduous forest biome."

Page H-40:

- The discussion of wildlife of the deciduous forest biome indicates that the Florida panther "…inhabit[s] the lower coastal plains and flatlands of the middle portion of this biome." The Florida panther is found only in peninsular Florida, which would not be considered the middle portion of this biome. We suggest making this clear or deleting reference to the Florida panther is this statement.

Page H-41:

- A list of threatened and endangered wildlife includes the American black bear as if it were listed range wide; however, it is the Louisiana subspecies (*Ursus americanus luteolus*) that is actually listed as Federally threatened. *Ursus americanus* is listed as threatened due to "similarity of appearance (T (S/A))" throughout the historic range of the Louisiana black bear, which includes Louisiana, Texas, and Mississippi and is, therefore, subject to a special rule as outlined in 50 CFR 17.40(i). The black bear is not federally listed throughout the remainder of its range.
- The species *Achatinella mustelina* is attributed to hammocks in the Everglades; however, it is a snail endemic to tropical evergreen forests in Hawaii.
- The West Indian manatee is incorrectly given the scientific name of an African species (*Trichechus senegalensis*). It is correctly identified as *Trichechus manatus* in Exhibit H-6 on page H-42.

Page H-42:

- The scientific name of the leatherback sea turtle is *Dermochelys coriacea*, the DPEIS incorrectly identifies its scientific name as *Ammospiza caudacuta*.

Page H-43:

- Gorillas are incorrectly listed as inhabitants of East Asian tropical and subtropical moist forest.

Page H-90:

- *Ostrya virginiana* is given as the scientific name of the ironwood introduced on Pacific islands. However, this is a species of eastern North America; it is likely the author had in mind a species of *Casuarina*, also commonly known as ironwood.

Page H-93:

- *Esox lucius*, the northern pike, is attributed to offshore areas near the Pacific Missile Range on Kauai; however, this species is not found in the waters around the Hawaiian Islands. It is likely the author had a different species in mind.

Page H-104:

- In a discussion of the savanna biome, the harpy eagle is listed as one of its "common bird species." However, this eagle is an extremely rare bird of deep forest habitats.

We appreciate the opportunity to provide these comments. Should you have any questions, please do not hesitate to contact Vijai Rai, Team Leader, Natural Resources Management Team, Office of Environmental Policy and Compliance at (202) 208-6661.

Sincerely,

Willie R. Taylor

Willie R. Taylor
Director
Office of Environmental
Policy and Compliance

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

November 17, 2004

Missile Defense Agency
Ballistic Missile Defense System PEIS
c/o ICF Consulting
9300 Lee Highway
Fairfax, VA 22031

Dear Mr. Lehner:

In accordance with our responsibilities under Section 309 of the Clean Air Act and the National Environmental Policy Act (NEPA), the Environmental Protection Agency (EPA) has reviewed the Missile Defense Agency's (MDA) Ballistic Missile Defense System (BMDS) Draft Programmatic Environmental Impact Statement (DPEIS) (CEQ # 040438).

The DPEIS identifies, evaluates and documents, at the programmatic level, the potential environmental impacts of activities associated with the development, testing, deployment, and planning for the eventual decommissioning of the BMDS. It considers the current technology components, support assets, and programs that make up the proposed BMDS as well as the development and application of new technologies.

EPA commends the efforts that MDA has commenced in producing such a comprehensive and well organized document. We also appreciate your efforts in utilizing the extensive environmental analysis that is available for many of the existing components of the proposed BMDS. Based on our review of the DPEIS, we have rated the document as LO - Lack of Objections (see attached "Summary of EPA Rating System"). Although EPA has no objections to the proposed action, there are a few issues that should be clarified.

1) General Comments:

a. To assess the impacts of implementing the proposed BMDS, the DPEIS characterized the existing condition of the affected environment in the locations where various BMDS implementation activities are proposed to occur. MDA has determined that activities associated with the proposed BMDS might occur in locations around the world. Therefore, the affected environment has been considered in terms of global biomes, broad ocean areas, and the atmosphere. This has resulted in the DPEIS being very conceptual and general in nature. EPA understands that once potential BMDS locations are determined, more detailed site-specific documents will be prepared. Through the discussions on the "block approach" or the "block development process", the DPEIS has given clear indications of when follow-on NEPA analysis will occur. We agree with this approach. However, while the documents give representative examples of past, current, or proposed locations where proposed activities may occur within each biome, EPA recommends that the EIS discuss the criteria that MDA will use in making future decisions for site-specific locations.

b. The resource areas considered in this analysis are those resources that MDA believes can potentially be affected by implementing the proposed BMDS. EPA agrees that some resource areas are site-specific or local in nature and, therefore, cannot be effectively analyzed in this type of programmatic document and that the potential impacts on these resources are more appropriately discussed in subsequent site-specific documentation tiered from this PEIS. However, EPA recommends that the final document discuss the existence of multiple species habitat conservation planning efforts that are proximate to DoD lands and the potential impacts of debris on marine and aquatic ecosystems.

c. As suggested by CEQ regulations, MDA has taken advantage of the extensive environmental analyses that already exist for many of the existing components of the proposed BMDS by incorporating these materials into the DPEIS by reference. However, some of these documents are greater than 10 years old. The PEIS should confirm the validity of the information in these documents.

2) Perchlorate Comment: Because there have been differing interpretations of the science associated with the impact on human health from low level exposure to perchlorate and in the interest of resolving scientific questions, EPA, the Department of Defense, the Department of Energy, and the National Aeronautics and Space Administration - members of a broader Interagency Working Group on Perchlorate led by the Office of Science and Technology Policy - have referred scientific issues and EPA's 2002 Draft Health Assessment on Perchlorate to the National Academy of Science (NAS) for review. NAS is currently conducting a study to determine the best science and model to use for determining the health impacts and standards for perchlorate. A report on this study is expected to be completed by the end of 2004. EPA recommends that the results of the report be incorporated into the FPEIS.

We appreciate the opportunity to review this DPEIS. We also look forward to reviewing the FPEIS related to this project. The staff contact for the review is Marthea Rountree and she can be reached at (202) 564-7141.

Sincerely,

Anne Norton Miller
Director
Office of Federal Activities

Enclosure: Summary of Rating Definitions

SUMMARY OF EPA RATING SYSTEM

Rating the Environmental Impact of the Action

- **LO (Lack of Objections)** The review has not identified any potential environmental impacts requiring substantive changes to the preferred alternative. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposed action.
- **EC (Environmental Concerns)** The review has identified environmental impacts that should be avoided in order to fully protect the environment. Corrective measures may require changes to the preferred alternative or application of mitigation measures that can reduce the environmental impact.
- **EO (Environmental Objections)** The review has identified significant environmental impacts that should be avoided in order to adequately protect the environment. Corrective measures may require substantial changes to the preferred alternative or consideration of some other project alternative (including the no action alternative or a new alternative). The basis for environmental objections can include situations:
  1. *Where an action might violate or be inconsistent with achievement or maintenance of a national environmental standard;*
  2. *Where the Federal agency violates its own substantive environmental requirements that relate to EPA's areas of jurisdiction or expertise;*
  3. *Where there is a violation of an EPA policy declaration;*
  4. *Where there are no applicable standards or where applicable standards will not be violated but there is potential for significant environmental degradation that could be corrected by project modification or other feasible alternatives; or*
  5. *Where proceeding with the proposed action would set a precedent for future actions that collectively could result in significant environmental impacts.*
- **EU (Environmentally Unsatisfactory)** The review has identified adverse environmental impacts that are of sufficient magnitude that EPA believes the proposed action must not proceed as proposed. The basis for an environmentally unsatisfactory determination consists of identification of environmentally objectionable impacts as defined above and one or more of the following conditions:
  1. *The potential violation of or inconsistency with a national environmental standard is substantive and/or will occur on a long-term basis;*
  2. *There are no applicable standards but the severity, duration, or geographical scope of the impacts associated with the proposed action warrant special attention; or*
  3. *The potential environmental impacts resulting from the proposed action are of national importance because of the threat to national environmental resources or to environmental policies.*

Adequacy of the Impact Statement

- **Category 1 (Adequate)** The draft EIS adequately sets forth the environmental impact(s) of the preferred alternative and those of the alternatives reasonably available to the project or action. No further analysis or data collection is necessary, but the reviewer may suggest the addition of clarifying language or information.
- **Category 2 (Insufficient Information)** The draft EIS does not contain sufficient information to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the reviewer has identified new reasonably available alternatives that are within the spectrum of alternatives analyzed in the draft EIS, which could reduce the environmental impacts of the proposal. The identified additional information, data, analyses, or discussion should be included in the final EIS.
- **Category 3 (Inadequate)** The draft EIS does not adequately assess the potentially significant environmental impacts of the proposal, or the reviewer has identified new, reasonably available, alternatives, that are outside of the spectrum of alternatives analyzed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. The identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. This rating indicates EPA's belief that the draft EIS does not meet the purposes of NEPA and/or the Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS.

K.5.2 Responses to Federal Agency Comments

The following comments and responses in Exhibit K-6 are organized by issue topics, including BMDS, Biological Resources, etc. The comment number includes the comment document number and the sequential number of the comment. For E0001-2, "E0001" refers to the comment document number and "2" refers to the sequential comment number.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
BMDS	F0003-1 and M0276-1	To assess the impacts of implementing the proposed BMDS, the DPEIS characterized the existing condition of the affected environment in the locations where various BMDS implementation activities are proposed to occur. MDA has determined that activities, associated with the proposed BMDS might occur in locations around the world. Therefore, the affected environment has been considered in terms of global biomes, broad ocean areas, and the atmosphere. This has resulted in the DPEIS being very conceptual and general in nature. EPA understands that once potential BMDS locations are determined, more detailed site-specific documents will be prepared. Through the discussions on the "block approach" or the "block development process", the DPEIS has given clear indications of when follow-on NEPA analysis will occur. We agree with this approach. However, while the documents give representative examples of past, current, or proposed locations where proposed activities may occur within each biome, EPA recommends that the EIS discuss the criteria that MDA will use in making future decisions for site-specific locations.	The MDA will continue to develop test scenarios that will allow for realistic testing of the proposed BMDS. In so doing, the MDA will consider the objectives of the proposed test, the BMDS assets required/available, and potential suitable locations to meet test objectives within acceptable safety, environment, schedule, and cost-effectiveness parameters. MDA uses both DoD and commercial launch facilities and ranges to facilitate and support its test program. MDA also considers targets of opportunity (i.e., piggy-backing components on the back of other tests) when planning its testing to optimize the use of other DoD or component-specific testing to play (i.e., testing target discrimination, track and potential intercept) or watch (i.e., testing data discrimination, tracking, and interpretation capabilities of various components). MDA-sponsored tests receive NEPA consideration and determination prior to conduct of testing.
Biological Resources	F0006-3	Whales, dolphins, seals, and sea lions are protected under the Marine Mammal Protection Act (MMPA).	On January 14, 2004 MDA representatives met with NOAA Fisheries Service personnel to discuss

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
		Under the MMPA, "take" of a small number of marine mammals is permitted by NOAA Fisheries under an Incidental Harassment Authorization (IHA) when the specified activity is incidental, but not intentional. "Take" is defined as harassing, hunting, capturing, or killing, or attempting to harass, hunt, capture, or kill any marine mammal. "Harassment" is defined as any act of pursuit, torment, or annoyance which has the potential to injure a marine mammal in the wild, or has the potential to disturb a marine mammal in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering. Based on the information included in the draft PEIS, the proposed project may cause take of marine mammals under the jurisdiction of NOAA Fisheries. NOAA Fisheries recommends that the Missile Defense Agency consult with the appropriate NOAA Fisheries Regional Office when conducting the site-specific analyses for potential impacts to marine mammals.	programmatic consultation pertaining to the BMDS PEIS. If site-specific analyses indicate the potential for BMDS activities to result in a "take" of species protected under the Marine Mammal Protection Act, the project proponent will consult with the NOAA Fisheries Service Regional Office, as appropriate.
Biological Resources	M0275-1	Pages 3-16 to 3-17: The portion titled "Definition and Description" emphasizes consideration of Federal and State listed species, or species proposed for listing. However, NEPA requires that other species that may be impacted by the proposed activity must also be evaluated throughout the DPEIS. See also page 4-42, subportion "Launch/Flight Activities," where impacts to only species of concern are addressed. We recommend that the DPEIS address all applicable species.	The text in Section 3.1.3 has been modified to reflect that environmental impacts to all species potentially impacted by the activities are considered in the PEIS.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
Biological Resources	M0275-2	Pages 3-17 to 3-18: In the portion titled "Impact Assessment," we recommend the following text be inserted to address requirements in the referenced laws: If the proponent of the proposed activity determines that migratory bird species may be adversely impacted, then the proponent should confer with the Department's Fish and Wildlife Service's (FWS) Regional Migratory Bird Program to ensure compliance with the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act, where applicable. Under the MBTA, the taking of migratory birds is not authorized without a permit. The project proponent should also confer with the Service to determine if conservation measures may be implemented to minimize or avoid take of migratory birds.	Language similar to the recommended text has been added to the PEIS.
Biological Resources	M0275-3	Page 3-19: In the subportion "Determination of Significance," we recommend that reference to the MBTA be incorporated. We also recommend that the final PEIS indicate that military readiness activities implemented in the future by the MDA should be in compliance with the rule currently being finalized by the Service, "Migratory Bird Permits; Take of Migratory Birds by DoD."	Language on the Migratory Bird Treaty Act has been added to the Determination of Significance for Biological Resources. It should be noted that throughout the PEIS references are made to the fact that the project proponent would be required to comply with all applicable regulations. Therefore, specific mention of the "Migratory Bird Permits; Take of Migratory Birds by DoD" currently being finalized has not been added to the PEIS.
Biological Resources	M0275-5	Page 4-26: In the portion titled "Biological Resources," under the subportion "Land and Sea Operating Environments," we recommend adding text that indicates that hydrochloric acid could have an effect on shorebirds and waterbirds (in addition to waterfowl, which are already referenced).	A reference to shorebirds and waterbirds has been added to the discussion on the impacts to birds from hydrochloric acid in water.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
Biological Resources	M0275-6	Page 4-27: In the last paragraph under the subportion referenced above, we recommend that the text specify the maximum noise level, if available, for which animals "generally return to normal activities within a short time following noise disturbance." Most wildlife has a limited tolerance to noise. We recommend specifying the threshold at which this tolerance level would generally be exceeded and when adverse effects may occur. See also page 4-43 where impacts to birds from noise disturbance are discussed in greater detail. These two sections should be in agreement with each other. The statement on page 4-27 is not in concurrence with the discussions on page 4-43, which indicate there may be more than minor disturbances.	The text has been modified to include details of two studies cited in the 1988 Manci et al report titled "Effects of aircraft noise on domestic animals and wildlife: a literature synthesis." (Manci, K.M., D.N. Gladwin, R. Villella, and M.G. Cadendish. 1988. Effects of aircraft noise on domestic animals and wildlife: a literature synthesis. USFWS. National Ecology Research Center, Ft. Collins, CO. NERC-88/29) Specifically, a 1982 study by Stewart (Stewart, B.S. 1982. Studies on the Pinnipeds of the Southern California Channel Islands, 1980-1981. Hubbs-Sea World Research Institute, San Diego, CA Tech Report No 82-136 as cited in Manci et al, 1988) and a 1980 study by Jehl and Cooper. (Jehl, J.R. and C.F. Cooper, eds. 1980. Potential effects of Space Shuttle booms on the biota and geology of the California Channel Islands. Research Reports Center for Marine Studies, San Diego State University, San Diego, CA. Tech Report 80-1 as cited in Manci et al, 1988)
Biological Resources	M0275-7	Page 4-64 to 4-65: We believe the analysis of impacts on birds from radar in the "Biological Resources" portion is outdated and inadequate. The first paragraph of this portion does not address the potential effects of radar on very large flocks of migrating birds. Even if a bird is not "within the most intense area of the beam for any considerable length of time," there is insufficient evidence to support the statement that no significant adverse impacts to birds would occur. The 1993 report that is referenced to support this conclusion is outdated.	In response to the Department of Interior comments regarding impacts to biological resources from radar, the MDA conducted an analysis of the potential for impact from proposed BMDS radars on migratory birds. This analysis is included in Appendix N of this PEIS. Appendix N responds to Department of Interior concerns regarding the conclusions reached in the 1993 EA and introduces possible mitigation measures.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
		We recommend the analysis describe what constitutes a "relatively small" beam size. A beam going through a dense flock could have an adverse effect on birds, particularly for those species which are already significantly in decline. We recommend that this potential adverse effect be described. We recommend that this section discuss the potential of using NEXRAD (Next Generation Weather Radar) to help evaluate when large flocks may be in the testing area. NEXRAD could provide valuable information regarding times when testing should not occur to reduce biological impacts. This technology is currently being used by the Air Force to reduce the potential for air strikes and by the Department of Defense to identify important stopover habitat in relation to Department of Defense installations. We recommend that an avian physiologist, particularly one very knowledgeable of electromagnetic radiation, carefully review the effects of this proposed activity. In reference to the Cobra Dane study, it should be noted in the DPEIS that arctic foxes, which are very efficient predators, are present on Shemya and other Aleutian Islands, and would quickly remove evidence of any bird kills. Lack of evidence of bird die-offs under these conditions does not provide solid evidence that they aren't occurring.	

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
Biological Resources	M0275-8	Bird collisions with radar equipment, particularly towers, can have significant impacts on birds. Estimated annual bird kills from collisions with communication towers (radio, television, cellular, and microwave) range from four- to five-million, both from direct collisions with the towers themselves and with guy wires. Tall radar towers, i.e., those above 199 feet MSL (mean sea level), are of particular concern. The greatest impact occurring from towers illuminated at night with solid or pulsating incandescent red lights. In addition, the potential for tower collisions significantly increases at night under cloudy or otherwise low visibility conditions. Because of these impacts, the MDA should follow the FWS's "Interim Guidelines For Recommendations On Communications Tower Siting, Construction, Operation, and Decommissioning - 2000," for both existing and proposed radar towers. These guidelines should be referenced in the DPEIS as applying to radar equipment. They also should be applied to Re-Radiation Towers discussed in the second paragraph on page 4-77.	MDA would follow or intend to follow all relevant and applicable USFWS Guidelines whether interim or not and indicate that all applicable environmental, health and safety rules and regulations are scrupulously adhered to during MDA siting, construction, operation and decommissioning.
Biological Resources	M0275-9	Page 4-73: Under the portion titled "Biological Resources," we have similar concerns for potential impacts on migratory birds from laser sensors as those stated above for radar equipment. This is particularly true for the use of land and sea-based lasers and in situations where large flocks may be present. Although the lasers may not directly hit birds or other wildlife on the ground, impacts to birds in the air	The potential for impacts or eye injuries to biological resources including migratory birds from laser sensor activation has been characterized and described in a level of detail commensurate with the potential for impact to these resources.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
		could be significant. We recommend that these potential impacts be described.	
Biological Resources	M0275-10	Regarding the Nominal Ocular Hazard Distance, the DPEIS concludes that impacts to wildlife from a space-based laser sensor would be insignificant because it is unlikely that the laser would be directed towards the Earth's surface and, if it were, distortion from atmospheric conditions would reduce the radiance level. It further concludes that the Earth's surface would likely be beyond the Nominal Ocular Hazard Distance. This conclusion is not well supported. We recommend that the DPEIS identify how "likely" it is that the Earth's surface would not be beyond this specified distance.	ANSI Z136.1 Safe Use of Lasers provides tables to determine the Maximum Permissible Exposure Limit (MPE) based on the wavelength, duration of exposure, and correction factors. Laser range equations are used to calculate the Nominal Ocular Hazard Distance (NOHD) based on the laser sensor MPE, classification, categorization, and other applicable laser operating characteristics. If the calculated distance of NOHD is below the Earth's surface for a space-based laser sensor to reach, the impact of that space-based laser sensor would be insignificant on the Earth surface. If specific space-based laser sensors were proposed to be used as part of the BMDS, the MDA would perform the necessary calculations to determine the NOHD. However, in general it is expected that the NOHD for space-based laser sensors would not intersect the Earth's surface.
Biological Resources	M0275-11	▪ Page 4-89 to 4-90: In reference to the first paragraph under "Biological Resources," we note that the construction of infrastructure, depending upon its extent, can significantly increase surface runoff. This can negatively impact surrounding habitats, particularly wetlands and other sensitive habitats. Impacts to fish, wildlife, and plants from pollutants could be more than temporary depending upon the pollutant and length of exposure. Depending upon the species in the project area, construction could have a larger area of disturbance than 50-feet, particularly for	▪ Language on the potential for surface runoff has been added to the PEIS. It should be noted that impacts to particular species from specific pollutants or construction projects would need to be considered in site-specific documentation.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
		nesting bird species. We recommend that this section describe these possible impacts. ▪ We recommend that the second paragraph indicate that site preparation and installation could negatively impact waterbirds utilizing the shore environment, particularly during breeding season. ▪ In the third paragraph, we recommend that the description of behavioral responses to construction include nest abandonment and alteration of migration routes of larger mammals.	▪ A reference to waterbirds has been added to the discussion on the impacts to species from site preparation and installation of underground cable. ▪ Language similar to the recommended text regarding possible behavioral responses including nest abandonment and alteration of migration routes has been added to the PEIS.
Biological Resources	M0275-12	We recommend that the fifth paragraph list compliance with the Marine Mammal Protection Act, the Migratory Bird Treaty Act, and the Bald and Golden Eagle Protection Act as required, where applicable. These regulatory references should also be inserted in the portion titled "Biological Resources" under Section 4.1.1.10 Support Assets - Test Assets.	Language similar to the recommended text regarding inclusion of the Marine Mammal Protection Act, Migratory Bird Treaty, and Bald and Golden Eagle Protection Act has been added to the PEIS.
Biological Resources	M0275-13	Page 4-105: Under "Integrated Ground Tests," we believe that the conclusion of insignificant impacts is not sufficiently justified or supported. This section lacks information regarding the size and orientation of the operating radar sensors. It also does not describe the anticipated increased number of these operating radar sensors.	The PEIS is a programmatic environmental analysis. The PEIS does not consider the operation of specific sensors or specific activation orientations for these sensors. In response to comments MDA added technical Appendix N, Impacts of Radar on Wildlife to the PEIS. Based on the information analyzed as part of the sensor component discussion, the analyses incorporated by reference, and the technical analyses in Appendix N in this PEIS, there is no indication that operating multiple sensors in a single biome would produce significant impacts on biological resources. The MDA believes that

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
			based on the information presented in this PEIS and on the information and analyses incorporated by reference, the expectation of insignificant impacts to biological resources from integrated ground tests is supported in the PEIS. However, it should be noted that test-specific analyses would be prepared to determine whether the potential for significant impacts exists for a specific test scenario.
Biological Resources	M0275-14	Page 4-133: As stated above, we believe that statements of no significant impact are not sufficiently justified or supported. This section indicates Best Management Practices would be implemented to mitigate adverse effects. However, the DPEIS does not provide sufficient information regarding what these measures might be or what would be recommended. In addition, the conclusion that "those [effects] that could not be avoided should not result in a significant impact to the environment" could be viewed as arbitrary since those effects are insufficiently described.	Section 4.4 of the PEIS states that "Adverse environmental effects that cannot be avoided include the removal of vegetation during site preparation and construction activities; minor short-term noise impacts startling of wildlife; deposition of small amounts of pollutants on land, air, and sea; minor increased generation of hazardous materials; and emission of EMR." This Section of the PEIS further states that these effects are not expected to result in significant impact to the environment. These effects were described in Sections 4.1.1.1 through 4.3 and on a programmatic level were found to have no significant impact to the environment. The PEIS is intended to serve as a tiering document for future site-specific analyses. These site-specific analyses would determine whether site or test specific characteristics would lead to a potentially significant impact. These impacts will be appropriately considered in these tiered analyses. The tiered analyses may also consider specific mitigation measures including Best Management Practices that are appropriate for the action or test under consideration.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
Biological Resources	M0275-27	A list of threatened and endangered wildlife includes the American black bear as if it were listed range wide; however, it is the Louisiana subspecies {Ursus americanus luteolus) that is actually listed as Federally threatened. Ursus americanus is listed as threatened due to "similarity of appearance (T (S/A))" throughout the historic range of the Louisiana black bear, which includes Louisiana, Texas, and Mississippi and is, therefore, subject to a special rule as outlined in 50 CFR 17.40(i). The black bear is not federally listed throughout the remainder of its range.	The reference to the American black bear has been removed. It should be noted that the species listed in Appendix H are examples of species that are listed as threatened or endangered in the Deciduous forest biome.
Biological Resources	M0275-28	The species Achatinella mustelina is attributed to hammocks in the Everglades; however, it is a snail endemic to tropical evergreen forests in Hawaii.	The reference to Achatinella mustelina has been removed.
Biological Resources	M0275-29	The West Indian manatee is incorrectly given the scientific name of an African species {Trichechus senegalensis). It is correctly identified as Trichechus manatus in Exhibit H-6 on page H-42.	The reference to the West Indian manatee's scientific name has been corrected.
Biological Resources	M0275-30	The scientific name of the leatherback sea turtle is Dermochelys coriacea, the DPEIS incorrectly identifies its scientific name as Ammospiza caudacuta.	The reference to the leatherback sea turtle's scientific name has been corrected.
Biological Resources	M0275-31	Gorillas are incorrectly listed as inhabitants of East Asian tropical and subtropical moist forest.	The reference to gorillas living in the East Asian tropical and subtropical moist broadleaf forests has been removed.
Biological Resources	M0275-32	Ostrya virginiana is given as the scientific name of the ironwood introduced on Pacific islands. However, this is a species of eastern North America; it is likely the author had in mind a species of Casuarina, also commonly known as ironwood.	The reference to Ostrya virginiana as being the scientific name of ironwood species introduced on Pacific islands has been removed.
Biological Resources	M0275-33	Esox lucius, the northern pike, is attributed to offshore areas near the Pacific Missile Range on Kauai;	The reference to Esox lucius has been removed.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
		however, this species is not found in the waters around the Hawaiian Islands. It is likely the author had a different species in mind.	
Biological Resources	M0275-34	In a discussion of the savanna biome, the harpy eagle is listed as one of its "common bird species." However, this eagle is an extremely rare bird of deep forest habitats.	The reference to the harpy eagle being a "common bird species" of the savanna biome has been removed.
Biological Resources – Debris Impacts	F0003-2 and M0276-2	The resource areas considered in this analysis are those resources that MDA believes can potentially be affected by implementing the proposed BMDS. EPA agrees that some resource areas are site-specific or local in nature and, therefore, cannot be effectively analyzed in this type of programmatic document and that the potential impacts on these resources are more appropriately discussed in subsequent site-specific documentation tiered from this PEIS. However, EPA recommends that the final document discuss the existence of multiple species habitat conservation planning efforts that are proximate to DoD lands and the potential impacts of debris on marine and aquatic ecosystems.	The potential impacts of debris in marine and aquatic ecosystems were considered as part of Postlaunch Activities for each resource area analyzed in the PEIS. These discussions highlighted the potential programmatic environmental impacts from launch debris impacting in water environments. Although it would not be appropriate to discuss specific multiple species habitat conservation areas that are proximate to DoD lands in this programmatic document, a statement about multiple species habitat conservation planning efforts has been added to Section 3.2.3 of the PEIS.
Hazardous Materials Hazardous Waste	F0006-1	NOAA Fisheries recommends that the Missile Defense Agency be responsible for handling and disposing of all hazardous materials or hazardous wastes in all phases of the proposed action in accordance with applicable Federal, state, and local laws, utilizing best management practices at all life cycle activities of the proposed action and through appropriate project planning and design measures including appropriate spill prevention, control and	The disposal of all hazardous materials and hazardous wastes would be conducted in compliance with applicable Federal, state, and local laws. Project planning would take spill prevention, control, and contingency planning into account to ensure compliance with all relevant regulations.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
		contingency plans (e.g., Oil Discharge Prevention and Contingency Plan, Storm Water Pollution Prevention Plan) for each site.	
Perchlorate	F0003-4 and M0276-4	Perchlorate Comment: Because there have been differing interpretations of the science associated with the impact on human health from low level exposure to perchlorate and in the interest of resolving scientific questions, EPA, the Department of Defense, the Department of Energy, and the National Aeronautics and Space Administration - members of a broader Interagency Working Group on Perchlorate led by the Office of Science and Technology Policy -have referred scientific issues and EPA's 2002 Draft Health Assessment on Perchlorate to the National Academy of Science (NAS) for review. NAS is currently conducting a study to determine the best science and model to use for determining the health impacts and standards for perchlorate. A report on this study is expected to be completed by the end of 2004. EPA recommends that the results of the report be incorporated into the FPEIS.	In addition to citing the Perchlorate Study Group findings, the Final PEIS has been modified to include the proposed findings from the State of California Office of Environmental Health Hazard Assessment, the State of Massachusetts, and U.S. EPA. The results of relevant reports and findings completed prior to the finalization and publication of the PEIS were included as appropriate. The proposed BMDS activities would need to comply with all applicable regulations including any regulations issued regarding perchlorate levels. To better characterize some of the potential impacts associated with proposed BMDS activities, additional information and research on perchlorate has been added to Section 4.1.1.2 of the Final PEIS. Further, a technical appendix (see Appendix M) addressing issues specifically related to perchlorate has been added to the Final PEIS. The appendix considers the uses, sources, and disposal of perchlorate as well as the effects on human health and the environment.
Editorial	M0275-16	Under the heading United States, in the first line and after the phrase "The Endangered Species Act of 1973" add, "as amended."	Editorial and other text modifications made as requested.
Editorial	M0275-17	After the phrase "requires all Federal," delete "departments and" so the line reads "requires all Federal agencies to seek."	Editorial and other text modifications made as requested.
Editorial	M0275-18	In the second line, delete the word "species" after "endangered."	Editorial and other text modifications made as requested.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
Editorial	M0275-19	In the third line, after the phrase "The Secretary of the Interior was directed," insert "by the Endangered Species Act."	Editorial and other text modifications made as requested.
Editorial	M0275-20	In the fourth line, after the phrase "Endangered species" replace "designation" with "listing."	Editorial and other text modifications made as requested.
Editorial	M0275-21	In the second paragraph, last line, delete "an adequate" and insert "integrated"; delete the phrase "in place at the sites" and replace it with "determined to be of benefit to the species", so the line reads…"from critical habitat designations if an integrated natural resource management plan is determined to be of benefit to the species." Modification made as requested.	Editorial and other text modifications made as requested.
Editorial	M0275-22	The scientific name of the northern sea otter is Enhydra lutris, not Eumetopias jubatus.	Editorial and other text modifications made as requested.
Affected Environment	M0275-15	Page H-106: We suggest expanding the discussion of "environmentally sensitive habitat" for the savanna biome. Currently, the discussion consists only of the following two sentences: "National parks and reserves have been established to preserve and protect threatened vegetative and wildlife species in the Savanna Biome. There are several National Wildlife Refuges along the Gulf Coast."	Editorial and other text modifications made as requested.
Affected Environment	M0275-23	In a discussion of the deciduous forest biome in the northeastern States, red spruce and balsam fir forest types are listed. We note that spruce and fir are evergreen conifers, and forests dominated by them are not generally considered components of a deciduous forest biome. We also note that the preceding description of the taiga biome on pages H-16 through	Editorial and other text modifications made as requested.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
		H-29 does not refer to balsam fir, its most prevalent tree species.	
Affected Environment	M0275-24	Tropical and subtropical moist broadleaf forests are described as components of the biome; as the text notes, these forests are "dominated by semi-evergreen and evergreen tree species" and thus may be out of place in discussion of a deciduous forest biome.	Editorial and other text modifications made as requested.
Affected Environment	M0275-25	A list of examples of "threatened and endangered vegetation [sic]" in this biome includes three species from the eastern and southern U.S. and a species of moss endemic to evergreen (not deciduous) forest on the island of Madeira, which may not be the best grouping of examples to illustrate listed species in the "inland deciduous forest biome."	Editorial and other text modifications made as requested.
Affected Environment	M0275-26	The discussion of wildlife of the deciduous forest biome indicates that the Florida panther"... inhabit[s] the lower coastal plains and flatlands of the middle portion of this biome." The Florida panther is found only in peninsular Florida, which would not be considered the middle portion of this biome. We suggest making this clear or deleting reference to the Florida panther is this statement.	Editorial and other text modifications made as requested.
NEPA Process	F0006-2	Based on the information provided in the draft PEIS, NOAA Fisheries recommends that the Missile Defense Agency consult with the appropriate NOAA Fisheries Regional Office to determine if listed species under the Endangered Species Act (ESA) of 1973 as amended (16.U.S.C. 1531 et. seq.) may be affected by the proposed project. If it is determined that this project may affect a listed or proposed species, the Missile Defense Agency should request	On January 14, 2004 MDA representatives met with NOAA Fisheries Service personnel to discuss programmatic consultation pertaining to the BMDS PEIS. If site-specific analyses indicate the potential for BMDS activities to result in a "take" of species protected under the Endangered Species Act of 1973 as amended (16.U.S.C. 1531 et. seq.), the project proponent will consult with the NOAA Fisheries Service Regional Office, as appropriate.

Exhibit K-6. Responses to Federal Agency Comments

Issue Topic	Comment Number	Excerpt Text	Response
		initiation of consultation with NOAA Fisheries pursuant to section 7 of the ESA.	
	F0003-3 and M0276-3	As suggested by CEQ regulations, MDA has taken advantage of the extensive environmental analyses that already exist for many of the existing components of the proposed BMDS by incorporating these materials into the DPEIS by reference. However, some of these documents are greater than 10 years old. The PEIS should confirm the validity of the information in these documents.	In accordance with 40 CFR § 1502.21, Incorporation by Reference, information that was incorporated by reference in the PEIS has been cited and briefly described in the PEIS and made available during the public review period. The MDA has reviewed the portions of the information from these documents that are incorporated by reference and found them to be valid and relevant to this PEIS.

APPENDIX L
ORBITAL DEBRIS TECHNICAL APPENDIX

ORBITAL DEBRIS TECHNICAL APPENDIX

L.1 Introduction

This appendix defines orbital debris, discusses its source, fate and disposal options, presents an overview of policies and regulations associated with orbital debris, and concludes with how the MDA addresses orbital debris. This appendix is organized as follows:

- Background information, including definitions and descriptions, fate and disposal options, and ground-based tracking and monitoring
- Current standards and policies, including those implemented by the DoD, NASA and the U.S. Strategic Command (USSTRATCOM)
- MDA activities that produce orbital debris and MDA's coordination with appropriate agencies (e.g., USSTRATCOM and NASA)
- References

L.2 Background Information

This section defines and describes orbital debris. The fate of orbital debris and options for its disposal are discussed, as well as measurements and other data associated with the ground-based tracking and monitoring of orbital debris.

L.2.1 Definition and Description

Orbital debris as considered in this appendix is man-made material that is in orbit around the Earth but no longer serves any useful purpose. This definition excludes the large amount of background or natural space debris (i.e., asteroids and comets) resident in space. Natural space debris occurs in densities several orders of magnitude greater than man-made space debris.

Orbital debris includes such objects as

- Discarded hardware (e.g., upper stages from launch vehicles),
- Abandoned satellites,
- Separations of spacecraft (e.g., bolts, adaptor shrouds),
- Material degradation (e.g., paint flakes, bits of insulation), and
- Object breakup (more than 124 have been identified).

NASA has defined four types of orbital debris

- Large objects that are larger than 10 centimeters (4 inches) in diameter and are routinely detected, tracked, and catalogued;
- Risk objects between one centimeter (0.4 inch) and 10 centimeters (4 inches) in diameter, which cannot be tracked and catalogued;
- Small debris that is between one centimeter (0.4 inch) and one millimeter (0.04 inch) in diameter; and
- Micro debris which is smaller than one millimeter (0.04 inch) in diameter.

The interaction among these four sizes of orbital debris during their time in orbit creates concern that there may be collisions producing additional fragments and causing the total debris population to grow, which may increase the potential for debris reentry into Earth's atmosphere. Debris in each of the four size categories can be divided further into four types depending on its source.

- ***Operational debris*** is composed of inactive payloads and objects released during satellite delivery or satellite operations, including such items as lens caps, separation and packing devices, spin-up mechanisms, empty propellant tanks, spent and intact vehicle bodies, payload shrouds, and a few objects thrown away or dropped during manned activities. (Aerospace Corporation, 2005)

- ***Fragmentation debris*** results from collisions or explosions of objects in space. More than 124 breakups have been verified, and it is estimated that a significant number of others have occurred. (Aerospace Corporation, 2005) Breakups result in the fragmentation of space objects and are generally caused by either the collision of two space objects or an explosion. Explosions cause the majority of breakups. The causes of most explosions can be attributed to

  - Deliberate collisions,
  - Accidental mixing of propellant and oxidizer, and
  - Over-pressurized batteries or propellant (due to heating).

- ***Deterioration debris*** consists of very small debris particles created by the gradual disintegration of spacecraft (e.g., satellites, booster rockets, and manned spacecraft) left on orbit. Material from the spacecraft degrades in space due to atomic oxygen, solar heating, and solar radiation, producing items such as paint flakes, plastic and metal micro debris, and bits of insulation. (Aerospace Corporation, 2005)

- ***Solid rocket motor ejecta*** are typically less than 0.01 centimeter (0.004 inch) in diameter (i.e., micro debris) and result from the ejection of thousands of kilograms of Al_2O_3 particles from SRMs into the orbital environment. (U.S. DOT, 2001) SRMs used to boost satellite orbits have produced various debris items, including motor casings, aluminum oxide exhaust particles, nozzle slag, motor-liner residuals, solid-fuel fragments, and exhaust cone bits resulting from erosion during the burn. SRMs may release larger chunks of unburned solid propellant or slag produced when most of the solid propellant has been expended and the combustion pressure inside the rocket motor begins to fluctuate or when unspent propellant is expelled into space. However, SRM particles and ejecta typically decay very rapidly or are dispersed by solar radiation pressure. (U.S. DOT, 2001)

Orbital debris generally moves at very high speeds relative to operational satellites. In Low Earth Orbit (LEO), an altitude approximately 1,600 kilometers (1,000 miles) above the surface of the Earth, the average relative velocity at impact is 10 kilometers per second (21,600 miles per hour). At this velocity, even small particles contain significant amounts of kinetic energy and momentum. In GEO, an altitude of approximately 35,000 kilometers (22,000 miles) above the Earth's surface, average relative velocity at impact is much lower than in LEO, about 200 meters per second (432 miles per hour). This is because most objects in GEO move along similar orbits. Nevertheless, fragments at this velocity can still cause considerable damage upon impact. A 10-centimeter (4-inch) fragment in GEO has roughly the same damage potential as a 1-centimeter (0.4-inch) fragment in LEO. A 1-centimeter (0.4-inch) GEO fragment is roughly equivalent to a 1-millimeter (0.04-inch) LEO fragment.

Estimates of the amount of orbital debris vary. According to the NASA Orbital Debris Program Office, approximately 11,000 objects larger than 10 centimeters (4 inches) are known to exist, more than 100,000 particles between one and 10 centimeters (0.4 to 4 inches) in diameter exist, and tens of millions of particles smaller than one centimeter (0.4 inch) exist. (NASA, 2004b) According to the European Space Agency, in 2003 there were approximately 10,000 catalogued debris objects orbiting the Earth. General damage levels associated with the various sizes of debris can be described as follows.

- Debris particles smaller than 1 millimeter (0.04 inch) in size do not generally pose a hazard to spacecraft functionality. However, they can erode sensitive surfaces such as payload optics; thus, while the spacecraft may survive an impact, payload degradation can still result in mission loss.

- Debris fragments from 1 millimeter to 1 centimeter (0.04 to 0.4 inch) in size may or may not penetrate a spacecraft, depending on material selection and whether shielding is used. Penetration through a critical component, such as the flight computer or propellant tank, can result in loss of the spacecraft. On average, debris of one millimeter (0.04 inch) is capable of perforating current U.S. space suits.

- Debris fragments between 1 and 10 centimeters (0.4 to 4 inches) in size will penetrate and damage most spacecraft. If the spacecraft bus is impacted, satellite function will be terminated and, at the same time a significant amount of small debris will be created. In large satellite constellations, this can lead to amplification of the local smaller debris population and its associated erosion effects.

While it is currently practical to shield or protect spacecraft against debris particles up to one centimeter (0.4 inch) in diameter (a mass of one gram [0.05 ounce]), for larger debris, current shielding concepts become impractical. (NASA, 2003)

Orbital debris also contributes to the larger problem of objects in space, which includes radio-frequency interference and interference with scientific observations in all parts of the spectrum. For example, emissions of debris at radio frequencies often interfere with radio astronomy observations. (NASA, 2003)

Measurements of near-Earth orbital debris are accomplished by conducting ground-based and space-based observations of the orbital debris environment. Data are acquired using ground-based radars and optical telescopes, space-based telescopes, and analysis of spacecraft surfaces returned from space. Some important data sources have been the U.S. Space Surveillance Network (SSN), the Haystack XBR, and returned surfaces from the Solar Max, Long Duration Exposure Facility, and the Space Shuttle spacecraft. The data provide validation of the environment models and identify the presence of new sources of debris. (NASA, 2005)

L.2.2 Fate and Disposal Options

Once orbital debris is formed, it continues to exist in space. Two types of orbits where satellites are stationed and where orbital debris is generated include LEO (see Exhibit L-1) and GEO (see Exhibit L-2). Debris generated at those altitudes would continue orbiting the Earth for extended periods of time (perhaps forever) before the orbit of the debris decays, drawing it closer and closer to Earth. The duration of orbit varies based on the trajectory, velocity, and altitude of an object, with lower altitude orbits decaying faster than high altitude orbits. This is because orbiting objects lose energy through friction with the upper reaches of the atmosphere, which is progressively thinner (less dense) at higher altitudes. Over time, the object falls into progressively lower orbits and eventually falls toward the Earth.

Exhibit L-1. Orbital Debris in LEO

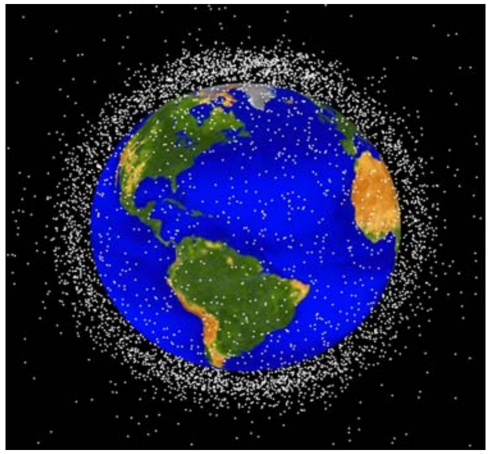
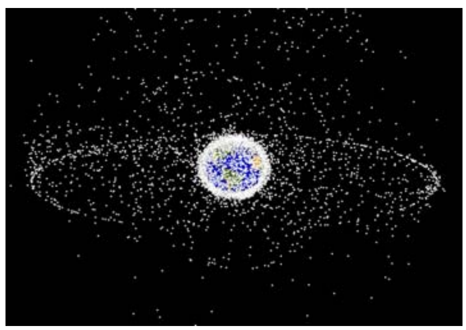


Exhibit L-2. Orbital Debris in GEO



As debris eventually reenters the Earth's atmosphere, it would most likely burn up before reaching the surface of the Earth. This deorbit process limits the lifetime of orbital debris to a maximum of a few days for debris below 200 kilometers (124 miles), a few months for debris originating between 200 kilometers (124 miles) and 400 kilometers (248 miles), a few years between 400 kilometers (248 miles) and 600 kilometers (373 miles), decades between 600 kilometers (373 miles) and 800 kilometers (497 miles), centuries over 800 kilometers (497 miles), and potentially forever if over 36,000 kilometers (22,370 miles). (NASA, 2004a)

The proper disposal of post-mission space structures is critically important to minimizing the amount and future impact of space debris orbiting the Earth. Post-mission space structures are those objects that have been left in space after a mission is complete, and is not planned to be returned to earth (e.g., satellites). Historically, about 2 million kilograms (4.4 million pounds) of space debris has accumulated in orbit because of the practice of abandoning, rather than disposing of, spacecraft at the end of their mission life. (NASA, 1995) This debris poses a threat to continued space operations and increases the likelihood of collisions between two objects in space.

In general, there are three post-mission disposal options available to minimize the creation of orbital debris: (1) direct retrieval and deorbit; (2) reentry disposal; and (3) moving the object to a designated post-mission disposal orbit. (NASA, 1995) Direct retrieval and deorbit refers to retrieving the structure and removing it from orbit at some point after mission completion. Reentry disposal refers to allowing the object to slowly break up as it reenters the Earth's atmosphere. (Patera and Ailor, 1998) "Moving the object…" refers to maneuvering the object to one of a set of disposal orbit regions in which the object will not interfere with future space operations. A disposal orbit region is also known as a graveyard orbit, which is generally a higher altitude orbit where a satellite or other object is placed at the end of its operational life. In a graveyard orbit, a space object is not expected to accidentally collide with an active satellite. However, it is assumed that one day it will eventually reenter Earth's atmosphere and burn up. (Encyclopedia, 2005)

Generally, reentry disposal is not viewed as hazardous to people on Earth because the intense heat generated by atmospheric drag upon reentry is expected to completely destroy the debris. Furthermore, the probability of a surviving piece of the debris striking an inhabited part of the Earth is very low. However, as both the human population on Earth and the number of satellites in the sky increases, the probability of a piece of a reentered satellite randomly striking a population center also increases.

There are two means of disposing of a satellite (or other structure) through reentry breakup: lifetime reduction, which results in a random reentry; and disposal by controlled deorbit, which seeks to target an unpopulated area of the Earth (usually the ocean). (Patera and Ailor, 1998) Lifetime reduction refers to maneuvering the object to an orbit from which atmospheric drag will remove it completely from orbit within 25 years. (NASA, 1995) This approach may result in an uncertain time and place of disposal and makes warning population centers of an impending strike impossible. Disposal by controlled deorbit seeks to guide the structure to a desired impact location through a series of perigee (the point at which the structure is closest to Earth) lowering burns. (Antonio, 2005) This approach is more appropriate than lifetime reduction under the following conditions (Patera and Ailor, 1998)

- The mass of the structure is especially large,
- The structure contains hazardous materials that may pose a safety threat to populations, or
- The structure contains sensitive components that need to be destroyed.

There are a number of options available for disposing an object via moving it to a designated orbital disposal region. These regions are areas of space that are between the three typical areas in which satellites orbit the Earth: LEO, Medium Earth Orbit (semisynchronous) (MEO), and GEO. LEO is the area between the Earth and approximately 1,600 kilometers (1,000 miles) above the Earth; MEO is the area between around 19,900 and 20,500 kilometers (12,366 and 12,738 miles) above the Earth; and GEO is the area between aproximately 35,0000 and 36,000 kilometers (22,000 and 22,400 miles) above the Earth. (NASA, 1995)

Spacecraft that reenter from either orbital decay or controlled entry usually break up at altitudes between 84 and 72 kilometers (52 and 45 miles) due to aerodynamic forces causing the allowable structural loads to be exceeded. The nominal breakup altitude for spacecraft is considered to be 78 kilometers (48.5 miles). Larger, sturdier, and denser satellites generally break up at lower altitudes. Solar arrays frequently break off the spacecraft parent body around 90 to 95 kilometers (56 to 59 miles) because of the aerodynamic forces causing the allowable bending moment to be exceeded at the array/spacecraft attach point.

Recognizing the growing issue of space debris, both NASA and USSTRATCOM have developed policies to regulate future post-mission disposal of satellites and other space structures. NASA's guidelines provide disposal methods for final mission orbits according to altitude, while USSTRATCOM's policy directive covers the appropriate methods for satellite disposal. Sections 3.1 and 3.2 provide outlines of the policies of both NASA and USSTRATCOM regarding spacecraft or space structure disposal.

L.2.3 Ground-Based Tracking and Monitoring

Ground-based measurements are used to remotely sense the presence of space debris. This is normally done using radar measurements for debris in LEO or optical measurements for debris in GEO. The following characteristics of the debris can be derived from radar measurements (with varying degrees of uncertainty)

- Orbital elements, which describe the motion of the object's center of mass around Earth,
- Attitude, which describes the motion of the object around its center of mass,
- Size and shape,
- Lifetime of the orbit,
- Ballistic coefficient, which specifies the rate at which the orbital semi-major axis decays,
- Mass of the object, and
- Properties of the material.

These data, along with statistical information on the number of objects of a certain size in a certain region over a period of time, are entered into catalogues of space objects. Several catalogues currently track space objects, including the USSTRATCOM catalogue and the space object catalogue of the Russian Federation. Using both of these catalogues, the Database and Information System Characterizing Objects in Space (DISCOS) is updated and maintained by the European Space Agency. Information contained in

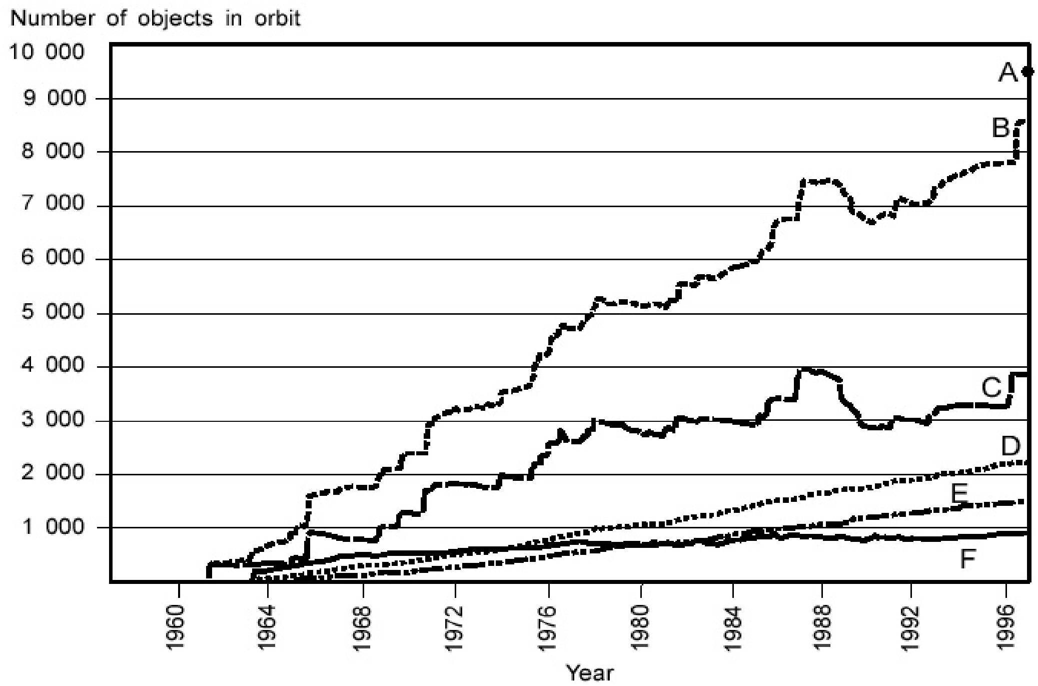
DISCOS includes the location and number of current orbital objects; a historical record of debris in orbit; data that can be used to model the behavior of orbiting objects; and data through which future launch and operational activity can be predicted. (United Nations, 2005)

According to the European Space Agency, in 2003 there were approximately 10,000 catalogued debris objects orbiting the Earth, while there is no good estimate for exactly how many uncatalogued objects exist. The 10,000 catalogued objects were categorized into the following five types with the distribution of each as noted

- Operational spacecraft – 7 percent,
- Mission-related objects – 13 percent,
- Rocket bodies – 17 percent,
- Old spacecraft – 22 percent,
- Miscellaneous fragments – 41 percent.

Exhibit L-3 shows the total number of objects in orbit by year and type of object.

Exhibit L-3. Number of Objects in Orbit by Year and Type of Object



A: Total number of objects, including objects not contained in the official catalogue
B: Total number of objects, based on the official catalogue
C: Fragmentation debris; fragments are counted since the year of event; fragmentation parents are counted as intacts until the date of event; since the event date the parents are counted as fragments
D: Spacecraft
E: Rocket bodies
F: Operational debris; operational debris related to a launch are counted since the year of launch; Salyut 4, 5, 6, 7 and Mir operational debris are not counted since the date of launch of the parent but since a more realistic date

Note: This figure does not take into account objects that have re-entered the atmosphere.

Source: United Nations, 2005

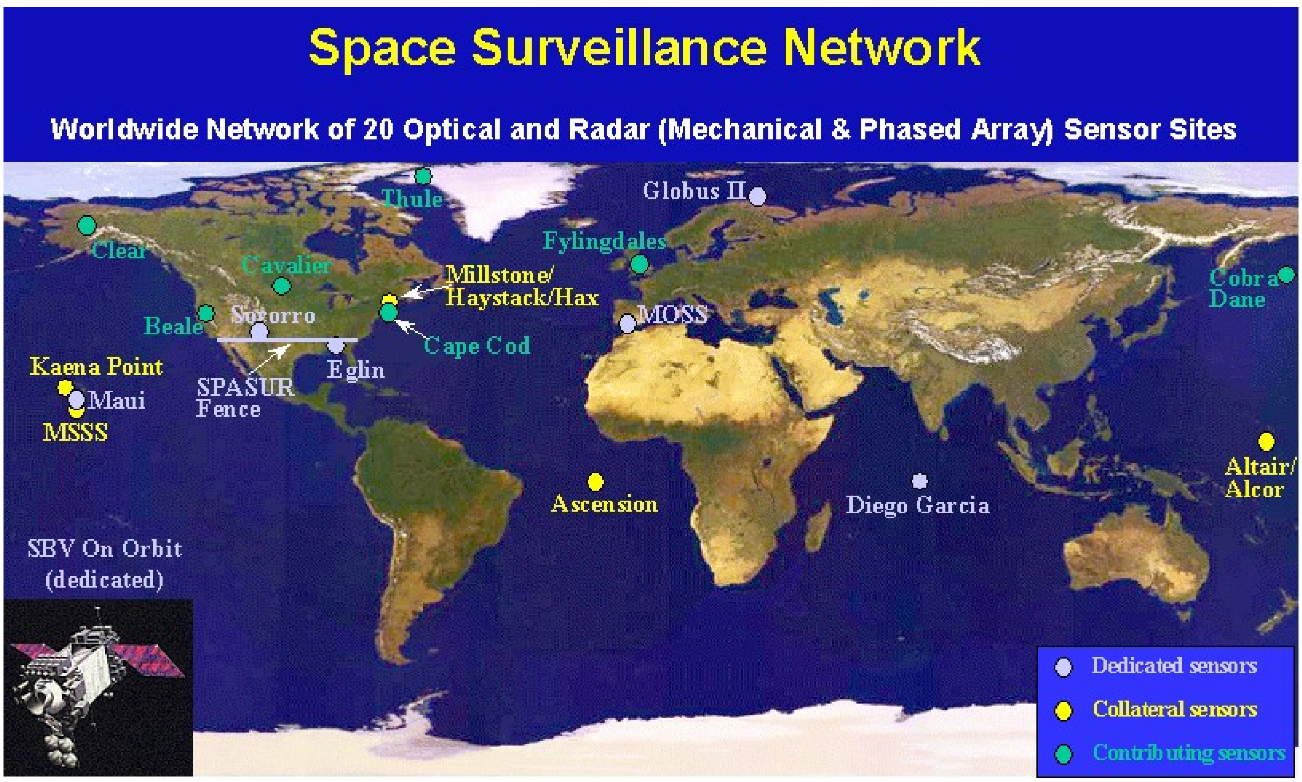
USSTRATCOM uses its SSN to accomplish space surveillance tasks. This involves detecting, tracking, identifying, and cataloging man-made objects orbiting the Earth, including active and inactive satellites, spent rocket bodies, or fragmentation debris. The functions of USSTRATCOM include

- Predicting when and where a decaying space object will re-enter the Earth's atmosphere,
- Charting the present position of space objects and predicting their paths,
- Detecting new man-made objects in space,

- Producing a catalogue of man-made objects in space,
- Determining which country owns a reentering object, and
- Informing NASA if any object might interfere with the space shuttle or the ISS.

The SSN is comprised of ground-based radars and optical sensors at 25 sites operated by the U.S. Army, Navy, or Air Force. Exhibit L-4 depicts the locations of 20 of these sensor sites. Since its beginning in 1957, SSN has tracked 24,500 space objects and currently tracks 8,000 orbiting objects. While its primary concern is operational satellites, USSTRATCOM tracks all space objects greater than 10 centimeters (4 inches) in diameter, including space debris. (U.S. Space Command, 2005)

Exhibit L-4. USSTRATCOM Space Surveillance Network



Source: U.S. Space Command, 2005

USSTRATCOM estimates that of the space objects it tracks, 7 percent are operational satellites, 15 percent are rocket bodies, and 78 percent are inactive or fragmented satellites. (U.S. Space Command, 2005) Therefore, commercial and government satellites are by far the largest contribution to not only space objects but to space debris as well.

L.3 Standards and Policy for Managing Orbital Debris

This section discusses various Federal standards and guidelines for managing and minimizing the risk from orbital debris. This includes the National Space Policy, White House Office of Science and Technology Policy (OSTP), 2006; DoD Directive 3100.10; NASA Safety Standard 1740.14; and the AFSPC policy directive *UPD10-39*.

L.3.1 National Space Policy (OSTP, 2006)

The National Space Policy was issued by the White House Office of Science and Technology Policy in 2006 and addresses specific space guidelines for civil space, commercial space, and national security. In order to support major U.S. space policy objectives, the policy identifies priority intersector guidance related to the defense, international, civil, and commercial space sectors. Among this intersector guidance, issues concerning space debris minimization are addressed. The policy states that NASA, the intelligence community, and DoD, in cooperation with the private sector, will develop design guidelines for future Government procurements of spacecraft, launch vehicles, and services. The design and operation of space tests, experiments, and systems will minimize or reduce accumulation of space debris consistent with mission requirements and cost-effectiveness.

Because it is in the interest of the U.S. Government to ensure that space debris minimization practices are applied by other space faring nations and international organizations, the policy states that the U.S. Government will take a leadership role in international forums to adopt policies and practices aimed at debris minimization. In addition, the U.S. Government will cooperate internationally in the exchange of information on debris research and the identification of debris mitigation options.

L.3.2 Department of Defense Directive 3100.10

The DoD Directive 3100.10 issued in July of 1999 is an update of the DoD Space Policy. It incorporates new policies and guidance disseminated since the last DoD Space Policy update in 1987. It assigns responsibilities and establishes a comprehensive policy framework for the conduct of space and space-related activities. This framework is meant to help articulate the need for capabilities, guide the allocation of resources, and direct program activities.

Among the operational guidance provided, the directive echoes the White House's 1996 National Space Policy regarding the minimization of space debris created. It states that the design and operation of space tests, experiments, and systems shall strive to minimize or reduce the accumulation of such debris consistent with mission requirements and cost effectiveness.

The directive also addresses policy regarding spacecraft end-of-life. It states that spacecraft disposal at the end of mission life shall be planned for programs involving on-orbit operations. Spacecraft disposal shall be accomplished by atmospheric reentry, direct retrieval, or maneuver to a storage orbit to minimize or reduce the impact on future space operations.

L.3.3 NASA Standard

NASA's Safety Standard 1740.14, *Safety Standard Guidelines and Assessment Procedures for Limiting Orbital Debris*, is a set of guidelines addressing how to dispose of spacecraft and structures that will eventually become orbital debris. The standard is divided into three different categories according to the altitude of the spacecraft or structure. These categories apply to structures at altitudes below 2,000 kilometers (1,243 miles), above 2,000 kilometers (1,243 miles), and those that are in near-circular 12-hour orbits. (NASA, 1995)

Spacecraft or structures with perigee altitude (the point at which the structure is closest to the Earth) below 2,000 kilometers (1,243 miles) in its final mission orbit will be disposed of by one of three methods. These are considered the methods of disposal for final mission orbits passing through LEO.

- ***Atmospheric reentry option*** - The structure is left in an orbit. Using conservative projections for solar activity, the structure will last no longer than 25 years after completion of mission. This is due to atmospheric drag. If drag enhancement devices are used to reduce the orbit lifetime, it must be demonstrated that such devices will significantly reduce the area-time product of the system or will not cause spacecraft or large debris to fragment if a collision occurs while the system is decaying from orbit.

- ***Maneuvering to a storage orbit between LEO and GEO*** - The structure can maneuver to an orbit with a perigee altitude above 2,500 kilometers (1,554 miles) and an apogee (the point at which the structure is furthest from Earth) altitude below 35,288 kilometers (21, 928 miles) (500 kilometers [311 miles] below GEO altitude). (Antonio, 2005)

- ***Direct retrieval*** - The structure is retrieved and removed from orbit within 10 years after completion of the mission.

Spacecraft or structures with perigee altitude above 2,000 kilometers (1,243 miles) in their final mission orbits will be disposed of by one of two methods. These are considered the methods of disposal for final mission orbits with perigee altitudes above LEO.

- ***Maneuvering to a storage orbit above GEO altitude*** - Maneuver to an orbit with a perigee altitude above the GEO altitude by a specific distance, which must be calculated according to a formula. A program will use the post-mission disposal strategy that has the least risk of leaving the vehicle near GEO in the event of a failure during the disposal process. Because of fuel gauging uncertainties near the end of mission, it is suggested that the maneuver be performed in a series of at least four burns, which alternately raise apogee and then perigee.

- ***Maneuvering to a storage orbit between LEO and GEO*** - Maneuver to an orbit with perigee altitude above 2,500 kilometers (1,554 miles) and apogee altitude below 35,288 kilometers (21,928 miles) (500 kilometers [311 miles] below GEO altitude).

Final mission orbits with perigee altitudes above 19,900 kilometers (12,366 miles) and apogee altitudes below 20,500 kilometers (12,739 miles), as well as final mission orbits that are (300 kilometers [186 miles] near-circular 12-hour orbits are disposed of using another method. For such orbits, the spacecraft or structure should be maneuvered to an orbit with perigee altitude above 2,500 kilometers (1,554 miles) and apogee altitude below 19,900 kilometers 12,366 miles) or to an orbit with perigee altitude above 20,500 kilometers (12,739 miles) and apogee altitude below 35,288 kilometers (21,928 miles). This would result in placing the spacecraft or structure approximately 500 kilometers [311 miles] below or above GEO altitude.

L.3.4 USSTRATCOM Policy Directive

USSTRATCOM is a unified command under the DoD that oversees the Army, Navy and Air Force Space Commands. In 2001, the U.S. Space Command (USSPACECOM) (now part of USSTRATCOM) prepared a policy directive that applies to all branches. According to this policy directive, *Satellite Disposal Procedures (UPD10-39)*, satellites should be disposed of by one of the following five methods. (U.S. Space Command, 2001)

- ***Atmospheric Reentry*** - This method requires maneuvering the satellite to an orbit in which atmospheric drag will cause atmospheric reentry within 25 years of mission completion. If atmospheric reentry is performed by a planned deorbit, it should be planned such that any remaining portions of the satellite will impact the Earth only in non-populated, preferably oceanic areas.

- ***Between LEO and MEO*** - This method requires maneuvering the satellite to an orbit with a perigee altitude above 2,000 kilometers and an apogee altitude below 19,700 kilometers.

- ***Between MEO and GEO*** - This method requires maneuvering the satellite to an orbit with a perigee altitude above 20,700 kilometers and an apogee altitude below 35,300 kilometers.

- ***Above GEO*** - This method requires maneuvering the satellite to remove it from Earth orbit into a heliocentric orbit.

- ***Direct Retrieval*** - This method requires retrieving the satellite and removing it from orbit as soon as is practical after mission completion.

L.4 MDA Activities and Orbital Debris Risk

This section describes the MDA flight test activities that have resulted in or may result in the generation of orbital debris. It discusses how MDA analyzes its activities to identify, assess and mitigate risk, and also describes MDA's participation in on-going governmental debris risk assessment activities.

L.4.1 MDA Activities

Successful flight tests of the BMDS in the exoatmosphere would result in kinetic energy (i.e., hit-to-kill) intercepts that would produce both target and interceptor debris clouds. With the need for increasingly realistic test scenarios, MDA is considering high altitude, high velocity intercept tests. MDA analysis of BMDS flight tests employing ground-launched interceptors shows that the majority (90 to 95 percent) of post-intercept debris reenters the Earth's atmosphere within six hours. A small amount of post-intercept debris may become orbital debris; however, modeling indicates that risk to spacecraft from intercept debris is far lower than the risk posed by existing background debris. Additional efforts are on-going to determine flight test risks in the space environment and resulting potential impacts on orbiting spacecraft.

L.4.2 MDA Risk Analysis

Prior to every BMDS flight test, MDA assesses the risks posed to spacecraft from the post-intercept debris. Launch times are selected to preclude any conjunctions between spacecraft and intercept debris. If necessary, additional analysis is conducted to determine safe launch times within windows thereby minimizing the risks to spacecraft. This analysis allows MDA to determine when to safely conduct a flight test.

A typical BMDS flight test planning process starts approximately 18 to 24 months prior to the mission launch date. The intercept debris risk assessment addresses both surface and space risk areas. Using an intercept debris model designed and verified and validated for hit-to-kill intercepts, the target and interceptor debris clouds are calculated. This model considers the mass properties and engagement conditions (e.g., altitude, velocity, flight path angle). The debris clouds are propagated forward in time and conjunctions between spacecraft and the intercept debris are identified. Launch times are selected when no conjunctions occur. At times, additional analysis is conducted to determine the probability of impact between spacecraft and intercept debris. This analysis is very thorough and complete. It considers the time and spatial dependence of the intercept debris density, satellite dwell time within the intercept debris field, and satellite area. Once again, launch times are selected when the risk level is low. The MDA works with Air Force Space Command and NASA to make sure all spacecraft are considered including manned spacecraft.

This analysis is performed throughout the entire mission planning process up to the day and hour of launch. It is refined continuously as the mission date nears. Early analyses assist in determining the mission feasibility and aid in mission planning and execution.

It is important to note that both surface and space risk analyses are conducted initially to determine a scenario's feasibility before it is deemed acceptable and the mission planning process starts. If the risks are considered too high (both surface and space), the scenario is redesigned before mission planning ever begins.

L.4.3 MDA Coordination

MDA is participating in the development of an inter-Agency workgroup to ensure that BMDS flight tests are conducted in a manner that permits a thorough and realistic testing of the BMDS while minimizing risk to manned and unmanned spacecraft per the National Space Policy, OSTP, 2006 as implemented by DoD Directive 3100.10. MDA is currently working with NASA, AFSPC, USSTRATCOM, and several other government agencies to establish a safe means to conduct more operationally representative flight tests.

These efforts build upon the current analytic process and inter-Agency coordination procedures as mentioned above. Risks would be assessed for launch window screening to minimize the risk to both manned and unmanned spacecraft with the goal of developing criteria for protecting space assets.

L.5 References

Aerospace Corporation, 2005. "Space Debris Basics: What is Orbital Debris?" Center for Orbital and Reentry Debris Studies, 16 February. http://www.aero.org/capabilities/cords/debris-basics.html, accessed December 2005.

Antonio, Franklin, 2005. "What does Perigee mean?" http://www.perigee.net/kepmodel.html, accessed April 2005.

Encyclopedia, 2005. "Encyclopedia of Astrobiology, Astronomy, and Spaceflight." http://www.daviddarling.info/encyclopedia/G/graveyard_orbit.html, accessed April 2005.

National Aeronautics and Space Administration (NASA), 2004a. "Orbital Debris Education Package." Johnson Space Center, Orbital Debris Program Office. http://www.orbitaldebris.jsc.nasa.gov/library/EducationPackage.pdf, accessed December 2005.

National Aeronautics and Space Administration (NASA), 2004b. "Orbital Debris Frequently Asked Questions." Johnson Space Center, Orbital Debris Program Office. http://www.orbitaldebris.jsc.nasa.gov/faqs.html, accessed December 2005.

National Aeronautics and Space Administration (NASA), 2003. "Atmospheric and Chemistry Data & Resources." NASA, Internet Publication. http://disc.gsfc.nasa.gov/acdisc/atmospheric_structure.shtml, accessed December 2005.

National Aeronautics and Space Administration (NASA), 1995. *NASA Safety Standard Guidelines and Assessment Procedures for Limiting Orbital Debris*. NSS 1740.14, August.

Patera, Russell P., and William H. Ailor, 1998. "The Realities of Reentry Disposal." http://ax.losangeles.af.mil/axf/studies/docs/reentrypaper.pdf, accessed April 2005.

United Nations, 2005. *Technical Report on Space Debris*. ISIS: International Space Information Service, United Nations Office for Outer Space Affairs. http://www.oosa.unvienna.org/isis/pub/sdtechrep1/index.html, accessed March 2005.

U.S. Department of Transporation (DOT), 2001. *Programmatic Environmental Impact Statement for Licensing Launches*, May. http://ast.faa.gov/lrra/comp_coop.htm, accessed December 2005.

United States Space Command, 2001. *Satellite Disposal Procedures*. Policy Directive 10-39 (UPD10-39), 1 February.

U.S. Strategic Command, 2005. "Space Control: Re-entry Assessment and Space Surveillance, Fact File." http://www.stratcom.mil/fact_sheets/fact_spc.html, accessed December 2005.

White House Office of Science and Technology Policy (OSTP), 2006. "U.S. National Space Policy." http://www.ostp.gov/html/US_National_Space_Policy.pdf, accessed November 2006.

APPENDIX M
PERCHLORATE TECHNICAL APPENDIX

Foreword

This appendix is not intended to be a stand-alone document or create DoD or MDA policy with respect to perchlorate-related issues. This technical appendix was prepared in response to public comments received on the BMDS PEIS.

This appendix

- Provides an overview of the uses, manufacturing, and disposal of perchlorate for both general commercial purposes and specific MDA or DoD uses;
- Presents DoD's significant contributions to perchlorate detection technology and ongoing research into potential health effects, viable alternatives and treatment methods; and
- Describes health effects and ecological impacts of perchlorate, and the development of an RfD and guidance levels for perchlorate.

This appendix is necessary to support MDA analysis of the potential environmental impacts of BMDS proposed activities, which includes the use of perchlorate as an oxidizer in rocket motors, and to respond to public comments regarding perchlorate that MDA received on the Draft BMDS PEIS.

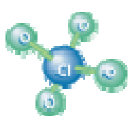
Specifically, public commenters requested that the PEIS

- Address health impacts on susceptible populations including fetuses and children;
- Factor an inhalation pathway for exposure to ammonium perchlorate, including assessments for both public and occupational exposure;
- Present the findings used to support the development of the proposed state guidance levels for perchlorate rather than relying on the findings of the Perchlorate Study Group;
- Include the findings of the NRC of the National Academy of Sciences (NAS) report;
- Include detailed estimates of perchlorate waste likely to be generated by system development, testing, deployment, and decommissioning; and
- Include site-specific analyses of the impacts of perchlorate debris on any freshwater lake or confined ocean areas that might receive perchlorate debris.

PERCHLORATE TECHNICAL APPENDIX

M.1 Introduction

Perchlorate is a common component in a number of commercial industry and government applications. The most common use is as an oxidizer in rocket motors, explosives, and pyrotechnics. Historical disposal practices resulted in the release of perchlorate to the environment. Contemporary concern about perchlorate stems from improved detection capabilities that revealed varying concentrations in ground water. Several human systems, especially the thyroid, have been shown to be sensitive to perchlorate. Historically, perchlorate was once used to treat thyroid disorders in people with a thyroid condition called Graves' disease. This appendix provides a review of the uses, manufacturing, and disposal of perchlorate for both general commercial purposes and specific MDA or DoD uses. It presents DoD's significant contributions to perchlorate detection technology and ongoing research into potential health effects, viable alternatives and treatment methods. Additionally, the appendix describes health effects and ecological impacts of perchlorate, and the development of guidance levels for perchlorate.



Perchlorate (ClO_4^-) is an anion, or negatively charged ion, that originates from both natural and man-made sources. The basic chemical composition of perchlorate consists of an atom of chlorine surrounded by four atoms of oxygen. Perchlorate is manufactured and used as a solid salt compound that typically contains ammonium, potassium, magnesium, or sodium. For this reason, the terms perchlorate and perchlorate salts are used interchangeably and are inclusive of all forms of perchlorate compounds.

Perchlorate is of interest to this analysis because of public concerns over the compound's presence in the natural environment and its potential effects on human health. In 1998, the U.S. Environmental Protection Agency (U.S. EPA) added perchlorate to the contaminant candidate list, which is U.S. EPA's priority list of drinking water contaminants. Contaminants on this list may require regulation and may undergo additional research and data collection before U.S. EPA can determine whether or not a regulation is appropriate. Although U.S. EPA has not determined whether a drinking water standard is appropriate, ground water contamination from the manufacture and disposal of perchlorate-containing chemicals is controversial and of increasing concern to ensure the safety and quality of the nation's water supply. The detection of perchlorate in drinking water systems is attributable to improvements in detection technology capable of measuring levels of perchlorate found in the environment. Technologies that use ion chromatography with preconcentrators or liquid chromatography with mass spectrometry can now detect perchlorate to sub ppb levels. One ppb is equivalent to a single kernel of corn in a silo measuring 16 feet in diameter and 45 feet high full of corn. See Exhibit M-1 for a comparison of existing perchlorate analytical laboratory methods.

Exhibit M-1. Perchlorate Analytical Laboratory Methods Comparison

Method	Description	Target Reporting Limit	Source
Current U.S. EPA Methods			
Method 314.0	Uses an ion chromatography instrument that includes an anion separator column, an anion suppressor device, and a conductivity detector. Includes alternatives for cleanup (pretreatment) procedures to cope with interfering ions.	0.1 µg/L is target reporting limit for perchlorate in drinking water	U.S. EPA. 1999. "Method 314.0. Determination of Perchlorate in Drinking Water using Ion Chromatography." Revision 1.0. National Exposure Research Laboratory, Office of Research and Development. November.
Method 9058	Uses an ion chromatography instrument that includes an anion separator column, an anion suppressor device, and a conductivity detector.	4 µg/L is Limit of Quantitation (LOQ). Method detection limit is 0.7 µg/L in ground water.	U.S. EPA. 2000. "Method 9058. Determination of Perchlorate using Ion Chromatography with Chemical Suppression Conductivity Detection." Revision 0. SW-846 Update IVB. November.
Method 314.1	Uses a preconcentrator to remove common interferents, including chloride, carbonate, and sulfate. In addition, provides for use of a second column to confirm identity of perchlorate.	0.5 – 1 µg/L	U.S. EPA. 2005e. "Determination of Perchlorate in Drinking Water Using Inline Column Concentration/Matrix Elimination Ion Chromatography with Suppressed Conductivity Detection." Document number 815-R-05-009. Revision 1.0. May. http://www.epa.gov/safewater/methods/pdfs/method_314_1.pdf.
Method 331.0 – "Determination of Perchlorate in Drinking Water by Liquid Chromatography Electrospray Ionization Mass Spectrometry"	Uses a different chromatographic method to separate perchlorate from other ions, which may be more effective in reducing interference. Tandem mass spectrometry provides a tool to eliminate sulfate interference. The method quantitates perchlorate against an isotopically labeled (oxygen-18) internal standard. This method may provide versatility needed for difficult matrices.	0.02 µg/L	U.S. EPA. 2005f. "Determination of Perchlorate in Drinking Water by Liquid Chromatography Electrospray Ionization Mass Spectrometry." Document number. Revision 1.0. Document number 815-R-05-007. January. http://www.epa.gov/safewater/methods/met331_0.pdf Accessed January 2006.
Method 332.0 – "Determination of Perchlorate in Drinking Water Using Ion Chromatography with Suppressed Conductivity	Substitutes an electrospray ionization mass spectrometry (ESIMS) detector for the conductivity detector of Method 314.0. Provides confirmation of identity of perchlorate or definite evidence of false positive results from interferents. Can handle relatively high	0.1 µg/L Ion Chromatography/Mass Spectrometry (IC/MS) and 0.02 µg/L (IC/MSMS)	U.S. EPA. 2005g. "Determination of Perchlorate in Drinking Water Using Ion Chromatography with Suppressed Conductivity and Mass Spectrometric Detection." Revision 1.0. Document number EPA/600/R-05/049. March. http://www.epa.gov/nerlcwww/m_332_0.pdf, accessed January 2006.

Method	Description	Target Reporting Limit	Source
and Mass Spectrometric Detection”	concentrations of total dissolved solids.		
Methods Under Development			
Method 6850 – “Determination of Perchlorate Using High Performance Liquid Chromatography/ Mass Spectrometry”	Uses the technology of Method 331.0 to separate perchlorate from other ions and the technology of Method 332.0 to confirm the identity of perchlorate and quantitate it.	Practical quantitation limits (PQL) are 0.2 µg/L for water (drinking water, simulated ground water, and Great Salt Lake water), 2 µg/L for soil, and 6 µg/L for biota (grass). Method detection limits are about 1/3 of the PQLs.	U.S. EPA. 2004b. E-mail message regarding perchlorate analysis. From Mike Carter, (EPA Federal Facilities Restoration and Reuse Office) to John Quander. July 14.
“Rapid Determination of Perchlorate Anion in Foods by Ion Chromatography – Tandem Mass Spectrometry”	Developed in support of an ongoing program for collection and analysis of foods to measure perchlorate content. Samples are extracted by food-specific methods. Extracts are then separated by ion chromatography as in Method 332.0 and determined by the technology (including the internal standard) used in Method 331.0.	LOQs are 0.5 µg/L for drinking water, 1 µg/L for fruits and vegetables, and 3 µg/L for milk	FDA. 2004. “Draft Rapid Determination of Perchlorate Anion in Lettuce, Milk, and in Bottled Water by HPLC/MS/MS.” Revision 0. Dated March 17. Downloaded July 15 from http://www.cfsan.fda.gov/~dms/clo4meth.html.
Field Screening Method for Perchlorate in Water and Soil	A field screening colorimetric method for perchlorate was developed by the U.S. Army Corps of Engineers (USACE). This method was published as a report (ERDC/CRREL TR-04-8), which is available for download at http://www.crrel.usace.army.mil/techpub/CRREL_Reports/reports/TR04-8.pdf.	Detection limits: 1 µg/L for water; 0.3 µg/g for soil	USACE. 2004. Field Screening Method for Perchlorate in Water and Soil. U.S. Army Engineer Research and Development Center (ERDC)/Cold Regions Research and Engineering Laboratory (CRREL) TR-04-8. April.

Source: Environmental Protection Agency, Office of Solid Waste and Emergency Response (OSWER): Perchlorate Treatment Technology May 2005 (EPA 542-R-05-015) http://www.clu-in.org/download/remed/542-r-05-015.pdf

While perchlorate has been detected in the drinking water of 35 states plus Puerto Rico and the Mariana Islands, the apparent absence of perchlorate in other regions may be due to the small number of sampled areas. (U.S. EPA, 2005d)

The U.S. EPA is responsible for establishing Federal drinking water standards where this is considered appropriate. Several Federal agencies initiated collaborative research efforts to better understand the fate, effects, and potential remediation strategies for perchlorate in the environment. This effort was initially coordinated by the Interagency

Perchlorate Steering Committee (IPSC), followed in 2002 by the establishment of the Perchlorate Interagency Working Group (IWG). The IWG is coordinated by the Office of Management and Budget and the Office of Science and Technology Policy and includes several agencies – White House CEQ, U.S. EPA, DoD, NASA, Department of Health and Human Services, and Department of the Interior.

Because of data limitations and controversies regarding the interpretation of the research results on perchlorate in U.S. EPA's draft perchlorate risk assessments, the IWG asked the NRC of the NAS to independently assess the state of the science regarding potential thyroid disruption, levels of chronic inhibition of iodine uptake that lead to adverse effects, and levels at which changes in thyroid hormones lead to adverse effects. The NRC was also tasked to review the scientific literature and findings from the U.S. EPA's 2002 draft risk assessment, *Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization*.

The NRC study recommended an RfD of perchlorate of 0.0007 mg/kg per day.[1] The NRC stated that this value is supported by clinical studies, epidemiologic studies, and studies of long-term perchlorate administration. The NRC report concluded that the proposed RfD of 0.0007 mg/kg per day should protect even the most sensitive populations. The U.S. EPA established a reference dose of 0.0007 mg/kg per day of perchlorate in its Integrated Risk Management System based on the NRC report. Doses below the RfD are considered safe. Doses exceeding the RfD will not necessarily lead to adverse effects as there are uncertainties incorporated into the calculation of the RfD. The possibility that adverse effects might occur increases the higher the dose is above the RfD.

M.2 Use and Manufacturing

Commercial industry and government entities use perchlorate for many applications. Perchlorate currently is used in approximately 250 types of munitions (approximately 14 percent) used by DoD today. The most common application is as an oxidizer in rocket motors, explosives, and pyrotechnics. Section M.3 discusses other industrial uses of perchlorate. It is estimated that 92 percent of perchlorate is sold for end-use as an oxidizer in solid rocket fuel, 7 percent as an explosive, and 1 percent for other uses. (Crowley, 2004) Oxidizers are the compounds that release oxygen to support a combustion reaction. The high ignition temperature, controllable burn rate, and stable chemical characteristics of perchlorate make it one of the most efficient and reliable materials currently available for use as an oxidizer. (DoD, 2005a)

[1]The RfD is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime. It can be derived from a no observed adverse effect level (NOAEL), lowest observed adverse effect level (LOAEL), or benchmark dose, with uncertainty factors generally applied to reflect limitations of the data used.

All military services (Air Force, Army, and Navy) use munitions, ordnance, etc. that contain perchlorate at the following types of facilities: ammunition plants, research laboratories, depots, proving grounds, testing facilities, rocket maintenance facilities, and training bases. (DoD, 2005a)

The principal ingredient in solid rocket propellant is ammonium perchlorate (a perchlorate salt), making the DoD and NASA the largest users of this type of perchlorate in the U.S. (DoD, 2005b; Aerospace Corporation, 2002) In fact, more ammonium perchlorate is used for solid rocket fuel production than for all other perchlorate uses combined. (AWWA, 2005) The GBI, Standard Missile-3, THAAD missile, PAC-3 missile, and the KEI under development are MDA missiles that use solid propellants containing perchlorate.

Of the four perchlorate salts listed in Exhibit M-2, ammonium perchlorate is the most commonly used. Although the four perchlorate salts have similar effects once introduced into the environment, they have distinctly different uses as outlined in Exhibit M-2.

Exhibit M-2. Military and Commercial Uses of Perchlorate Salts

Type of Perchlorate	Uses
Ammonium (NH_4ClO_4)	Solid rocket fuel oxidizer, flares, explosives, pyrotechnics, and chemical processes
Potassium ($KClO_4$)	Solid rocket fuel oxidizer, flares, air bag inflation systems, pyrotechnics such as fireworks, training simulators, hand grenade delays, aircraft countermeasures, and detection of defects in thyroid function (medical use)
Magnesium ($Mg(ClO_4)_2$)	Military batteries
Sodium ($NaClO_4$)	Slurry explosives, electro-machining, and chemical processes (precursor to potassium and ammonium perchlorate)

Source: American Pacific Corporation, 2005; California EPA, 2004; DoD, 2005; NRC, 2005; Greer et al., 2002; U.S. EPA, 2002

In the U.S., two companies began full-scale commercial production of perchlorate-containing chemicals in the 1940s, with combined production volumes ranging from 1 to 15 million pounds per year. (U.S. EPA, 2002) Production peaked in the 1980s with volumes of 20 to 30 million pounds per year. (U.S. EPA, 2002) Annual production volumes have been decreasing from 16.4 million pounds of Grade I ammonium perchlorate in 2002 to between 10 million and 11 million pounds in 2004. (Crowley, 2004) In 2003, NASA's Space Shuttle program used a little more than half of the ammonium perchlorate produced and DoD (including MDA) used the majority of the remaining ammonium perchlorate produced that year.

M.3 Other Sources of Perchlorate

Although military uses account for much of the perchlorate produced and used, other sources exist including those derived from

- Storage, handling, and use of Chilean nitrate-based fertilizers containing perchlorate;
- Manufacturing, storage, handling, use, and/or disposal of fireworks containing perchlorate;
- Manufacturing, storage, handling, use, and/or disposal of road flares containing perchlorate;
- Manufacturing, storage, handling, use, and/or disposal of explosives or pyrotechnics containing perchlorate; and
- Manufacturing, storage, handling, and use of electrochemically-prepared chlorine products (primarily those that contain chlorate or were manufactured from chlorate feedstocks). (SERDP, 2005)

Chilean Nitrate Fertilizer: Records show that between 1909 and 1929, the U.S. imported an estimated 19 million tons of Chilean nitrate (Goldenwieser, 1919 and Howard, 1931, as cited in SERDP, 2005), 65 percent of which was used as fertilizer. (Brand, 1930, as cited in SERPD, 2005) U.S. EPA research found an average perchlorate content in Chilean nitrate of about 0.2 percent. Using this average, approximately 49 million pounds of perchlorate may have been unknowingly applied to agricultural crops during this time. (SERDP, 2005) The use of Chilean nitrate fertilizer has declined but it is still used in limited quantities. (SERDP, 2005) The "Santa Ana Regional Water Quality Board officials have recently acknowledged that a major source of perchlorate pollution in some Southern California drinking water supplies may be the Chilean nitrate fertilizer that was applied to the region's citrus crops for decades into the early 20th century. (Press Enterprise Company, 2004)

Fireworks: In 2003, 221 million pounds of fireworks were consumed in the U.S. (SERDP, 2005) Perchlorate is used as an oxidizer in fireworks; however, there is little information related to the amount of perchlorate residue remaining after burning fireworks or on the number of dud fireworks used. Therefore, it is difficult to estimate potential perchlorate inputs from fireworks to the environment. Recent studies have detected perchlorate in soils, ground water and/or surface water following fireworks displays. (SERDP, 2005)

Safety Flares: Preliminary research indicates that 3.6 grams of perchlorate can potentially leach from an unburned, damaged (e.g., run over by a motor vehicle) 20-minute road flare. It has been estimated that some 20 to 40 million flares may be sold annually. Given this estimate, up to 237,600 pounds of perchlorate could leach from road flares annually. (SERDP, 2005) Studies have shown that one unburned flare can leach up to 243,000 ppb of perchlorate when in contact with 15 liters of water for 3.5 hours. This could be enough to contaminate up to 2.2 acre-feet of water to 4 ppb. Under similar conditions, even completely burnt flares released perchlorate at rates up to 130 ppb per flare. (DoD, 2005b)

Blasting Explosives: Some explosives can contain substantial amounts of perchlorate (e.g., up to 30% by weight). Most of the perchlorate would be consumed during the detonation; however, spills, improper use, or misfires could potentially result in contamination of surface and ground water. (SERDP, 2005)

Chlorine Chemicals: During the electrochemical manufacture of chlorine products, such as chlorate, perchlorate may be formed as an impurity at concentrations of 50 to 500 mg/kg. The North American annual chlorate manufacturing capacity is estimated at 2.4 million tons, and the total annual consumption of sodium chlorate in the U.S. is approximately 1.2 million tons. (SERDP, 2005) The pulp and paper industry uses approximately 94% of all sodium chlorate consumed in the U.S. and effluents from pulp mills have been reported to contain chlorate (1 to 70 milligrams per liter). (SERDP, 2005) However, there is little information about the potential for perchlorate release from these facilities. Sodium chlorate is also used as an herbicide and defoliant for cotton, sunflowers, sundangrass, safflower, rice, and chili peppers. (SERDP, 2005)

Natural Sources: Tests conducted by Texas Tech University suggest that there is a natural flux of atmospheric perchlorate to the Earth as well as a natural perchlorate level. (Environmental Science and Technology Online News, 2005) With improved detection methods researchers have found low levels of perchlorate in many locations. The Texas Tech study found highly variable data ranging from levels too low to detect to levels measuring in the ppb. (Environmental Science and Technology Online News, 2005) The specific reasons for this variability were not determined and follow on studies have been proposed.

Exhibit M-3 shows the current and historical uses of perchlorate.

Exhibit M-3. Current and Historical Uses of Perchlorate

Raw Product	Product/Process	Role of Perchlorate in the Product/Process
Perchlorate Salts	Ammonia production	Ingredient of catalytic mixtures used in making ammonia
	Detonating compositions	Oxidizing Agent
	Matches	Oxidizing Agent
	Pyrotechnic compositions	Oxidizing Agent
	Railroad signal (fuse) compositions	Oxidizing Agent
	Smoke-producing compounds	Oxidizing Agent
	Metallurgical	Constituent of brazing fluxes, welding fluxes
	Pharmaceutical	Used in compounding and dispensing practice
	Air bags for vehicles	Initiators
	Paints and enamels	Curing/Drying Agent
	Photography	Flash powder/ oxidizing agent
	Oxygen generators	Burn Rate Modifier
	Road flares	Oxidizing Agent
	Ejection seats	Propellant
	Model rocket engines	Propellant
	Rockets used for research, satellite launches, and Space Shuttle	Propellant
	Some explosives in construction, mining and other uses	Oxidizing Agent
	Fireworks	Oxidizing Agent
	Voltaic cells and batteries involving lithium or lithiated anodes, non-aqueous solvents or polymeric films, and manganese dioxide or other transition metal oxides	Electrolyte (Lithium perchlorate)
	Zinc and magnesium batteries	Electrolytes (Zinc perchlorate and magnesium perchlorate)
	Electropolymerization reactions involving monomers such as aniline, benzidine, biphenyl, divinylbenzene, and indole	Electrolyte
	Polyvinyl chloride	Dopants to improve heat stability and fire retardation characteristics
	Thin film polymers such as polyethylene oxide, polyethylene glycol, or poly (vinylpyridine)	Dopant to impart conductive properties in various electrochemical devices
	Drying agent for industrial gases and other similar applications	Desiccant (Anhydrous magnesium perchlorate)
	Plastics and polymers	Dopants to impart antistatic and conductive properties
Perchloric Acid	Nitrogen measurement	Used for Kjeldahl digestions
	Leather tanning	Extraction of chromium

Raw Product	Product/Process	Role of Perchlorate in the Product/Process
	Potash measurement	Used to form insoluble potassium perchlorate
	Manufacture of inorganic chemicals, intermediates, organic chemicals, pharmaceuticals, synthetic aromatics	Oxidizing Agent
	Manufacture of explosive compounds, such as the perchlorated esters of monochlorohydrin.	Reagent
	Ingredient of lead-plating baths	Facilitates the deposition of lead from baths containing lead perchlorate
	Electropolishing operations	Electrolyte in anodization of metals to produce non-corroding surfaces
	Metallurgy	Extraction of rare earth metals
	Etching brass and copper	Acid
	Acetylations, alkylations, chlorinations, polymerizations, esterifications, and hydrolyses	Catalyst
	Cellulose acetate production	Esterification of cellulose
	Destruction of organic matter, especially in preparation for the determination of calcium, arsenic, iron, copper, and other metals	Acid digestion, in combination with nitric acid
	Determination of copper and other metals in sulfide ores	Acid digestion
	Dissolving refractory substances such as titanium slags	Acid digestion
	Ammonium perchlorate, high purity metal perchlorates	Starting material for the manufacture of pure ammonium perchlorate and in the production of high purity metal perchlorates
	Pickling and passivation of iron and steels	Oxidant
	Determination of silica in iron and steel and in cement and other silicate materials	Dehydrating Agent
	Determination of chromium in steel, ferrochrome, chromite, leather, and chromatized catgut	Oxidizing Agent
	Separation of chromium from other metals by distillation of chromyl chloride	Used in combination with hydrochloric acid
	As a primary standard acid	Perchloric acid, when distilled in a vacuum at a carefully regulated pressure, has exactly the composition of the dihydrate, 73.6% $HClO_4$
	Indirectly in the manufacture of anhydrous magnesium perchlorate	Dehydrating Agent

Raw Product	Product/Process	Role of Perchlorate in the Product/Process
	Titration of bases in non-aqueous solvents	As the strongest of the strong acids dissolved in anhydrous acetic acid
	Analytical procedures for the destruction of organic matter prior to the determination of metallic and non-metallic ingredients such as: • Determination of sulfur in coal, coke, and oils; • Determination of iron in wine, beer, and whiskey; • Determination of chromium and of iron in leather and tanning liquors; • Determination of phosphorus, alkali metals, lead, and other ingredients; and • Analysis of blood for calcium and of urine for lead.	Destruction of organic matter (mixtures of perchloric acid dihydrate with nitric acid or sulfuric acid, or of these three acids together)
Chilean Sodium Nitrate	Fertilizers	Incidental ingredient in fertilizers (largely historical, but soils previously treated may still contain perchlorate)
	Charcoal briquettes	Naturally occurring by-product
	Meat tenderizers	Naturally occurring by-product

Source: SERDP, 2005

M.4 Disposal

As seen in Exhibit M-3, perchlorate can enter the environment through a variety of sources including: solid rocket propellant, Chilean nitrate fertilizers, fireworks, safety flares, blasting explosives, and electrochemically-prepared chlorine products. However, the discussion on disposal of perchlorate in this appendix focuses on the disposal of perchlorate generated by DoD activities.

Perchlorate is most commonly used in solid rocket propellant. Solid rocket propellant has a finite shelf life and periodically must be replaced. Consequently, a large amount of ammonium perchlorate has been disposed of since the 1950s. For example, the SRM fuel used in the GBIs has a planned shelf life of approximately 20 years. However, the solid rocket fuel contained in the Minuteman missiles has remained viable for 32 years. The specific chemical composition of the SRM propellant and the environmental conditions (temperature and humidity) of the storage area influence the shelf life of the SRM propellant. (California EPA, 2004)

Although the exact amounts of perchlorate disposed of are not available, the number of pounds of SRM requiring disposal has been reported. In 1998, the U.S. had 55 million pounds of SRM propellant requiring disposal. This amount is projected to grow to over 164 million pounds by the end of 2005. (U.S. EPA, 2002) The Minuteman III Propulsion

Replacement Program will remove over 35 million pounds of propellant from 1,200 first and second stage motors to recover and reuse the motor cases. (ESTCP, 2000)

Most of the perchlorate that has been found in ground water is due to past disposal practices that are no longer used today. Past disposal methods for solid rocket propellant included open-burning, open-detonation, or static (stationary) firing of SRMs as well as dumping off-specification batches of solid propellant. In some isolated past practices, the wastewater was discharged into unlined waste ponds. Many areas where perchlorate has been detected in ground water are located near weapons and rocket fuel manufacturing facilities and disposal sites, research facilities, and military bases. (DoD, 2005a)

The Services have prepared various directives and instructions regarding the responsibility of safely managing munitions and rocket engines. For example, as discussed in OPNAV Instruction 8026.2A, Navy Munitions Disposition Policy (15 June 2000), DoD Directive 5160.65 (Nov 81), "Single Manager for Conventional Ammunition," designated the Secretary of the Army as the Single Manager for Conventional Ammunition (SMCA). The SMCA is assigned responsibility for demilitarization, recycling, declassification and disposal of all munitions (SMCA and non-SMCA managed) except large strategic missile rocket motors. The Director, Strategic Systems Programs (DIRSSP) is responsible for Navy large strategic missile rocket motor demilitarization, reclamation, declassification and disposal.

These directives and instructions prohibit many of the past disposal practices and have established DoD's preferred hierarchy of demilitarization and disposal techniques for minimizing environmental, health and safety impacts.

- Complete reuse or recycling of system components and materials,
- Reprocessing system components and materials into a useful format,
- Sale or donation to the private sector and other governments, and
- Waste disposal (as a final resort).

At MDA and throughout DoD, significant effort is expended in reusing excess or surplus rocket engines by providing them to one of the Services for use as target vehicles or lift vehicles. In fact, a significant portion of the target vehicles acquired by MDA are obtained from the Services. This practice prevents the excess or surplus rocket engine from becoming a waste that would need to be managed.

In cases when a Service cannot use the rocket engine, as is the case in some rocket engine remanufacturing or demilitarization programs, the rocket engine might be destroyed using controlled firings or the rocket popellant washed out of rocket motor casings using high-pressure water or other techniques such as cryogenic removal. Although some of these processes might generate wastewater streams containing dissolved rocket propellant, they are handled and managed in accordance with appropriate wastewater regulations.

Specifically, non-hazardous wastewaters are handled as industrial wastewaters that are treated in wastewater treatment plants. Wastewaters that might exhibit one of the characteristics of a hazardous waste under the Resource Conservation and Recovery Act (RCRA) are treated and disposed of in a RCRA Subtitle C facility or are discharged via a National Pollution Elimination Discharge System permitted outfall. (ESTCP, 2000) Likewise, solid waste streams are handled in accordance with either the industrial waste (Subtitle D) regulations or the hazardous waste (Subtitle C) regulations to safely manage and prevent the introduction of hazardous constituents into our environment. The waste handling requirements of RCRA ensure the public is protected from the hazards of waste disposal, and that any wastes that may have been spilled, leaked or improperly disposed are cleaned up. (ESTCP, 2000; Motzer, 2003; U.S. EPA, 2004)

M.5 Department of Defense Efforts

The DoD has been a leader in perchlorate-related research. The DoD developed and contributed to establishing technologies that detect perchlorate at extremely low levels. Prior to 1997, the lowest detection level was 400 ppb. Through cooperation with DoD, U.S. EPA approved a method, Method 314.0, that allows detections as low as 1- 4 ppb.[2] The state of California started using a 4 ppb detection limit prior to the approval of U.S. EPA Method 314.0. Following the detection of these lower levels, DoD and other Federal and state authorities formed the IPSC. The Committee assembled the leading perchlorate specialists to coordinate efforts to better understand the occurrence, health effects, treatability and waste stream handling, analytical detection, and ecological impacts of perchlorate contamination in drinking water and irrigation water supplies. The IPSC aimed to address public concerns about perchlorate and to provide real-time information on the issue. Its collaborative efforts continue under the 2002 IWG that funded the 2005 independent review of the perchlorate issue by the NRC.

In 2000, DoD formed the Perchlorate Workgroup to coordinate internal perchlorate research and technology development. Through the Workgroup, DoD cooperates with Federal, state, and local officials and host communities to effectively address perchlorate concerns at active, base realignment and closure (BRAC) sites, and Formerly Used

---

[2] The original perchlorate detection method, EPA Method 314.0, was based on ion chromatography with a conductivity detector. There have been concerns about the potential for both false positive and false negative identifications as well as this methods ability to reliably detect and quantitate low concentrations. The Office of Water has now published several new perchlorate methods using either ion chromatography or liquid chromatography coupled to a mass spectrometer detector which results in identifications that are extremely reliable. (See Exhibit M-1.) In addition, the Office of Solid Waste is developing analogous mass spectrometer methods applicable to soil, sediment and waste samples that are also very sensitive with measurement capabilities in the parts per trillion range.

Defense Sites. The Workgroup's mission is to provide for further research into the actual extent of perchlorate in ground and surface water, pollution prevention measures, safe and effective alternatives to perchlorate, potential health effects from chronic, low-level perchlorate exposure in drinking water, ecological effects, and suitable treatment technologies. To date, DoD has spent over $59 million on efforts including: investigations into perchlorate sampling and analysis, identifying and evaluating innovative and cost-effective remediation technology, applying pollution prevention principles to minimize and eliminate perchlorate waste streams, and finding alternatives to perchlorate in munitions. MDA continues to follow DoD policy and guidance regarding the sampling and analysis of perchlorate.

The DoD's action plan reflects a commitment to protect public health and the environment by

- Sampling for perchlorate;
- Establishing priorities for sampling and monitoring that reflect the most sensitive exposure pathways;
- Monitoring and determining appropriate actions to prevent migration of perchlorate into drinking water supplies;
- Incorporating Federal or state regulatory standards, whichever are more stringent, into the DoD's clean up program once standards are established for perchlorate; and
- Preventing pollution and investing in finding substitutes for the various military uses of perchlorate that will have less public health and environmental concerns. (SERDP, 2005)

Perchlorate Recycling Efforts

In December 2002, the Army established a missile recycling center at Anniston Army Depot in Alabama. This recycling center enables the Army to safely dispose of obsolete and over-aged tactical missiles in an environmentally responsible manner. The Army estimates that 600,000 outdated missiles at ammunition storage sites and plants across the country and overseas need to be recycled over the next 10 to 15 years. The Army estimates that 98 percent of the missile hardware, warhead explosives and propellant ingredients can be reused or recycled into various industrial or military applications. The current recycling production rate at this facility is approximately 15,000 missiles annually. The Army hopes to be able to recover over 80 million pounds of ammonium perchlorate to be used in new military munitions or converted into various industrial products including potassium perchlorate (used by the air bag industry), perchloric acid, and other specialty chemicals. (DoD, 2005a)

Researching Alternatives to Perchlorate

DoD is currently evaluating alternatives to perchlorate in munitions. For example, the Army is in the process of replacing perchlorate in two training simulators which are responsible for the majority of the perchlorate expended (fired) on Army training ranges today. The M115A2/Ground Burst projectile simulator and the M116A1/Hand Grenade Simulator expend approximately 10.8 tons of perchlorate per year for training. The perchlorate is consumed when the simulators are used; however, concern over the integrity of the cardboard casing in the rain, and the chance of incomplete consumption of the perchlorate led the Army to replace the perchlorate composition as a precautionary measure. The Army expects to have the replacement simulators fielded and operational by 2006. (DoD, 2005a)

Other examples of replacement efforts include potential alternatives for rocket and missile propellants, smoke formulations for rockets, and flares and signals. The DoD carefully weighs safety, cost, and potential for contamination when determining which munitions to target for perchlorate replacement. (DoD, 2005a)

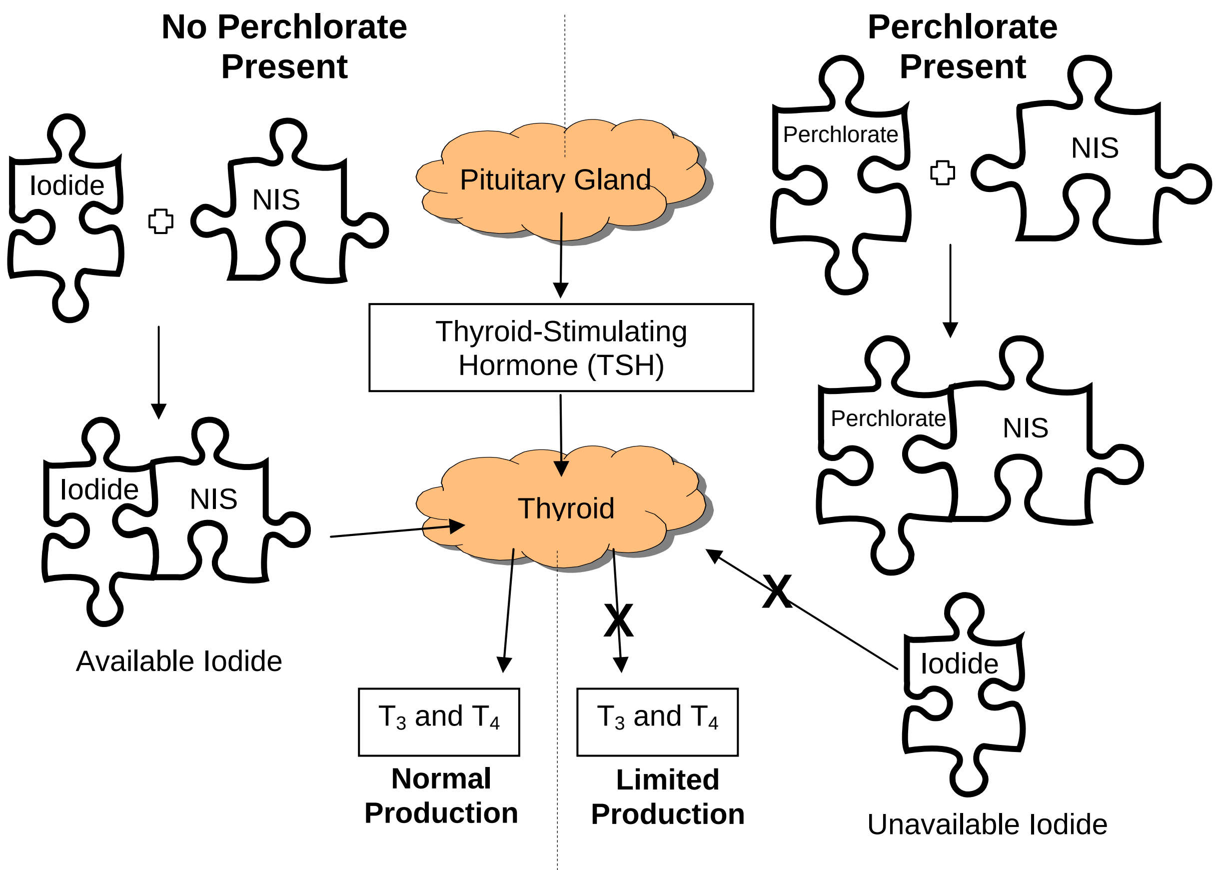
M.6 Human Health Effects

Detection of perchlorate in drinking water is critical to evaluating human health and ecological effects. This section of the appendix presents a general review of the thyroid gland, one of the more perchlorate-sensitive human systems, and discusses the effects of perchlorate exposure on the thyroid and non-thyroid related functions. MDA reviewed numerous scientific studies on the effect of perchlorate on the thyroid gland and on other human systems, as well as epidemiological (population studies) and animal toxicology studies. The primary literature reviewed by MDA included U.S. EPA's draft risk assessment Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization (2002), and the NRC report entitled Health Implications of Perchlorate Ingestion (2005). The NRC of the NAS was asked to assess independently the adverse health effects of perchlorate ingestion from clinical, toxicological, and public-health perspectives. They were also asked to evaluate the relevant scientific literature and key findings underlying U.S. EPA's 2002 draft risk assessment. In response to the request, the NAS convened the Committee to Assess the Health Implications of Perchlorate Ingestion and published their comprehensive report in January 2005.

M.6.1 Thyroid Function

Current research demonstrates that the human thyroid gland is one of the more sensitive glands affected by perchlorate. The thyroid gland converts iodide, found in many foods that we eat, into thyroid hormones [thyroxine (T_4) and triiodothyronine (T_3)], which aid in regulating metabolic rates throughout the human body. Perchlorate affects the way that iodide is transported into various glands and systems throughout the body. For iodide to enter the thyroid and other glands and systems, it must bind to another molecule, sodium (Na^+)/iodide (I^-) symporter or "NIS." Perchlorate has a similar shape and electric charge as iodide and readily binds with NIS. When NIS is bound to other non-iodide ions (perchlorate), the transport of iodide into the thyroid and other glands is inhibited. Exhibit M-4, Thyroid Hormone Production with and without Perchlorate Present, graphically displays what happens when perchlorate is present in the human body.

Exhibit M-4. Thyroid Hormone Production with and without Perchlorate Present



Proper thyroid function depends on the balance of the negative feedback loop of the hypothalamic-pituitary-thyroid (HPT) axis. The hypothalamus produces thyrotropin-releasing hormone (TRH) that travels to the pituitary gland and stimulates the synthesis of thyroid stimulating hormone (TSH). TSH initiates a series of transduction signals resulting in the synthesis and release of T_3 and T_4. Homeostasis is maintained by an endocrine negative feedback loop; increased circulating levels of T_3 and T_4 lead to a decrease in TRH and TSH secretions resulting, in turn, in decreased thyroid gland activity; conversely, decreased T_3 and T_4 levels in systemic circulation result in an increase in TRH and TSH secretions that stimulate the thyroid gland to increase its activities to synthesize and release additional T_3 and T_4 requires both the presence of sufficient iodide as well as TSH released from the pituitary gland. Feedback regulation through changes to TSH levels protects against both hypothyroidism (deficiency of thyroid hormone) and hyperthyroidism (excess of thyroid hormone). The presence of perchlorate at sufficient doses can inhibit iodide uptake to the thyroid, eventually reducing thyroid hormone levels (T_3, T_4) if maintained for a prolonged period of time at a sufficient level to exceed thyroid compensatory mechanisms, such as the increased TSH production. The T_3 and T_4 thyroid hormones are responsible for regulating the body's metabolic rate, but also for stimulating the development and growth of many kinds of cells throughout the body including in the brain and central nervous system.

As shown in Exhibit M-4, when the transport of iodide into the thyroid is inhibited, there is a decrease in the production of T_4 and T_3. If, in spite of TSH-induced increases in thyroid function, the amount of iodine is still insufficient to keep up with the body's hormone demand, the serum thyroid hormone levels will decrease. For adverse health effects to occur in otherwise healthy adults, thyroid hormone production would likely have to be reduced by at least 75% for months or longer. (NRC, 2005) In sensitive populations (pregnant women, infants, children, and people with low iodide intake or thyroid dysfunction) the dose required to cause hypothyroidism may be lower. However, data are not available to determine the precise level of decreased production that would cause adverse health effects in those sensitive populations.

Humans obtain iodide by ingestion of food or water that contains it. The human body is able to compensate for iodide deficiency; therefore, thyroid hormone production is generally normal even when iodide intake is quite low. Hypothyroidism occurs only if daily iodide intake is below about 10 to 20 grams (about one-fifth to one-tenth of the average intake in the U.S.). However, iodide deficiency of that severity in pregnant women can result in neurodevelopmental deficits and goiter in their children. Lesser degrees of iodide deficiency may also cause significant neurodevelopmental deficits in infants and children. (NRC, 2005)

M.6.2 Perchlorate and the Thyroid

As described in Section M.6.1, perchlorate replaces iodide and results in a decrease of the normal production of thyroid hormones T_4 and T_3. To understand the effect of perchlorate ingestion on the thyroid, it is necessary to equate the concentration of perchlorate in drinking water with a daily intake level, in milligrams for example, to relate the concentration of perchlorate in each test to an amount that would need to be consumed.

The exposure factors established by U.S. EPA for converting a health-based dose level to a drinking water concentration were used to convert a daily dose of perchlorate (e.g., 10 milligrams) to a concentration of perchlorate in ground water (e.g., 5 milligrams (mg) per liter or 5 parts per million [ppm]). (U.S. EPA, 1997) The U.S. EPA-established methodology assumes that healthy adults weigh 70 kg (154 pounds) and drink 2 liters (approximately 0.5 gallon) of water per day. Based on the above example, 10 mg per day times 1 day per 2 liters equals 5 mg per liter, as displayed below.

$$\frac{10\ \text{mg}}{1\ \cancel{\text{day}}} \times \frac{1\ \cancel{\text{day}}}{2\ \text{liters}} = \frac{5\ \text{mg}}{\text{liter}} \quad 5\ \text{ppm}\ (5{,}000\ \text{ppb})$$

The dose of perchlorate (in mg/kg per day) is multiplied by a standard body weight of 70 kg and divided by the number of liters (2 liters) that an adult consumes per day. This converts the concentration of the daily dose into mg per liter, which is approximately equivalent to ppm. For doses of perchlorate that are provided in mg/kg of body weight, the dose is multiplied by the body weight (70 kg) to calculate the total daily dose of perchlorate and equate a comparative ground water contamination. Exhibit M-5, Correlation of Doses and Concentration, presents the concentration of perchlorate in ground water in mg per liter, ppm, and ppb that would be necessary to achieve such a dose.

Exhibit M-5. Correlation of Doses and Concentration

Human and Animal Health Studies		**Groundwater Concentration**		
Dose (mg per day)	**Dose (mg/kg of body weight)**	**mg/liter**	**ppm**	**ppb**
0.001	0.000014	0.0005	0.0005	0.5
0.01	0.00014	0.005	0.005	5
0.05	0.0007	0.025	0.025	25
0.1	0.0014	0.05	0.05	50
0.5	0.007	0.25	0.25	250
1	0.014	0.5	0.5	500
10	0.14	5	5	5,000
100	1.4	50	50	50,000
250	3.6	125	125	125,000
500	7.14	250	250	250,000
1,000	14.3	500	500	500,000
5,000	71.4	2,500	2,500	2,500,000
10,000	142.9	5,000	5,000	5,000,000

U.S. EPA is responsible for setting appropriate drinking water standards. U.S. EPA makes these determinations based on hazard and exposure information and whether or not regulation of perchlorate would provide a meaningful opportunity for health risk reduction. MDA has reviewed available studies in which perchlorate was given to patients with hyperthyroidism and healthy subjects over various amounts of time to determine the effects on thyroid function. As a caveat to the information provided below, it should be noted that the NRC indicated that there is no information on the effects of low level iodide uptake inhibition on iodide-deficient, hypothyroid or borderline hypothyroid pregnant women or neonates. The dosage estimates provided relate to healthy adults who are both euthyroid and iodide replete (see Greer et al., 2002) or to seriously hyperthyroid states followed by maintenance therapy under presumably normal iodide intake levels. Early medical literature during the 1950s and 1960s contained reports of successful treatment of more than 1,000 hyperthyroid patients with high levels of potassium perchlorate (between 400 and 2,000 milligrams per day) for many weeks or months. These dose values correspond to estimated drinking water concentrations (EDWCs)[3] of 200,000 to1,000,000 ppb. Among the patients were 12 pregnant women who had hyperthyroidism and were treated with 600 to 1,000 mg of potassium perchlorate per day (EDWCs: 300,000 to 500,000 ppb). One infant had slight thyroid enlargement that decreased soon after birth. No other abnormalities were reported in the infants. However, no thyroid function tests or neurodevelopmental evaluations were conducted, and the infants did not receive any follow up medical evaluation.

Perchlorate also was used in the 1950s and 1960s to treat hyperthyroidism associated with Graves' disease.[4] Perchlorate was not widely used to treat this disorder, and its use was curtailed when severe hematologic side effects were noticed including aplastic anemia[5] and agranulocytosis[6], and when better antithyroid drugs became available. (NRC, 2005) By 1984, another study administered potassium perchlorate to 18 people with hyperthyroidism caused by Graves' disease. (Wenzel and Lente, 1984) The high doses on the order of 900 mg per day were gradually reduced to an average of 93 mg per day. Absence of the antibodies indicated that the patients no longer had Graves' disease. Thus, one could consider treatment in the latter 12 months to be equal to administration of perchlorate to healthy people. Therefore, the results provide evidence that moderately high doses of perchlorate given chronically to people with a history of hyperthyroidism do not cause hypothyroidism. (NRC, 2005) There are no reports of the appearance of new thyroid disorders, thyroid nodules, or thyroid carcinomas in patients treated with potassium perchlorate for hyperthyroidism. (NRC, 2005)

---

[3] All EDWC values listed are based on the default adult drinking water consumption of 2.0 liters per day and the default adult body weight of 70 kilograms.

[4] According to the National Graves' Disease Foundation (2000), Graves' disease "represents a basic defect in the immune system, causing production of immunoglobulins (antibodies) which stimulate and attack the thyroid gland, causing growth of the gland and overproduction of thyroid hormone. Similar antibodies may also attack the tissues in the eye muscles and in the pretibial skin (the skin on the front of the lower leg).

[5] Aplastic anemia occurs when the bone marrow stops making enough blood-forming stem cells. (Aplastic Anemia and MDS International Foundation, Inc., 2005)

[6] Agranulocytosis occurs when there are an insufficient number of granulocyte type white blood cells. This can cause an individual to become susceptible to an infection or can be caused when white blood cells are destroyed faster than they can be produced. (Medline Plus, 2005)

Exhibit M-6 briefly summarizes the parameters and results of five more recent studies in which lower doses of perchlorate were given to healthy subjects over various amounts of time to determine the effects on thyroid function. Each study measured the amount percent decline of iodide uptake after varying dosages of perchlorate.

Exhibit M-6. Summary of Perchlorate Studies

Study	Subjects	Dosage and Duration	Results
Study 1 - Brabant et al., 1992	5 Men	200 grams of iodide daily for 28 days followed by 900 mg of perchlorate daily for 28 days	Concentration of TSH, T4, and total thyroid iodide content were slightly lower after administering perchlorate
Study 2 - Lawrence et al., 2000	9 Men	10 mg of perchlorate daily for 14 days	No change in the concentration of T4, T3, or TSH A 42% reduction of iodide uptake in the thyroid
Study 3 - Lawrence et al., 2001	8 Men	3 mg of perchlorate daily for 14 days	No statistically significant change in the rate of iodide uptake
Study 4 - Greer et al., 2002	16 men 16 women	0.02 mg/kg 0.1 mg/kg 0.05 mg/kg for a total of 14 days	For 0.02 mg/kg, a 16.4 percent decrease in the rate of iodide uptake For 0.1 mg/kg, a 44.7 percent decrease in the rate of iodide uptake For 0.5 mg/kg, a 67.1 percent decrease in the rate of iodide uptake
Supplemental Study 1 for Study 4 - Greer et al., 2002	1 man 1 woman	0.02 mg/kg 0.1 mg/kg 0.05 mg/kg for a total of 14 days	For 0.02 mg/kg, a 16.4 percent decrease in the rate of iodide uptake For 0.1 mg/kg, a 44.7 percent decrease in the rate of iodide uptake For 0.5 mg/kg, a 67.1 percent decrease in the rate of iodide uptake
Supplemental Study 2 for Study 4 - Greer et al., 2002	1 man 6 women	0.007 mg/kg daily for a total of 14 days	No change in the concentration of T4, T3, or TSH No change in the rate of iodide uptake in the thyroid

Study	Subjects	Dosage and Duration	Results
Study 5 - Braverman et al., 2005	13 Subjects	Placebo daily for 6 months 0.5 mg of perchlorate daily for 6 months (0.007 mg/kg) 3 mg of perchlorate daily for 6 months (0.04 mg/kg)	No change in the concentration of T4, T3, or TSH No change in the rate of iodide uptake in the thyroid

The results of the studies in which thyroid function was assessed in several ways are remarkably consistent. The study subjects were healthy men and women 18 to 57 years old, and no one was taking medications that might influence thyroid radioiodide independently of perchlorate. In the studies in which thyroid radioiodide uptake was measured, the baseline values varied somewhat among the subjects, but no more than expected in healthy people eating their usual diet. The normal range for 24-hour thyroid uptake of radioiodide in many places in the U.S. is between 10 and 30 percent, also reflecting variation in dietary iodide intake. Although individual study groups were small (4 to 10 subjects), the results were highly consistent within each treatment group in that the variance of the change, or lack of change, in thyroid radioiodide uptake during potassium perchlorate administration was similar to or less than the variance at baseline.

The effects of similar doses of potassium perchlorate on thyroid radioiodide uptake were similar. A daily perchlorate dose of 0.007 mg/kg (EDWC: 245 ppb) had no statistically significant effect in two studies (Greer et al., 2002; Braverman et al., 2005); a daily dose of 0.02 mg/kg (EDWC: 700 ppb) had a small effect (about 15 percent inhibition of thyroid iodide uptake) (Greer et al., 2002); and daily doses of 0.03 and 0.04 mg/kg (EDWCs: 1,050 and 1,400 ppb) had no effect in two other studies. (Lawrence et al., 2000; Braverman et al., 2005)

Perchlorate is still used to diagnose defects in the synthesis of thyroid hormones and as a treatment for patients who have developed hyperthyroidism after being exposed to the antiarrythmic drug amiodarone; however, perchlorate is rarely used to treat any type of hyperthyroidism in the U.S.

M.6.3 Nonthyroid Effects of Perchlorate

Exposure to perchlorate can cause other nonthyroid effects. Most human health effects that stem from perchlorate exposure are related to the disruption of the function of the NIS. The disruption is caused by perchlorate binding with the NIS, thereby inhibiting the NIS from binding with iodide. The NIS is present in the human body in

- Salivary glands;
- Mammary glands, especially during lactation;
- Stomach;
- Choroid plexus of the brain; and
- Ciliary body of the eye (Dohan et al., 2003).

Iodide and NIS functions in these tissues are not the same as in the thyroid. The iodide transported into those tissues is not further metabolized as it is in the thyroid gland. Instead, iodide is rapidly returned into the circulation or secreted into the saliva or breast milk. Iodide transport into these tissues has not been confirmed to be required for their normal function, with the possible exception of mammary tissue. Furthermore, TSH has been found to increase only the NIS content in thyroid tissue. Perchlorate acutely inhibits iodide transport in salivary and mammary tissue, but it does not appear to reduce the iodide content of breast milk. (NRC, 2005)

Very small amounts of the NIS have been detected in other tissues, including the heart, kidneys, lungs, and placenta. Perchlorate is not known to cause congenital malformations, but the relationship has not been well studied.

Some of the side effects of high doses of perchlorate – rashes, aplastic anemia, or agranulocytosis – might have been immunologic responses. Those effects could be caused by a direct toxic effect of perchlorate itself, a contaminant of it, or an immunologic reaction to the drug or a contaminant that is not known. The fact that the effects were dose-dependent argues for direct toxicity rather than an immunologic reaction. Regarding a possible immunologic effect of perchlorate, it is not possible to assess potential clinical effects from experiments in which high doses of perchlorate were added directly to immune cells *in vitro*. In summary, there is no evidence that regular ingestion of perchlorate in any dose causes immunologic abnormalities in humans. (NRC, 2005)

M.6.4 Animal Toxicology Studies

The pituitary-thyroid system of rats is similar to that of humans. For example, decreases in thyroid hormone production result in increased secretion of TSH, which then increases thyroid production and release of T_4 and T_3. However, differences in binding proteins, binding affinities of the proteins for the hormones, turnover rates of the hormones, and thyroid stimulation by placental hormones create important quantitative differences between the two species. Therefore, although studies in rats provide useful qualitative information on potential adverse effects of perchlorate exposure, they are limited in their utility for quantitatively assessing human health risk associated with perchlorate exposure.

There are several controversial issues regarding animal toxicology studies. One is the interpretation of results of rat studies that evaluated the effects of maternal perchlorate exposure on offspring brain development. In those studies, female rats were given ammonium perchlorate throughout pregnancy and into the postnatal period. Linear measurements of several brain regions of the male and female pups at several postnatal ages were compared with control values. Serious questions have been raised regarding the design and methods used in those studies. The NRC report agreed with some previous reviewers that the methodological problems, such as possible systematic differences in the plane of section across treatment groups, and the lack of a consistent dose-response relationship, make it impossible to conclude whether or not perchlorate exposure causes changes in brain structure.

Other studies that have received critical attention are rat studies that investigated the effect of maternal exposure on offspring neurobehavior. In the primary study, female rats were treated with ammonium perchlorate throughout pregnancy and into the postnatal period, and the offspring were evaluated with a battery of behavioral tests. Overall, the NRC report found that the functions evaluated (i.e., activity, auditory startle, learning, and memory) were appropriate but no significant effects of perchlorate were observed in any of the behavioral measures except an increase in motor activity in male pups on one day of testing. Because the tests lacked the sensitivity to detect subtle effects, the NRC report concluded that the data were inadequate to determine whether or not gestational or lactational exposure to perchlorate affects behavioral function in rats.

Concerns have also been raised over the significance of the results of a two-generation rat study in which benign thyroid tumors were observed in two male offspring. Both the parent generation and the offspring were given ammonium perchlorate before mating, during mating, gestation, and lactation, and until sacrifice. The NRC report concluded that the thyroid tumors in the offspring were most likely treatment-related, but that thyroid cancer in humans resulting from perchlorate exposure is unlikely because of the hormonally mediated mode of action and species differences in thyroid function.

High doses of perchlorate in humans with hyperthyroidism have caused side effects that could be considered immunologic responses; however, immunotoxicity studies in mice revealed no changes in immunologic function in response to perchlorate exposure. Therefore, the NRC report found that there is no evidence of a causal relationship between perchlorate ingestion and any biologically meaningful stimulatory or inhibitory effect on the immune system in rodents. The report concludes that the side effects in humans were probably toxic effects of the very high doses of perchlorate given to those patients.

M.6.5 Epidemiologic Studies

Numerous epidemiologic studies have examined the associations of environmental exposure to perchlorate in drinking water at levels between 4 and 120 ppb. These studies addressed abnormalities of thyroid hormone and TSH production in newborns, thyroid diseases (i.e., congenital hypothyroidism, goiter, and thyroid cancer), and cancer in infants and adults. (Lamm and Doemland, 1999; Brechner et al., 2000; Crump et al., 2000; F.X. Li et al., 2000; Z. Li et al., 2000; Schwartz, 2001; Morgan and Cassady, 2002; Kelsh et al., 2003; Lamm, 2003; Buffler et al., 2004)

Occupational studies of respiratory exposures up to 0.5 mg/kg perchlorate per day (EDWC: 17,500 ppb) have been conducted. These studies addressed the abnormalities of thyroid hormone and TSH production in adult workers. (Gibbs et al., 1998; Lamm et al., 1999; Braverman et al., 2005) Only one study has examined a possible relation between perchlorate exposure and adverse neurodevelopmental outcomes in children (e.g., attention-deficit-hyperactivity disorder [ADHD] and autism). (Chang et al., 2003) A number of the studies have samples that are too small to detect differences in the frequency of outcomes between exposure groups.

No studies have examined the relationship of perchlorate exposure to adverse outcomes among especially vulnerable groups, such as low-birth weight or preterm infants. In addition, the available studies do not assess the possibility of adverse outcomes associated with perchlorate exposure in infants born to mothers who had inadequate dietary iodide intake. Thus, no direct human data are available regarding a possible interaction between maternal iodide intake and perchlorate exposure.

Nearly all the studies were ecologic studies (i.e., general population studies), which include newborns and children, who are potentially most vulnerable to the effects of perchlorate exposure. Ecologic studies can provide supporting evidence of a possible association but cannot provide definitive evidence regarding cause. Perchlorate exposure of individuals is difficult to measure and was not assessed directly in any of the studies conducted outside the occupational setting. One study took perchlorate measurements directly from drinking-water samples taken from faucets in Chile. (Crump et al., 2000)

The design of an ecologic study is inherently limited with respect to establishing causality. However, results of ecologic studies can be informative when combined with other data on the biology of the thyroid gland, experimental studies of the effects of acute exposure to perchlorate, and studies of occupational perchlorate exposure.

Acknowledging that ecologic data alone are not sufficient to demonstrate whether or not an association is causal, the NRC report provided evidence bearing on possible associations and reached the following conclusions regarding the proposed association of perchlorate exposure with various health end points:

- Congenital hypothyroidism (deficiency of thyroid hormone production). The available epidemiologic evidence is not consistent with a causal association between perchlorate exposure and congenital hypothyroidism as defined by the authors of the studies reviewed by the NRC report. All studies of that association were negative, meaning that perchlorate exposure was not found to cause congenital hypothyroidism.

- Changes in thyroid function of newborns. The available epidemiologic evidence is not consistent with a causal association between exposure to perchlorate in the drinking water during gestation (up to 120 ppb) and changes in thyroid hormone and TSH production in normal-birth weight, full-term newborns. Most of the studies show neither significantly lower T_4 production nor significantly higher TSH secretion in infants born in geographic areas in which the water supply had measurable perchlorate concentrations. However, no data are available on the association of perchlorate exposure with thyroid dysfunction in the groups of greatest concern, low-birth weight or preterm newborns, offspring of mothers who had iodide deficiency during gestation, or offspring of hypothyroid mothers. There have been no adequate studies of maternal perchlorate exposure and neurodevelopmental outcomes in infants.

- Neurodevelopmental outcomes. The epidemiologic evidence is inadequate to determine whether or not there is a causal association between perchlorate exposure and adverse neurodevelopmental outcomes in children. Only one pertinent study has been conducted, an ecologic study that examined the association of perchlorate exposure with autism and ADHD. Although the NRC report considered the inclusion of ADHD plausible, it questions the appropriateness of autism as an end point given that autism has not been observed in the spectrum of clinical outcomes in children who had congenital hypothyroidism and were evaluated prospectively. (Rovet, 1999, 2002, 2003)

- Hypothyroidism and other thyroid disorders in adults. The evidence from chronic, occupational exposure studies and ecologic investigations in adults is not consistent with a causal association between perchlorate exposure at the doses investigated and hypothyroidism or other thyroid disorders in adults. In occupational studies, perchlorate doses as high as 0.5 mg/kg per day (EDWC: 17,500 ppb) have not been associated with adverse effects on thyroid function in workers. However, the small sample sizes in some studies may have reduced the ability to identify important differences, and the studies were limited to those workers who remained in the workforce.

- Thyroid cancer in adults. The epidemiologic evidence is insufficient to determine whether or not there is a causal association between exposure to perchlorate and thyroid cancer. Only two pertinent ecologic studies have been conducted. In one, the number of cancer cases was too small to have a reasonable chance of detecting an association if one existed. (Li et al., 2001) In the second (Morgan and Cassady, 2002), subjects were exposed to both perchlorate and trichloroethylene. It was not possible to adjust for potential confounding variables in either study.

M.7 Ecological Impacts

The potential ecological impacts of perchlorate are discussed in this section. The characteristics and behavior of perchlorate in the environment are explained, followed by a discussion of ecotoxicology in aquatic and terrestrial environments.

M.7.1 Chemical Characterization and Fate in the Environment

The perchlorate anion (ClO_4^-) forms weak bonds with cations (positively charged ions) to produce perchlorate salts (e.g., ammonium, lithium, potassium, and sodium perchlorate salts) and weak complexes. These salts and acids are very soluble in water (>200 grams/liter) with densities greater than water. (Mendiratta et al., 1996) Once dissolved, perchlorate is extremely mobile in water systems. Limited published information is available on the fate of perchlorate in the environment. The scientific literature does not contain environmental partitioning coefficients or degradation rates. The perchlorate ion is highly charged; however, there is no evidence that perchlorate is attracted to soil particles. Therefore, it is likely to move through soil as it does in water. Perchlorate in the soil may be re-released into the environment via leaching from irrigation and/or rainfall. Perchlorate is not expected to be in the atmosphere because it has low vapor pressure; thus, it will not volatilize from water systems or the land. Perchlorate particles can be suspended in the air but return to the ground via dry deposition (gravity) or wet deposition (precipitation).

Perchlorate is chemically stable, meaning that it requires a high amount of energy to break it down. Its stability is based on its atomic structure: four oxygen atoms surrounding each chlorine atom. This results in perchlorate's resistance to degradation and/or biotransformation under most environmental conditions, allowing it to persist for many decades in terrestrial and aquatic systems.

M.7.2 Ecotoxicity

The USAF sponsored studies that evaluated the effects of perchlorate in aquatic systems on primary and secondary production, toxicity to aquatic organisms, decomposition, biodegradation, and bioaccumulation. (USAF, 2002) Terrestrial ecotoxicity is also discussed below.

Aquatic Environment

Studies indicate that the presence of perchlorate has little effect on common processes in the aquatic environment. For example, photosynthesis in aquatic systems was minimally affected by high aquatic perchlorate concentrations. High levels (1,000 ppm) of perchlorate can adversely affect marine phytoplankton or bacterioplankton (secondary production). However, coastal waters are large areas constantly circulating and mixing, and it is unlikely such high concentrations of perchlorate would be encountered except for short periods of time. (USAF, 2002)

Likewise, respiration, as a measure of decomposition in marine and freshwater sediments and wetland peat, was not adversely affected by high perchlorate concentrations. It is unlikely that concentrations exceeding this level would be encountered in sediments except in small regions in direct contact with solid propellant for extended periods of time. Perchlorate concentrations in sediments did not tend to decrease over a seven-day incubation period. Anaerobic bacteria are capable of respiring perchlorate and this process has been observed in perchlorate-contaminated sediments. However, this ability tends to be associated with chronically contaminated systems. (USAF, 2002)

Perchlorate concentrations nearing 30 ppm had no effect on the stickleback, a freshwater to brackish water fish. The study evaluated mating and the birth and growth of young fish. Although morphological or behavioral abnormalities may occur as the young fish matures, these characteristics were not evaluated in this study. (USAF, 2002) Effects measured as growth and mortality, ranged from a No Observed Effects Level (NOEL) of 10 mg/liter in the water flea (*Ceriodaphnia dubia*) to a NOEL of 155 mg/liter in a fresh water fish (*Pimephales promelas*). The Lethal Concentration for 50 percent of the water flea population (LC_{50}) was 66 mg/liter. (U.S. EPA, 2002)

Several studies have evaluated the effect of perchlorate on algae/bacteria and animals in and around an aquatic environment. A USAF study (USAF, 2002) showed that both the microbial and fish components accumulated significant levels of perchlorate. Susarla et al., 2000 also found that perchlorate can accumulate in aquatic vascular plants. Further, both the USAF and Smith et al., 2001 found that perchlorate could be passed on to following trophic levels. The U.S. Army Corps of Engineers study (Condike, 2001) demonstrated that fish tissue concentrations of perchlorate exceed comparable concentrations detected in the water, indicating the bioaccumulation of perchlorate in fish tissue, a conclusion also supported by Smith et al., 2001.

Terrestrial Environment

In the terrestrial environment, perchlorate can influence natural soil processes and can be taken up by plants. For example, in the presence of high levels of perchlorate (between 100 and 1,000 ppm), soil samples exhibited significant decreases in respiration activity indicating that decomposition of perchlorate, nutrient recycling, and potentially plant growth will slow down. (USAF, 2002)

Phytoremediation studies have found that terrestrial plants will uptake perchlorate, first in the leaves, followed by stems, then roots, and that perchlorate concentrations are usually greater than in surrounding soil samples. (Susarla et al., 2000; Parsons, 2001) However, perchlorate was not detected in terrestrial birds, mammals, or insects when soils were reported to contain 0.3 to 0.4 mg/kg of perchlorate. Perchlorate breakdown products – chlorate, chlorite, and chloride – were detected in plant tissues but were not quantified.

M.8 Guidance and Recommendations

No Federal drinking water standard for perchlorate has been established. Although MDA is not responsible for evaluating the health effects or potential risk of perchlorate exposure, it will adhere to any applicable drinking water standards or regulations promulgated by the U.S. EPA or state authorities. Pending the establishment of a drinking water standard, MDA will continue to mitigate potential introduction of perchlorate into the environment by properly disposing of rocket fuel debris resulting from non-normal detonations/explosions of boosters on the pad.

Section M.8.1 discusses the existing Federal guidance on perchlorate from U.S. EPA and the NRC. Section M.8.2 provides explanations of two of the existing state ground water guidance levels that were developed for Massachusetts and California. Section M.8.3 describes other scientific studies that have made recommendations regarding perchlorate levels.

Many of the studies express their scientific findings in terms of an RfD, which is determined based on body weight and is expressed in mg/kg. An RfD is a reference dose level and in itself is not considered a standard that can be implemented as a regulation. To determine a drinking water standard for perchlorate, a number of ppb allowed in drinking water must be calculated. A drinking water standard is developed based on a number of factors, including the RfD, potential exposure to sensitive populations, and possible exposure to perchlorate from other sources (e.g., food, milk).

For example, a recent study by the Environmental Working Group[7] found perchlorate in 31 of 32 California supermarket milk samples taken from supermarkets in Los Angeles and Orange Counties. The levels of perchlorate measured in these samples ranged from non-detectable levels to 3.6 ppb. (FDA, 2005) In a separate study, the Food and Drug Administration found perchlorate in several samples of milk taken from retail locations

[7] The Environmental Working Group is a nonprofit research organization, which uses "the power of information to educate the public and decision-makers about a wide range of environmental issues, especially those affecting public health."

around the country. Perchlorate levels in the milk from these retail locations ranged from 3.16 to 11.3 ppb in 101 out of 104 samples, with perchlorate levels that were not quantifiable in three samples. (FDA, 2005) The mean measured perchlorate level for this study was 5.76 ppb for the 104 samples. The Food and Drug Administration also cited a 2003 Texas Tech University that found perchlorate levels ranging from 1.7 to 6.4 ppb in seven fluid milk samples and 1.1 ppb in one evaporated milk sample. (FDA, 2005)

A separate study completed by Texas Tech University also considered perchlorate content in 47 samples of dairy milk and 36 samples of human milk. Perchlorate was detected in 46 of the dairy milk samples and in all of the breast milk samples. (Kirk et al, 2005) The mean perchlorate levels were 2.0 micrograms/liter in dairy milk and 10.5 micrograms/liter in breast milk, with maximum levels of 11 and 92 micrograms/liter, respectively. (Kirk et al., 2005) Although the Texas Tech study relied on a relatively small sample size the researchers found that perchlorate in breast milk is not well correlated with the water the mothers are drinking. The study hypothesizes that perchlorate consumption comes primarily from food rather than water or beverages. (Kirk et al., 2005)

Iodine-deficient vegetarians (especially women of child-bearing age) have been proposed to be a sensitive, perchlorate-susceptible population; however, studies reviewed by Fields, et al. (2005) indicate that vegetarian diets do not necessarily lead to iodine deficiency and that vegans[8] may actually have excess iodine intake. The authors question the necessity of applying the 10-fold default uncertainty factor (UF) for intraspecies (i.e., within human) variability to protect this hypothetical and unlikely subpopulation.

M.8.1 Federal Guidance

This section provides a description of the recommended guidance related to perchlorate as established by U.S. EPA and the NRC. Each organization reviewed and analyzed existing studies to support its recommendation.

U.S. EPA Analysis and Recommendation

U.S. EPA's perchlorate RfD comes from the technical review of the "Health Implications of Perchlorate Ingestion" by the NRC of the NAS (NRC, 2005). Iodide uptake inhibition was determined to be the key biochemical event that precedes all potential thyroid-mediated effects of perchlorate exposure. Because iodide uptake inhibition is not an adverse effect but a biochemical change, this is a NOEL. The use of a NOEL differs from the traditional approach to deriving an RfD, which bases the critical effect on an adverse outcome. Using a no adverse effect that is upstream of the adverse effect is a

[8] In this instance the term "vegan" applies to someone who is a strict vegetarian; and therefore, consumes no animal food or dairy products.

more conservative and health-protective approach to perchlorate hazard assessment. The resulting official RfD established by U.S. EPA was 0.0007 mg/kg per day of perchlorate. This corresponds to estimated drinking water equivalent level of approximately 24.5 ppb.[9] This level is not a Federal drinking water standard but is consistent with the recommended RfD included in the NRC January 2005 report. (U.S. EPA, 2005b)

The National Academy of Science, National Research Council Analysis and Recommendation

The NRC report on perchlorate exposure and human health, entitled *Health Implications of Perchlorate Ingestion*, emphasized that its RfD recommendation differs from the traditional approach to deriving the RfD in that it recommended using a no adverse effect rather than an adverse one. (NRC, 2005) The report reviewed the human and animal data and found that the human data provided a more reliable point of departure (POD) for the risk assessment than the animal data. The NRC report recommends using clinical data collected in a controlled setting with the relevant routes of exposure to derive the RfD.

The NRC report also did not recommend using the available epidemiologic studies to derive the POD for the risk assessment based on limitations of ecological studies discussed in Section 5.5. Instead, the NRC report recommended using the Greer et al. (2002) study in which groups of healthy men and women were administered perchlorate at 0.007 to 0.5 mg/kg per day (EDWC: 245 to 17,500 ppb) for 14 days. That study identified a NOEL for inhibition of iodide uptake by the thyroid at 0.007 mg/kg per day (EDWC: 245 ppb). The NRC report concluded that the NOEL value from Greer et al. (2002) is a health-protective and conservative POD and is supported by the results of a six-month study of 0.007 mg/kg per day (EDWC: 245 ppb) in a small group of healthy subjects, a four-week study of higher doses in healthy subjects, the studies of perchlorate treatment of patients with hyperthyroidism, and extensive human and animal data that demonstrate that there will be no progression to adverse effects if no inhibition of iodide uptake occurs.

The report's recommendations would lead to an RfD of 0.0007 mg/kg per day. This corresponds to estimated drinking water concentration of approximately 24.5 ppb. That value is supported by other clinical studies, occupational and environmental epidemiologic studies, and studies of long-term perchlorate administration to patients with hyperthyroidism. The report concluded that an RfD of 0.0007 mg/kg per day should protect the health of even the most sensitive populations. The NRC report acknowledges that the RfD may need to be adjusted upward or downward on the basis of future research.

---

[9] A drinking water equivalent level is a conversion of the reference dose to a drinking water concentration taking body weight and water consumption into consideration.

Department of Defense

MDA will follow the perchlorate guidance developed by the DoD that establishes 24 ppb as the current level of concern for managing perchlorate found on DoD sites. The level of concern is based on the RfD established by the NRC study, which was subsequently adopted by the EPA. Where sampling indicates perchlorate concentrations above the level of concern, DoD Components are directed to conduct site-specific risk assessments. If a risk assessment indicates perchlorate concentrations could potentially result in adverse health effects, the site will be prioritized for appropriate risk management. In addition, DoD Components will: (1) assess for off-range migration of perchlorate from operational ranges; (2) test quarterly for perchlorate at DoD-owned drinking water systems until they are satisfied that concentrations are likely to remain below the level of concern; and (3) sample semi-annually at permitted point sources where the use of perchlorate is associated with processes related to the manufacture, maintenance, processing, recycling or demilitarization of military munitions. (DoD, 2006) Sampling results will continue to be maintained in the perchlorate database developed pursuant to the September 29, 2003, "Interim Policy on Perchlorate Sampling," which this policy statement supersedes. (DoD, 2003)

M.8.2 State Guidance

Exhibit M-7 shows state advisory levels for perchlorate that were established as of April 2005.

Exhibit M-7. State Perchlorate Advisory Levels (as of April 20, 2005)

State	Advisory Level	Supplemental Information
Arizona	14 ppb	1998 health based guidelines for child exposures
California	6 ppb	Public health goal – California expects to propose a maximum contaminant level in 2005
Maryland	1 ppb	Advisory level
Massachusetts	1 ppb	Advisory level for children and at risk populations – Massachusetts proposed a maximum contaminant level of 1 ppb and started the evaluation process
Nevada	18 ppb	Public notice standard
New Mexico	1 ppb	Drinking water screening level
New York	5 ppb	Drinking water planning level
	18 ppb	Public notification level
Texas	17 ppb	Residential protective cleanup level
	51 ppb	Industrial/commercial protective cleanup level

Source: U.S. EPA, 2005c

The remainder of this section describes the RfD and guidance levels implemented by the states of Massachusetts and California, and how their decisions were arrived at based on existing scientific research.

Massachusetts Department of Environmental Protection

To establish an RfD for perchlorate, the Massachusetts Department of Environmental Protection applied standard U.S. EPA UFs to the lowest observed adverse effect levels (LOAELs) for animals and humans. (U.S. EPA, 2002a and b; Massachusetts Department of Environmental Protection, 2004) Several sets of UFs were identified and applied to the animal and human LOAELs to arrive at a number of RfDs that span a range of possible true values. The RfD value at the higher end of this range is only 1.3 times the value in the lower end of the range. Since the Massachusetts Department of Environmental Protection as a rule develops a single RfD and not a range, the value of 0.00003 mg/kg per day (EDWC: 1 ppb) was selected as the point estimate for the RfD.

California Environmental Protection Agency

The California Environmental Protection Agency's (California EPA) Public Health Goal is based on the same human clinical study used in the analysis for NASA as described in Section 8.3 below. (Greer et al., 2002; California EPA, 2004) Rather than focusing on T_4 levels, California EPA selected iodide uptake inhibition as the critical effect. Using benchmark dose modeling, a 5 percent decrease in 24-hour iodide uptake ($BMDL_{05}$) was estimated to occur at a dose of 0.0037 mg/kg per day (EDWC: 130 ppb). After the application of UFs and exposure duration, the resulting RfD is 0.00037 mg/kg per day. Using a tap water consumption rate and body weight ratio of 25.2 kg/day per liter for the 95th percentile value of the pregnant woman population and a relative source contribution of 60 percent, the estimated drinking water concentration of 6 ppb of perchlorate was determined.

On August 11, 2005 the California Developmental and Reproductive Toxicant Identification committee, an independent scientific panel, decided against adding perchlorate to the Proposition 65 list of chemicals known to the state of California to cause birth defects or other reproductive harm. The committee can only list a substance if it has been "clearly shown" to cause reproductive toxicity. A decision that a substance falls short of the "clearly shown" standard does not mean that the committee believes that the substance is non-toxic. (California Office of Environmental Health Hazard Assessment, 2005)

M.8.3 Other Recommendations

This section describes three other studies that resulted in the recommendation of a drinking water advisory level for perchlorate. These recommendations are not Federal drinking water standards but add to the general scientific knowledge base regarding perchlorate.

Dollarhide Analysis and Recommendation

As in the California EPA (2004) analysis, the RfD determined by Dollarhide was based on the Greer et al. (2002 study with iodide uptake inhibition as the critical effect. (Dollarhide et al., 2002) However, the benchmark response (an adverse effect, used to define a benchmark dose from which an RfD can be developed) was set at 20 percent inhibition ($BMDL_{20}$) rather than 5 percent inhibition. Therefore, the POD for derivation of the RfD was a $BMDL_{20}$ of 0.02 mg/kg per day. After consideration of UFs and exposure duration, the resulting RfD is 0.002 mg/kg per day. This corresponds to an average drinking water concentration of approximately 65 ppb.

Strawson Analysis and Recommendation

In this analysis, the RfD is based on an epidemiological study of elementary school children (ages 6 to 8) in three regions of Chile with varying degrees of perchlorate contamination. (Crump et al., 2000; Strawson et al., 2003) The drinking water exposure levels were estimated to be 0; 4 to 7; or 100 ppb. There were no effects on T_4 levels in any of the populations following exposure throughout their life (including *in utero*). Therefore, the POD for derivation of the RfD was a free-standing No Observed Adverse Effect Level (NOAEL) of 0.006 mg/kg per day (estimated daily dose based on drinking water concentration). After consideration of UFs and exposure duration, the resulting RfD is 0.002 mg/kg per day. This corresponds to an average drinking water concentration of approximately 65 ppb. A major limitation of the Crump et al. (2000) study is that Chilean children have much higher iodine intake (10-fold) than U.S. children of the same age. Therefore, this study cannot be expected to accurately predict levels of perchlorate exposure associated with adverse effects in populations with normal iodine intake.

Crump and Gibbs Analysis

Crump and Gibbs (2005) performed benchmark calculations for perchlorate using human data from three previous perchlorate studies - Lamm et al. (1999), Greer et al. (2002), and Braverman et al. (2005). They determined that the statistical lower bound on the benchmark dose was between 0.36 - 0.92 mg/kg per day for serum thyroid hormone and 0.21 - 0.56 mg/kg per day for free T4 index. These benchmark dose level values required to cause hypothyroidism in adults would be in agreement with the value of 0.4 mg/kg per day that was obtained by the NRC report (2005).

Exhibit M-8 below provides a summary of the guidance and recommendations discussed in Section M.8. This exhibit shows the citation, a description, and the critical endpoints of the scientific study from which the agencies or organizations based their recommendation. The exhibit also provides a side-by-side comparison of the POD, UFs, and RfD values.

Exhibit M-8. Comparison of Health Criteria Values for Perchlorate Derived by Different Agencies/Groups

	U.S. EPA (2002b)	NRC (2005)[13]	MA Department of Environmental Protection (2004)	California EPA (2004)	TERA (Dollarhide et al., 2002)	TERA (Strawson et al., 2003)
Critical Study	Argus (1998, 2001)	Greer et al. (2002)	Greer et al. (2002); Argus Laboratories (2001)	Greer et al. (2002)	Greer et al. (2002)	Crump et al. (2000a)
Type of Study	Sprague-Dawley rats, neurohistological/ neurodevlopmental toxicity	Human adult volunteers, controlled, clinical, 14 days	Human adult volunteers, controlled, clinical, 14 days; Sprague-Dawley rats, neurohistological/ neurodevelopmental toxicity	Human adult volunteers, controlled, clinical, 14 days	Human adult volunteers, controlled, clinical, 14 days	Human children (6 to 8 years of age) volunteers in Chile, population-based cross-sectional
Critical Study Endpoint(s)	Changes in brain morphometry in pups on post-natal day (PND) 21 and decreasedT_4/increased TSH in dams of effected pups at various pre- & post-natal time intervals	Inhibition of radioiodide uptake by the thyroid	Radioiodide Uptake Inhibition; Brain Morphometry Changes (corpus callosum, striatum, cerebellum)	5 percent decrease in 24-hour iodide uptake after 14 days exposure	20 percent decrease in 24-hour iodide uptake after 14 days exposure	Change in T_4 levels following lifetime exposure, including during gestation
POD (mg/kg per day)	LOAEL = 0.01	NOEL = 0.007	NOAEL = 0.007 LOAEL = 0.01	$BMDL_{05}$ = 0.0037	$BMDL_{20}$ = 0.02	NOAEL = 0.006 (free-standing)
UFs [1]	$UF_H = 3$ $UF_{DUR} = 3$ $UF_L = 10$ $UF_{DB} = 3$	$UF_H = 10$	$UF_H = 10$ $UF_L = 3$ $UF_A = 10$	$UF_H = 10$ $UF_{DUR} = 1$	$UF_H = 10$ $UF_{DUR} = 1$	$UF_H = 3$ $UF_{DUR} = 1$
RfD (mg/kg-day)	0.00003	0.0007	0.000085 – 0.00007 0.00003	0.00037	0.002	0.002

[1] UFs: UF_A = animal to human extrapolation; UF_H = intra-individually in humans; UF_{DUR} = exposure duration; UF_{DB} = database deficiencies; UF_L =LOAEL to NOAEL extrapolation
TERA -Toxicology Excellence for Risk Assessment

[13] A study by Crump and Greer found benchmark dose level values required to cause hypothyroidism in adults would be in agreement with the value of 0.4 mg/kg per day that was obtained by the NRC report (2005)

M.9 References

Aerospace Corporation, 2002. "Assessment of Perchlorate Releases in Launch Operations II." El Segundo, CA: Aerospace Report No. TR-2003(1306)-1, 1 December.

American Pacific Corporation, 1997. "Ammonium Perchlorate." http://www.apfc.com/utah/product1.html, accessed February 2005.

American Water Works Association (AWWA), 2005. "Perchlorate Occurrence Mapping." January. http://www.awwa.org/Advocacy/YourWater/Issues/OnPoint_Perchlorate.cfm, accessed February 2005.

Aplastic Anemia and MDS International Foundation, Inc., 2005. "Ask the Experts: What are these diseases?" http://aplastic.eyemg.com/cgi-bin/faq_answer.pl?id=3998, accessed June 2005.

Argus Research Laboratories, Inc, 2001. "Hormone, thyroid and neurohistological effects of oral (drinking water) exposure to ammonium perchlorate in pregnant and lactating rats and in fetuses and nursing pups exposed to ammonium perchlorate during gestation or via material milk." Protocol no. 1416-003. Argus Research Laboratories, Inc., Horsham, PA.

Argus Research Laboratories, Inc, 1998. "A neurobehavioral developmental study of ammonium perchlorate administered orally in drinking water to rats [report amendment: July 27]." Protocol no. 1613-002. Argus Research Laboratories, Inc., Horsham, PA.

Brabant, G., P. Bergmann, C.M. Kirsch, J. Kohrle, R.D. Hesch, and von zur Muhlen, 1992. Early adaptation of thyrotropin and thyroglobulin secretion to experimentally decreased iodide supply in man. *Metabolism*. 41(10):1093-1096.

Brand, C.J., 1930. "Recent Developments in the Fertilizer Industry, a memorandum." Prepared for the consideration of the Committee on Military Affairs House of Representatives, Washington, DC. Prepared by the National Fertilizer Association. (as cited in SERDP, 2005)

Braverman, L.E., X. He, S. Pino, B. Magnani, and A. Firek, 2005. The effect of low dose perchlorate on thyroid function in workers exposed to perchlorate long-term. *The Journal of Clinical Endocrinology and Metabolism*. 90 (2):700-706, February.

Brechner, R.J., G.D. Parkhurst, W.O. Humble, M.B. Brown, and W.H. Herman, 2000. Ammonium perchlorate contamination of Colorado River drinking water is associated with abnormal thyroid function in newborns in Arizona. *Journal of Occupational Environmental Medicine*. 42(8):777-782.

Buffler, P.A., M.A. Kelsh, E.C. Lau, C.H. Edinboro, and J.C. Barnard, 2004. "Epidemiologic Studies of Primary Congenital Hypothyroidism and Newborn Thyroid Function Among California Residents." Final Report. Berkeley, CA, April.

California Environmental Protection Agency (California EPA), 2004. "Public Health Goal for Perchlorate in Drinking Water." Office of Environmental Health Hazard Assessment, March. http://www.oehha.ca.gov/water/phg/index.html, accessed February 2005.

California Office of Environmental Health Hazard Assessment, 2005. "Scientific panel decides against adding perchlorate to proposition 65 list of toxic chemicals."

Chang, S., C. Crothers, S. Lai, and S. Lamm, 2003. Pediatric neurobehavioral diseases in Nevada counties with respect to perchlorate in drinking water: An ecological inquiry. *Birth Defects Research, Part A, Clinical and Molecular Teratology*. 67(10):886-892.

Condike, B. J, 2001. "Perchlorate data in fish and plants [letter with attachments to Annie M. Jarabek]." Department of the Army, Fort Worth District, Corps of Engineers, 21 December. (as cited in U.S. EPA, 2002)

Crooks, J., and E.J. Wayne, 1960. A comparison of potassium perchlorate, methythiouracil, and carbimazole in the treatment of thyrotoxicosis. *Lancet*. 1:401-404.

Crowley, Matthew, 2004. "Shuttle loss may affect company's sales figures." Las Vegas Review-Journal. 6 February. http://www.reviewjournal.com/lvrj_home/2004/Feb-06-Fri-2004/business/ 23161612.html, accessed December 2005.

Crump, C., P. Michaud, R. Tellez, C. Reyes, G. Gonzalez, E.L. Montgomery, K.S. Crump, G. Lobo, C. Becerra, and J.P. Gibbs, 2000. Does perchlorate in drinking water affect thyroid function in newborns or school-age children? *Journal of Occupational Environmental Medicine*. 42(6): 603-612.

Crump, Kenny S. and John P. Gibbs, 2005. "Benchmark Calculations for Perchlorate from Three Human Cohorts." *Environmental Health Perspectives*. 113:1001–1008 (2005).

Dollarhide J, Zhao Q, Dourson M, 2002. Reference dose for perchlorate based on human studies. Toxicology Excellence for Risk Assessment, 1757 Chase Ave. Cincinnati, OH 45223.

Dohan, O., A. De La Vieja, V. Paroder, C. Riedel, M. Artani, M. Reed, C.S. Ginter, and N. Carrasco, 2003. The sodium/iodide Symporter (NIS): Characterization, regulation, and medical significance. *Endocrine Reviews*. 24(1):48-77.

EA Engineering, Science, and Technology, Inc, 1998. Results of acute and chronic toxicity testing with sodium perchlorate. Brooks Air Force Base, TX: Armstrong Laboratory; report no. 2900. (as cited in U.S. EPA, 2002)

Environmental Science and Technology Online News, 2005. “Atmospheric processes may create perchlorate.” 2 February. http://pubs.acs.org/subscribe/journals/esthag-w/2005/feb/science/rr_ atmospheric.html, accessed December 2005.

Environmental Security Technology Certification Program (ESTCP), 2000. “Ammonium Perchlorate Biodegradation for Industrial Wastewater Treatment.” Cost and Performance Report, Department of Defense, June. http://www.estcp.org/documents/techdocs/, accessed February 2005.

Food and Drug Administration (FDA), 2005. “Exploratory Data on Perchlorate in Food.” http://www.cfsan.fda.gov/~dms/clo4data.html, accessed November 2005.

Fields, C., et al., 2005. Iodine-deficient vegetarians: A hypothetical perchlorate-susceptible population? *Regulatory Toxicology and Pharmacology*.

Gibbs, J.P., R. Ahmad, K.S. Crump, D.P. Houck, T.S. Leveille, J.E. Findley, and M. Francis, 1998. Evaluation of a population with occupational exposure to airborne ammonium perchlorate for possible acute or chronic effects on thyroid function. *Journal of Occupational Environmental Medicine*. 40(12):1072-1082.

Goldenwieser, E.A., 1919. “A survey of the fertilizer industry.” United States Department of Agriculture, Bulletin No. 798, Washington, DC, 20 October. (as cited in SERDP, 2005)

Greer, M.A., G. Goodman, R.C. Pleus, and S.E. Greer, 2002. “Health effects assessment for environmental perchlorate contamination: The dose-response for inhibition of thyroidal radioiodine uptake in humans.” *Environmental Health Perspectives*. 110:927-37.

Howard, P.E., 1931. “A survey of the fertilizer industry.” United States Department of Agriculture, Circular No. 129, Washington, DC, January. (as cited in SERDP, 2005)

Kelsh, M.A. et al., 2003. Primary congenital hypothyroidism, newborn thyroid function, and environmental perchlorate exposure among residents of a southern California community. *Journal of Occupational Environmental Medicine*. 45(10):1116-1127.

Kerr-McGee Chemical Corporation, 2003. "Annual Report." http://www.kerr-mcgee.com/SiteObjects/files/kmg_annualreport_2003.pdf, accessed December 2005.

Kirk, Andrea, P. Kalyani Martinelango, Kang Tian, Aniruddha Dutta, Ernest Smith, and Purnendu Dasgupta, 2005. "Perchlorate and Iodide in Dairy and Breast Milk."

Lamm, S. H, 2003. Perchlorate exposure does not explain differences in neonatal thyroid function between Yuma and Flagstaff. [Letter]. *Journal of Occupational Environmental. Medicine*. 45(11):1131-1132.

Lamm, S.H., and M. Doemland, 1999. Has perchlorate in drinking water increased the rate of congenital hypothyroidism? *Journal of Occupational Environmental Medicine*. 41(5):409-411.

Lawrence, J., S. Lamm, and L.E. Braverman, 2001. Low dose perchlorate (3 mg daily) and thyroid function. *Thyroid*. 11(3):295.

Lawrence, J.E., S.H. Lamm, S. Pino, K. Richman, and L.E. Braverman, 2000. The effect of short-term low-dose perchlorate on various aspects of thyroid function. *Thyroid*. 10(8):659-663.

Li, F.X., D.M. Byrd , G.M. Deyhle, D.E. Sesser, M.R.Skeels, S.R.Katkowsky, and S.H. Lamm, 2000. Neonatal Thyroid-Stimulating Hormone Level and Perchlorate in Drinking Water. *Teratology*. 62(6):429-431.

Li, Z., F.X. Li, D. Byrd, G.M. Deyhle, D.E. Sesser, M.R. Skeels, and S.H. Lamm, 2000. Neonatal thyroxine level and perchlorate in drinking water. *Journal of Occupational Environmental Medicine*. 42(2):200-205.

Li, F.X., L. Squartsoff, and S.H. Lamm, 2001. Prevalence of thyroid diseases in Nevada counties with respect to perchlorate in drinking water. *Journal of Occupational Environmental Medicine*. 43(7):630-634.

Massachusetts Department of Environmental Protection, 2004. "Final Draft Perchlorate Toxicological Profile And Health Assessment." Office of Research and Standards, Boston, MA, May. http://www.mass.gov/dep/toxics/perchlor.pdf, accessed December 2005.

Medline Plus, 2005. "Medical Encyclopedia" http://www.nlm.nih.gov/medlineplus/ency/article/001295.htm, accessed June 2005.

Mendiratta, S.K., R.L. Dotson, and R.T. Brooker, 1996. "Perchloric acid and perchlorates." *Kirk-Othmer Encyclopedia of Chemical Technology*, 4th Ed. J.I. Kroschwitz, and M. Howe-Grant, eds. Vol. 18, pp. 157-170. New York: John Wiley and Sons.

Morgan, J.W., and R.E. Cassady, 2002. Community cancer assessment in response to long-time exposure to perchlorate and trichloroethylene in drinking water. *Journal of Occupational Environmental Medicine*. 44(7):616- 621.

Morgans, M.E., and W.R. Trotter, 1960. Potassium perchlorate in thyrotoxicosis. [Letter]. *British Medical Journal*. (8 October):1086-1087.

Motzer, William E, 2003. "Perchlorate: The New Environmental Concern." 38th Western Regional Meeting of the American Chemical Society, October 15-18. Long Beach Hilton Long Beach, CA. Abstract available at: http://www.dreamweaverproductions.net/wrm2003/envirochem_abs.pdf, accessed February 2005.

National Research Council (NRC), 2005. "Health Implications of Perchlorate Ingestion." Committee to Assess the Health Implications of Perchlorate Ingestions, National Research Council. Washington, DC: National Academy Press. http://www.nap.edu/books/0309095689/html, accessed December 2005.

National Graves' Disease Foundation, 2000. "Frequently Asked Questions About Graves' Disease." http://www.ngdf.org/faq.htm, accessed June 2005.

Parsons Engineering Science, Inc, 2001. "Scientific and technical report for perchlorate biotransport investigation: a study of perchlorate occurrence in selected ecosystems." Interim final. Austin, TX; contract no. F41624-95-D-9018. (as cited in U.S. EPA, 2002)

Press Enterprise Company, 2004. "Fertilizer yields perchlorate, Riverside, California." (as cited in DoD, 2005)

Rovet, J.F, 1999. "Long-term neuropsychological sequelae of early-treated congenital hypothyroidism: Effects in adolescence." *Acta Paediatrica*. 88(432):88-95.

Rovet, J.F, 2002. Congenital hypothyroidism: An analysis of persisting deficits and associated factors. *Neuropsychology, Development, and Cognition, Section C, Child Neuropsychology*. 8(3):150-162.

Rovet, J.F, 2003. Long-term follow-up of children born with sporadic congenital hypothyroidism. *Annales d'endocrinologie*. 64(1):58-61.

Schwartz, J, 2001. "Gestational Exposure to Perchlorate is Associated With Measures of Decreased Thyroid Function in a Population of California Neonates." M.S. Thesis, University of California, Berkeley.

Sharp, Renee, 2004. "Rocket Fuel Contamination in California Milk" The Environmental Working Group. http://www.ewg.org/reports/rocketmilk/, accessed December 2005.

Smith, P.N., Theodorakis, C.W., Anderson, T.A. and Kendall, R.J., 2001. Preliminary Assessment of Perchlorate in Ecological Receptors at the Longhorn Army Ammunition Plant (LHAAP), Karnack, Texas. Ecotoxicology, 10: 305-313. (as cited in USAF, 2002)

Soldin, O.P., L.E. Braverman, and S.H. Lamm, 2001. Perchlorate clinical pharmacology and human health: a review. *Therapeutic Drug Monitoring*. 23(4):316-331.

Strawson J, Zhao Q, Dourson M, 2003. "Reference dose for perchlorate based on thyroid hormone change in pregnant women as the critical effect." Toxicology Excellence for Risk Assessment, 1757 Chase Ave., Cincinnati, OH 45223.

Susarla, S., Bacchus, S.T., Harvey, G. and McCutcheon, S.C., 2000. Phytotransformations of perchlorate contaminated waters. *Environmental Technology*. 21: 1055-1065. (as cited in USAF, 2002)

United States Air Force (USAF) Space and Missile Systems Center, 2002. "Biological Effects of Inadvertent Perchlorate Releases During Launch Operations." TRW Space & Electronics, contract F04701-00-D-0203. http://ax.losangeles.af.mil/axf/studies/docs/uaa093002.pdf, accessed December 2005.

United States Department of Defense (DoD), 2006. "Policy on DoD Required Action Related to Perchlorate." Memorandum from Deputy Under Secretary of Defense (Installations and Environment), 26 January. http://www.dodperchlorateinfo.net/, accessed February 2006.

United States Department of Defense (DoD), 2005a. "Perchlorate Work Group homepage." http://www.dodperchlorateinfo.net/, accessed June 2005.

United States Department of Defense (DoD), 2005b. "Report to Congress: Perchlorate in the Southwestern United States." http://www.dodperchlorateinfo.net/newsroom/announcements/2005/documents/SW-Perchlorate-Final-Rpt.pdf, accessed December 2005.

United States Department of Defense (DoD), 2003. "Interim Policy on Perchlorate Sampling." Memorandum from Principal Assistant Deputy Under Secretary of Defense (Installations and Environment), 29 September. https://www.denix.osd.mil/denix/Public/Library/Water/Perchlorate/Policy/perchlorate_sampling_policy.pdf, accessed September 2005.

United States Department of Defense Strategic Environmental Research and Development Program (SERDP), 2005. "Alternative Causes of Wide-Spread, Low Concentration Perchlorate Impacts to Groundwater." GeoSyntec Consultants, May. http://www.dodperchlorateinfo.net/newsroom/announcements/documents/PerchlorateAlternativeSources.pdf, accessed December 2005.

United States Department of the Navy, 2004. "Interim Guidance on Sampling and Testing for Perchlorate Sampling." Memorandum from Deputy Assistant Secretary of the Navy (Environment) to Components, 5 February. http://www.navylabs.navy.mil/Archive/PerchlorateInterim.pdf, accessed February 2005.

United States Environmental Protection Agency (U.S. EPA), 2005a. "Federal Facilities Restoration and Reuse Perchlorate Homepage." http://epa.gov/swerffrr/documents/perchlorate.htm, accessed February 2005.

United States Environmental Protection Agency (U.S. EPA), 2005b. "Integrated Risk Information System (IRIS): Perchlorate (ClO4) and Perchlorate Salts." http://cfpub.epa.gov/iris/quickview.cfm?substance_nmbr=1007, accessed April 2005.

United States Environmental Protection Agency (U.S. EPA), 2005c. "State Perchlorate Advisory Levels as of 4/20/05." http://www.epa.gov/fedfac/pdf/stateadvisorylevels.pdf, accessed September 2005.

United States Environmental Protection Agency (U.S. EPA), 2005d. "Federal Facilities Restoration and Reuse Perchlorate Links." http://www.epa.gov/fedfac/documents/perchlorate_links.htm#occurrences, accessed October 2005.

United States Environmental Protection Agency (U.S. EPA), 2005e. "Determination of Perchlorate in Drinking Water Using Inline Column Concentration/Matrix Elimination Ion Chromatography with Suppressed Conductivity Detection." Revision 1.0, 815-R-05-009, May. http://www.epa.gov/safewater/methods/pdfs/method_314_1.pdf, accessed January 2006.

United States Environmental Protection Agency (U.S. EPA), 2005f. "Determination of Perchlorate in Drinking Water by Liquid Chromatography Electrospray Ionization Mass Spectrometry." Revision 1.0, 815-R-05-007, January. http://www.epa.gov/safewater/methods/met331_0.pdf, accessed January 2006.

United States Environmental Protection Agency (U.S. EPA), 2005g. "Determination of Perchlorate in Drinking Water Using Ion Chromatography with Suppressed Conductivity and Mass Spectrometric Detection." Revision 1.0, EPA/600/R-05/049, March. http://www.epa.gov/nerlcwww/m_332_0.pdf, accessed January 2006.

United States Environmental Protection Agency (U.S. EPA), 2004. "Basic Information: The Office of Solid Waste (OSW)." http://www.epa.gov/epaoswer/osw/mission.htm, accessed March 2005.

United States Environmental Protection Agency (U.S. EPA), 2002a. "Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization (External Review Draft)." Office of Research and Development, National Center for Environmental Assessment, Washington, DC, NCEA-1-0503. http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=24002, accessed February 2005.

United States Environmental Protection Agency (U.S. EPA), 2002b. "Disposition of Comments and Recommendations for Revisions to 'Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization, External Review Draft.'" 16 January. http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=72117, accessed December 2005.

United States Environmental Protection Agency (U.S. EPA), 1997. Exposure Factors Handbook. EPA/600/P-95/002Fa. http://www.fda.gov/ohrms/dockets/dockets/95s0316/95s-0316-rpt0242-22-Appendix-17-vol177.pdf, accessed December 2005.

Weetman, A.P., C. Gunn, R. Hall, and A. McGregor, 1984. Immunosuppression by perchlorate. *Lancet*. 1(8382):906.

Wenzel, K.W., and J.R. Lente, 1984. Similar effects of thionamide drugs and perchlorate on thyroidstimulating immunoglobulins in Graves' disease: Evidence against an immunosuppressive action of thionamide drugs. *Journal of Clinical Endocrinology And Metabolism*. 58(1):62-69.

Wolff, J, 1998. Perchlorate and the thyroid gland. *Pharmacological reviews*. 50(1):89-105.

APPENDIX N
IMPACTS OF RADAR ON WILDLIFE

IMPACTS OF RADAR ON WILDLIFE

N.1 Introduction

This appendix responds to comments from the USFWS on the Draft BMDS PEIS by providing an analysis of the impacts from radar on wildlife. Specifically, this appendix provides

- Background information including electromagnetic radiation (EMR) wavelengths of concern, radar operations, and characteristics unique to BMDS radars;
- Analysis of biological effects including absorption of EMR, basis for the 1999 Institute of Electrical and Electronics Engineers (IEEE) Standard to Protect Humans from EMR Exposure, thresholds for effects in birds, and studies of effects of EMR on migrating birds;
- Exposure assessment considering bird migration, radar operation, and estimates of duration and magnitude of exposure; and
- Impact characterization including individual and population risks, uncertainties, and mitigation measures.

Concerns raised by the USFWS include consideration of

- The potential effects of radar on very large flocks of migrating birds;
- The sufficiency of evidence to support the statement that no significant adverse impacts to birds would occur even if a bird is not within the most intense area of the beam for any considerable length of time;
- An analysis to describe what constitutes a "relatively small" beam size;
- Description of the potential adverse effect to birds from radar operation;
- Discussion of the potential of using Next Generation Weather Radar (NEXRAD) to help evaluate when large flocks may be in the testing area; and
- The fact that arctic foxes, which are very efficient predators, are present in areas where the COBRA DANE radar operates, and would quickly remove evidence of any bird kills.

The USFWS indicated that the 1993 Final Ground-Based Radar Family of Radars EA report used to support statements concerning potential effects of radar on migrating birds was out of date and inadequate for drawing conclusions of no harm. Some of the qualitative statements concerning no harm to birds can be supported by more quantitative data than was presented in the 1993 report. To do this it was necessary to first review the analyses provided in Appendix A of the 1993 report (Section N.2 of this appendix), and then describe additional quantitative analyses conducted to estimate the probability of harm to populations of migrating birds for this PEIS (Sections N.3 through N.7 of this appendix).

N.2 Review of 1993 EA Analysis of Potential Effects on Migrating Birds

As stated in the Draft BMDS PEIS, the 1993 Final Ground-Based Radar Family of Radars EA analyzed potential impacts on wildlife from EMR on migrating birds that might fly through the path of the radar beams. That analysis concluded that because the main beam would normally be in motion, it would be extremely unlikely that a bird would remain within the most intense area of the beam for any considerable length of time. That analysis also noted that the size of the beam is "relatively small," further reducing the probability of birds remaining within this limited region of space, even if the beam remained stationary. (U.S. Army Space and Missile Defense Command, 2003) The quantitative analyses supporting that conclusion were presented in part in Appendix A of the 1993 EA. (U.S. Army Space and Strategic Defense Command, 1993) The key points of this analysis are presented below.

To estimate a radar power density that might represent a lower threshold for adverse effects in birds based on heating from EMR at frequencies of 8 to 12 gigahertz (GHz), the analysis used data from rats indicating behavioral changes occurring at energy absorption rates of 4 watts per kilogram body weight (W/kg bw) over relatively long periods of time. The American National Standards Institute (ANSI) used the rat exposure studies and a safety factor of 0.1 applied to the 4 W/kg level to derive a maximum exposure level. Considerations such as the relative body size and EMR penetration depth in biological tissues at 10 GHz were used to establish the ANSI 1982 C95.1 limit for continuous human exposure to 10 GHz EMR expressed as a power density of 5 milliwatts per square centimeter (mW/cm^2). That value assumes the polarization of the EM field is aligned with the long axis of the body; other orientations would result in lower EM power absorption rates. In 1991, the IEEE revised that standard based on additional considerations to 10 mW/cm^2 averaged over six minutes, with a peak electric field (E) not to exceed 100,000 volts per meter (V/m) for controlled populations (i.e., occupational exposures). For uncontrolled populations (i.e., the public), the maximum exposures were set to 5.3 to 8 mW/cm^2 for frequencies from 8 to 12 GHz (with averaging times ranging from 11.3 to 7.5 minutes).

To estimate risks to migrating birds from XBR beams, the 1993 EA evaluated the potential for the radar beams to cause heating of bird tissues. Because the metabolic rate associated with sustained flight generally is 7 to 10 times resting metabolic rate, and for peak flight bursts might be as high as 20 times resting metabolic rate, the analysts assumed that birds should be able to tolerate an additional thermal load equivalent to 1 times their basal metabolic rate. The analysts therefore estimated a specific absorption rate (SAR) for birds that, if averaged over the entire body of the bird, would be equivalent to the resting metabolic rate.

Metabolic rates of birds vary with body weight; empirically derived allometric models are available to relate metabolic rate to body weight for different groups of birds (e.g., passerines, seabirds). In general, passerines have higher resting metabolic rates than other groups of birds. (Lasiewski and Dawson 1967) The 1993 EA Appendix A does not specify which allometric equations were used. The analysts noted further that there will be variation in absorption of EM for a given radar beam power density at a given frequency (and wavelength) as a function of bird size. They calculated that for birds weighing between 25 grams (g) and 3.5 kilograms (kg), i.e., from warbler to eagle or goose-sized birds, EMR power densities that would deliver an energy input equivalent to the resting metabolic rate would range from between 38 and 61 mW/cm^2. For the Aplomado falcon (*Falco femoralis*) in particular, the analysis indicated that the power density would have to exceed 42 mW/cm^2 to cause thermal loading equal to 1 times the metabolic rate of the bird.

Finally, based on a volumetric analysis of the proportion of airspace over a radar that would include the radar beam at power densities exceeding 38 to 61 mW/cm^2 averaged over a six-minute interval, analysts concluded that birds in flight had a less than one percent risk of incurring harm from a beam in motion. Specifically, analysts estimated that 0.014 to 0.025 percent (i.e., 1/4,000 to 1/7,000) of the airspace surrounding a radar might contain the beam at any given time. Details of the volumetric calculations were not provided. Note that a six-minute averaging time is likely to be very much longer than is relevant for a bird passing through a moving radar beam. Thus, the EMR power densities of 38 to 61 mW/cm^2, estimated to be thresholds for thermal loading effects in birds, are more conservative than necessary for shorter duration exposures, as discussed below.

N.3 Overview of Appendix

The assessment in this appendix of potential impacts of BMDS radars on migrating birds, particularly during testing phases, focuses on potential duration and magnitude of exposure of birds encountering beams, as well as the likelihood that birds might encounter the beams. This analysis includes review of the most recent basis for the IEEE standards for human exposure to EMR to determine if the bases for those standards have changed. As part of this analysis, reference hazard values were developed for migrating birds that are somewhat more conservative than the ones developed for birds of different sizes for the 1993 EA. Due to the sensitive nature of specifications of individual radars in the BMDS program, radars have been analyzed by category. In some cases, the most powerful radar in operation in each category is well known, with many published sources describing it. Where there is the potential of risk of impact to some birds, the specific radar type and the conditions under which a risk to migrating birds might exist is identified. For instances where a potential risk exists, mitigation measures are provided.

N.4 Background on Radar Systems

The BMDS program includes a large number of different types of radar systems for surveillance, detection, and tracking of missiles. These radar systems are described in Appendix E of this PEIS. Because there are many types of radar systems, it is necessary to provide background on the relationship between EMR frequency and potential for absorption of EMR by animals of different sizes. This discussion is provided in Section N.4.1. Section N.4.2 of this Appendix provides an overview of several types of calculations relevant to estimating radar EMR at varying distances from the source. Section N.4.3 evaluates the potential effects of the proposed BMDS radars on migrating birds.

N.4.1 EMR Wavelengths of Concern

EMR consists of inter-related E and magnetic (H) fields that oscillate at the sending frequency and travel at the speed of light. EMR frequency (f) and wavelength (λ) are related according to the equation:

Equation 1

$$\boldsymbol{\lambda = c/f}$$

where

λ	= wavelength in meters (m)
c	= speed of light (3×10^8 m/second)
f	= frequency in Hertz (Hz; cycles/second)

To facilitate later discussion, Exhibit N-1 shows the relationship between EMR frequency in megahertz (MHz) and wavelength in meters for selected frequencies between 10 MHz and 12,000 MHz.

Exhibit N-1. EMR Penetration Depth in Muscle Tissues vs. Frequency/Wavelength

Frequency (MHz)	Band	Wavelength (meters)	Penetration depth in muscle (cm)	Biological entity of similar size
10	HF	30		
30	VHF	10		
70	VHF	4.3		human
100	VHF	3	6.2	human
300	VHF/UHF	1	3.3	goose
435	UHF	0.69		eagle
650	UHF	0.46		bobwhite, rat
915	UHF	0.33		plover, robin
1,000	UHF/L	0.30	2.5	catbird
2,000	L/S	0.15	2.0	swallow, mouse
2,450	S	0.12		goose or eagle head
3,000	S	0.10	1.7	warbler
4,000	S/C	0.075		
5,000	C	0.06	1.0	
7,500	C	0.04		robin head
8,000	C/X	0.0375		
10,000	X	0.03	0.4	warbler head
11,000	X	0.0273		
12,000	X	0.025		

MHz = megahertz; HF = high frequency, VHF = very high frequency, UHF = ultrahigh frequency; L = long; S = short; C = compromise between X and S bands.
Source for penetration depth: AFRL 2005, Figure 2.

EMR is reflected or absorbed by different materials and objects to varying degrees depending on several parameters, including the material surface characteristics, its conductivity/impedance, the size and shape of the object relative to the wavelength of the incident EMR field, and orientation of the object relative to the incident field. Absorption of EMR is maximal when the long-axis of the object (e.g., animal body) is oriented in the direction of the electric field vector, i.e. the incident plane wave is perpendicular to the body. When wavelengths are much shorter than the length of an animal body, EMR is absorbed in the skin surface facing the source. For wavelengths approximating twice the length of the body, the body itself acts as an antenna to enhance the coupling of the EMR energy into the body.

Dosimetry studies for humans have demonstrated that maximum energy transfer occurs when the height of an individual approximates four-tenths the length of the EMR wavelength. The frequency of maximal absorption is called the resonance frequency, and for humans, it is between 70 and 100 MHz.

The depth to which radar EMR can penetrate biological materials generally decreases with increasing frequency and depends on the impedance of the material. Measured penetration depths for muscle tissue are included for some frequencies in Exhibit N-1; penetration depths for fat are higher (see Figure 2 in AFRL 2005). Thus, the higher the EMR frequency, the more shallow the penetration and the lower the potential for warming effects in an animal, with XBR penetrating only a fraction of a centimeter into muscle tissues.

Exhibit N-1 includes the corresponding wavelengths in meters for comparison with birds of different sizes (considering the length of the body from head to base of tail). For reference, Exhibit N-1 also shows the human and laboratory rat and mouse. Because it is possible for the head (or other body parts) of an animal to have its own resonance and absorption characteristics, estimates of the size of the head of a few types of birds is included as well. From Exhibit N-1, it is clear that the EMR frequencies of most concern for migrating birds range from 300 to 10,000 MHz (wavelengths from about 100 to 3 cm, respectively). EMR with shorter or longer wavelengths is outside of the principal resonant frequencies for migrating birds.

N.4.2 Radar Basics

Radar is an acronym for **RA**dio **D**etection and **R**anging. The radar frequencies are organized by bands: UHF band (300 MHz to 1 GHz), L-band (1 to 2 GHz), S-band (2 to 4 GHz), C-band (4 to 8 GHz), and X-band (8 to 12 GHz).

The power in a radar beam at some distance from the source depends on the power at the source, radar power efficiency, antenna gain, and distance from the source. It is often expressed as a power density (S) in units of watts per unit area. For radar performance calculations, power density is expressed in watts per square meter, and for biological effects, in mW/cm^2. Due to spherical spread, S decreases with the square of the reciprocal of the distance from the radar.

Radar antenna radiation fields are divided into near field and far field regions. Within the far field region, the angular EMR power density distribution is essentially independent of the distance from the radar and the E and H field vectors form a plane-wave. Within the near field region, the angular EMR power density distribution is a function of range. In the far field, the power density S is calculated as follows:

Equation 2

$$\mathbf{S} = (\mathbf{P} / 4 \pi \mathbf{r}^2) \cdot \mathbf{G}_T$$

where

S is the power density in watts per unit square meter
P is the radiated peak power
r is the range in meters
$\mathbf{G}_T$ is the transmitter antenna gain in a particular direction

The antenna gain (G_T) describes the degree to which the radar is able to concentrate its power in a given direction and is highest along the main axis of the radar beam. The gain in Equation 2 is expressed as the ratio of the maximum radiation intensity of the actual antenna in a given direction over the radiation intensity of an isotropic antenna (i.e., radiating energy in all directions uniformly) with the same power input, and is dimensionless.

For plane waves, the power density (S) is related to electric field strength (E) and magnetic field strength (H) by the impedance of free space, i.e., 377 Ohms (Ω), as in Equation 3.

Equation 3

$$\begin{aligned}\mathbf{S} &= E^2/377 \\ &= 377 \cdot H^2\end{aligned}$$

where

S is in units of watts per square meter
E is in units of volts per meter
H is in units of amperes per meter

Equation 4 is used where S in units of mW/cm^2 is desired.

Equation 4

$$\begin{aligned}\mathbf{S} &= E^2/ (377 \cdot 10) \\ &= 377 \cdot 10 \cdot H^2\end{aligned}$$

where S is in units of milliwatts per square meter, and E and H are as in Equation 3.

The start of the far field region, given by Equation 5, is where the antenna gain versus angular direction is independent of range for both the mainlobe and sidelobes of the antenna pattern. However, a well formed mainlobe can appear at ranges less than the range computed by Equation 5. In the near field, the power density estimated using Equation 2 overestimates the power density to some extent, particularly for phased-array radars.

Equation 5

$$\text{Far Field Range (m)} = \frac{2 \cdot (\text{antenna diameter (m)})^2}{\text{wavelength (m)}}$$

At distances less than those calculated using Equation 5, Equation 2 overestimates the power densities by an increasing amount as the distance to the antenna decreases. A generalized equation for calculating power density in the near field does not exist. Radar-specific models must be used to accurately estimate near field power densities.

N.4.3 Radars in the BMDS Program

The BMDS program radars operate within five different wavebands: UHF, L, S, C, and X bands. To streamline the evaluation of potential impacts to migrating birds, radars were evaluated based on the frequency that corresponds with the birds that might be maximally affected due to the resonant frequencies as indicated in Exhibit N-1.

For each of the five bands, the most powerful type of radar operating in that band was evaluated. Exhibit N-2 provides unclassified specifications on source power (both peak and average), beam width, antenna diameter, wavelength, and antenna gain for the most powerful radar in each band. The representative radar from each band is Position and Velocity Extraction Phased Array Warning System (PAVE PAWS) for UHF, COBRA DANE for L-band, Aegis for S-band, MPS-36 for C-band, and Sea-Based X-Band Radar (SBX) for X-band.

Exhibit N-2. Unclassified Specifications for Radars Used by MDA

Radar Antenna Type	Frequency	Peak Power (kW)	Average Power (kW)	-3 dB Beam Width (deg)	Antenna Diameter (m)	Wave-length (cm)	Gain (dB)
		Upper Bound (all values approximate)					
Phased Array	X-band (8 to 12 GHz)	500 [a]	150 [a]	0.2 [a]	9 [a]	2.5 - 3.75	53.2
Dish	C-band (4 to 8 GHz)	2,500 [b]	6 [c]	0.4 [c]	10 [c]	4 - 8	51.7
Phased Array	S-band (2 to 4 GHz)	2,200 [a]	65 [a]	2.0 [a]	5 [a]	7.5 - 15	38.6
Phased Array	L-band (1.22 – 1.25 GHz)	15,500 [c]	1,000 [c]	0.7 [a]	30 [c]	23 - 25	49.5
Phased Array	UHF (420-450 MHz)	582 [d]	146 [d]	2.2 [d]	22 [d]	67 - 71	38.0

[a] Technical Realities: An Analysis of the 2004 Deployment of a U.S. National Missile Defense System, Union of Concerned Scientists, May 2004

[b] Range Instrumentation Handbook, Vandenberg Air Force Base, September 2000

[c] GMD Validation of Operational Concept, MDA, April 2002

[d] NMD Deployment Final EIS, Ballistic Missile Defense Organization, July 2000. Peak and average power as reported by MITRE (2000) are 543 and 136 kW, respectively.

The peak power is actually the root mean square (RMS) power over a single pulse period, while the average power is the power averaged over a longer interval of time, such as one second. Because the radar emissions are pulsed, with off periods during which the radar "listens" for the returning reflected beams, average power is always less than peak power. The longer the listening intervals compared with the radar emission, the lower the average power relative to peak power. Phased array radars can have duty cycles as high as 25 percent. The maximum antenna gain can be approximated by assuming a circular aperture and computing the gain from Equation 6 using the given antenna diameter, D.

Equation 6

$$\mathbf{G}_T = 4\,\pi\,(\pi\,D^2 / 4)/\lambda^2$$

N.5 Biological Effects

This section first discusses EMR dosimetry expressed as the SAR. It then discusses the derivation of current IEEE exposure limits recommended for humans and notes their applicability to migrating birds. This section concludes by examining studies of potential effects of tracking radars on migrating birds for evidence that lower levels of EMR could interfere with their orientation.

N.5.1 Absorption of EMR

SAR has been used to express EMR dosimetry for many years. SAR expresses the rate at which EMR energy is absorbed from the incident field in units of watts per kilogram of body weight. It is a function of a variety of parameters of the body, including size relative to the incident wavelength, shape, density, total mass, and orientation relative to the incident field (SAR is higher when the body is more perpendicular than parallel to an incident field). As noted in Section N.4.1 above, SAR is highest at resonant frequencies. For example, for an adult male human exposed to an incident power density of 10 W/m^2 (1 mW/cm^2), the average SAR will be highest at an exposure of 0.25 W/kg at a frequency near 70 MHz. For a rat exposed to that power density at that frequency, the average SAR would be only 0.0125 W/kg. The average SAR for rats is highest at frequencies near 700 MHz, where exposure to an incident power density of 10 W/m^2 (1 mW/cm^2) would result in an average SAR of 0.8 W/kg. For humans exposed to that power density at 700 MHz, the SAR is less than 0.04 W/kg.

SAR for different species of birds will be maximal at the resonant frequencies for their body size (or size of the head). Exhibit N-1 indicates which frequencies will be resonant frequencies for different types and sizes of birds.

N.5.2 Basis for IEEE Standard to Protect Humans from EMR Exposure

Table 1 in IEEE Standard C95.1, 1999 Edition (IEEE, 1999) presents the MPE limits for humans in occupational settings (i.e., controlled environments) for frequencies between 0.003 and 300,000 MHz, a revision and expansion of the IEEE Standard C95.1-1991. In the near field region, the MPE is best expressed as either the electric field strength (E) or the magnetic field strength (H). The plane-wave equivalent power density values also are presented for comparison. The MPEs for the IEEE Standard vary with frequency and are most stringent (lowest) in a range of frequencies (30 to 300 MHz) surrounding the resonant frequencies for humans, where the MPE is approximately 1 mW/cm^2 averaged over a six-minute period. The MPE is less stringent at both lower and higher frequencies (e.g., at frequencies between 3,000 and 300,000 MHz, the six-minute average MPE is 10 mW/cm^2).

These MPEs are consistent with the 1991 adopted SAR criterion of 4 W/kg, which was based on behavioral changes observed in laboratory rats due to thermal loading and an applied safety factor of 10. The working SAR of 0.4 W/kg was reexamined by the Risk Assessment Working Group of the IEEE Standards Committee on Non-Ionizing Radiation Hazards in a comprehensive evaluation of the recent literature and found to be adequate for the 1999 Standard: "An extensive review of the literature revealed once again that the most sensitive measures of potentially harmful biological effects were based on the disruption of ongoing behavior associated with an increase of body temperature". (pg 22; IEEE, 1999) The Committee noted further that "The disruption of a highly demanding operant task is a statistically reliable endpoint that is associated with whole-body SARs in a narrow range between 3.2 and 8.4 W/kg, despite considerable differences in carrier frequency (400 MHz to 5.8 GHz), species (rodents to rhesus monkeys), and exposure parameters (near- and far field, multipath and planewave, CW- and pulse-modulated)." (pg 22; IEEE, 1999) The time-averaged power densities associated with those thresholds ranged from 8 to 140 mW/cm^2.

For exposures to pulsed EMR in the range of 0.1 to 300,000 MHz, the peak (temporal) value of the IEEE MPE in terms of the E field is 100 kV/m. (pg 8; IEEE, 1999) Using Equation 4, that translates into a peak power density (S) of 2,652,520 mW/cm^2.

$$\begin{aligned}\textbf{Peak S}\ (\text{mW/cm}^2) &= E^2/3{,}770\ \Omega,\\ &= 100{,}000^2\ (\text{V}^2/\text{m}^2)/3{,}770\ \Omega\\ &= 2{,}652{,}520\ \text{mW/cm}^2\end{aligned}$$

For exposures to pulsed EMR with pulse durations less than 100 milliseconds in the same frequency, the peak power density for a single pulse is given by the MPE (from Exhibit N-1, the E-field equivalent power density) multiplied by the averaging time in seconds and divided by 5 times the pulse width in seconds. (pg 8; IEEE, 1999)

Equation 7

$$\textbf{Peak MPE} = \text{MPE} \cdot \text{Averaging Time (sec)}/5 \cdot \text{Pulse width (sec)}$$

This limit provides a conservative MPE given some uncertainty associated with the value of the spatial peak SAR in short pulses of EMR, which might be as high as 20 times the spatially averaged SAR. Thus, where pulses are less than 100 milliseconds (0.1 sec) in duration, the MPE is reduced by a factor of five. (pg 28; IEEE, 1999) For example, assuming a six-minute MPE of 10 mW/cm^2 for an X-band frequency, the peak MPE allowed for a 100-millisecond pulsed EMR field would be calculated as:

$$\begin{aligned}\textbf{Peak MPE} &= 10\ \text{mW/cm}^2 \cdot 360{,}000\ \text{milliseconds}/(5 \cdot 100\ \text{milliseconds})\\ &= 7{,}200\ \text{mW/cm}^2\end{aligned}$$

For a 1-millisecond pulse, the corresponding peak MPE would be 720,000 mW/cm^2.

At frequencies below 100 kHz, other biological mechanisms become important (e.g., electro-stimulation of excitable cells), but those frequencies are well below those used for radars. To prevent burns from the higher frequency (including infrared) EMR at frequencies above 15,000 MHz (15 GHz), the averaging time for the exposure duration in the MPE is reduced from six minutes according to Equation 8.

Equation 8

$$\text{Averaging time for the MPE (in minutes)} = 616{,}000 \,/\, \text{frequency (in MHz)}^{1.2}$$

The highest frequency proposed for BMDS radars is in the X-band, or under 12,000 MHz. Thus, neither of these frequency extremes needs to be considered for migrating birds potentially exposed to BMDS radars beams.

N.5.3 Threshold for Effects in Birds

Given the wide range of animals and conditions used to establish the human exposure limits for EMR, it is safe to assume that the MPEs for humans are conservatively protective against thermally induced behavioral changes in birds. However, for this analysis those MPEs were modified in two ways. First, the lowest six-minute average MPE value of 1 mW/cm^2 set for the resonant frequencies for humans was applied to the higher resonant frequencies (shorter wavelengths) for birds (Exhibit N-1). Second, the safety factor of 10 was removed to extrapolate from rodents to humans for two reasons. The first reason is that the base SAR threshold of 4 W/kg is conservative in several ways.

- The endpoint for the threshold, behavioral disruption owing to increasing body temperature, will have no permanent physiological effects.
- The SAR threshold assumes the far field, E-polarized “worst case” exposure as the reference condition (the SAR decreases markedly for other polarizations).
- The SAR falls off markedly for frequencies different from resonance.

The second reason it was assumed that the safety factor of 10 does not need to be applied to the SAR of 4 W/kg is that birds have a greater ability to eliminate body heat through respiration (flow-through design) than do mammals, and migrants regularly incur and must dissipate excess metabolic heat during long-distance flights. For the pulsed EMR, the requirement to divide the appropriate time-averaged MPE by a factor of 5 was removed to account for spatial variation of pulsed EMR because of the smaller size of birds relative to humans.

Thus, without conducting a specific evaluation for birds, these considerations indicate that 10 mW/cm^2 averaged over six minutes (or higher power densities averaged over correspondingly shorter periods of time) is a conservative reference value to protect against possible behavioral effects during migration due to thermal heating. This is consistent with, but slightly more conservative than, the value of 42 mW/cm^2 estimated as a threshold for thermal loading equivalent to 1 times the basal metabolic rate in the Aplomado falcon, and a range of power density thresholds for the same effect from 38 to 61 mW/cm^2 for birds ranging in size from warblers to birds up to 7.7 pounds in weight used in the 1993 EA.

N.5.4 Studies of Potential Effects of Tracking Radars on Orientation and Flight of Migrating Birds

For migratory birds, there is one additional behavioral effect of concern that is not relevant to mammals, which is the possibility that EMR from radars might interfere with navigation during migration for birds that use magnetic cues for orientation. Because many species of birds can use the static magnetic field of the Earth as one of their sensory cues for navigation, it is reasonable to consider whether the EM fields – oscillating, pulsed, or continuous – produced by radar beams might interfere with bird navigation. This concern is relevant to lower power densities than might be associated with actual thermal effects in birds.

Interest in possible reactions of migrating birds to radar beams dates back to the 1940s. Several investigators reported finding short-term deviations in the flight path of migratory birds in the vicinity of radar transmitters based on observations rather than experiments. (e.g., Poor, 1946; Drost, 1949; Knorr, 1954; Hild 1971) Others (e.g., Busnel et al., 1956) were unable to repeat some of these observations. Older laboratory experiments failed to demonstrate reactions of birds to the transmission of continuous waves (e.g., Kramer, 1951, at 52 MHz), but more recent laboratory tests have indicated that at least some avian species can detect pulsed radar signals. For example, Kreithen and Davis (1995) demonstrated physiological reactions of pigeons to pulsed signals in the range of 1.25 to 2.45 GHz, which corresponds to L- to S-band frequencies. More recent field studies have failed to demonstrate changes in bird orientation or migratory behavior in response to radar beams. (Bruderer et al. 1999)

An experimental field study by Bruderer et al. (1999) found no effect of former military radar on the orientation of migrating birds. This XBR of approximately 9 GHz, 100 to 150 kW peak pulse power, 60 to 100 W mean transmitted power, 0.3 millisecond pulse duration, 2,082 Hz pulse repetition frequency, and a 2.2 degree opening angle of the pencil beam, was used to track nocturnal migrants between sunrise and sunset. Bruderer et al. (1999) calculated that a pulse of 100 kW peak power for that radar produces a peak power density of approximately 400 W/m^2 (40 mW/cm^2) at a distance of 250 m from the source and 100 and 25 W/m^2 (10 and 2.5 mW/cm^2) at distances of 500 and 1,000 m from the source, respectively. In these experiments, the radar was used to track the birds for at least 60 seconds with three separate 20-second tracking periods (turned off and on to test for directional responses by the birds) at distances from the radar as close as 200 to 300 m. With one possible exception, the investigators were unable to detect changes in flight path that might be due to the tracking radar beam. They found that for large migrating birds (e.g., raptors, herons, ducks) reactions were sometimes detected when the radar was aimed at them on approach at a short distance (i.e., 50 to 200 m), but in these cases, the birds may have been able to see the movement in the radar antenna. In contrast, when they used a bright light beam, the majority of birds shifted direction away from the light source and slowed in flight speed at distances up to 1 kilometer from the light source. The only obvious response to the tracking radar was observed in September 1974, when a flock of 21 grey herons (*Ardea cinerea*) flew at an altitude of approximately 1,000 m above the radar in a V formation. When the radar beam was aimed at the flock, the V-formation disintegrated, and the birds flew in horizontal circles for some time before gaining altitude and reforming the V at 1,300 m. This study, in essence, has identified an NOEL for an XBR tracking birds for 20 sec intervals for up to 60 sec at peak power densities up to 40 mW/cm^2. Thus, there is no evidence that the proposed six-minute threshold of 10 mW/cm^2 estimated in this assessment or the six-minute threshold of 42 mW/cm^2 estimated for the falcon in the 1993 EA, would be insufficient to protect against possible effects on birds' magnetic orientation during migration. Data are lacking, however, to evaluate possible effects for birds tracked by radar for between 60 sec and 6 minutes.

N.6 Exposure Assessment

Exposure of migrating birds to radar beams will depend both on the behavior of the birds and the motion and output of the radars. This section includes a brief overview of bird migration patterns, emphasizing altitude, flight speeds, and density of migrating birds. Attributes of the PAVE PAWS radar are provided to illustrate principles of the operation of phased-array radars. Available unclassified radar specification data were then used to estimate maximal exposure durations for birds flying through a BMDS radar beam in each of the five radar categories in Exhibit N-2. This section concludes with estimates of the maximum power densities that might be encountered by birds under both relatively clear weather conditions and poor weather conditions, when the birds may be forced to migrate at lower altitudes than usual.

N.6.1 Background Information on Migrating Birds

N.6.1.1 Migration Flyways

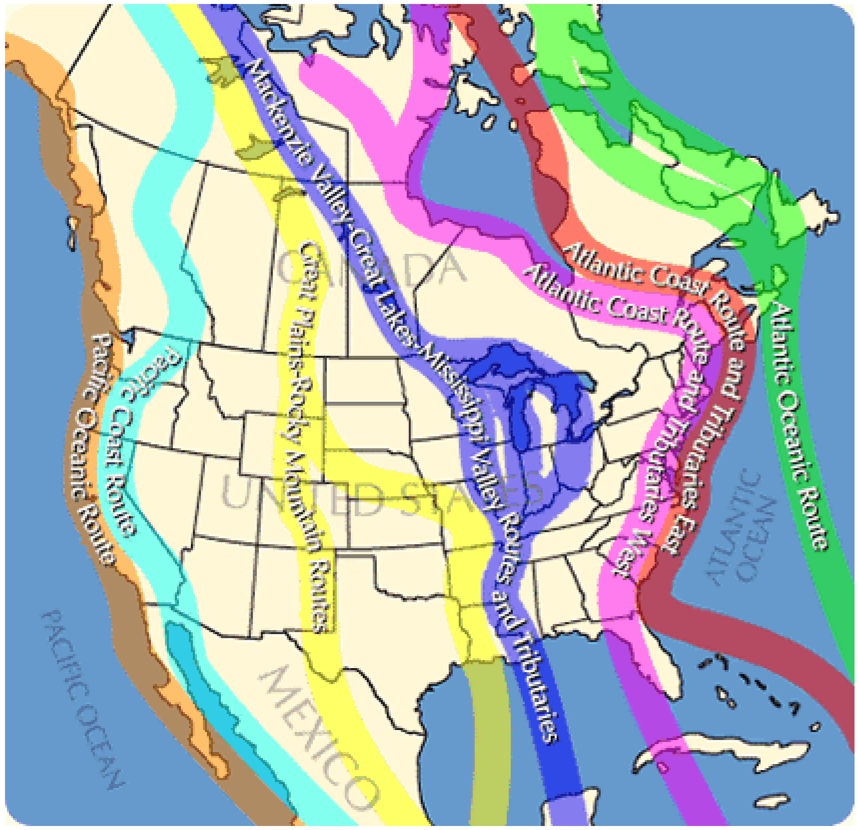
Bird migration generally refers to the movement of birds as they travel to and from their breeding and wintering grounds. The geographic paths that these birds travel are commonly known as migration routes. The migratory movements of most concern are the longer distance flights between North, Central and South America, and between Alaska and Asia, particularly by neotropical songbirds and some species of shorebirds, which have been experiencing population declines over the past several decades. The physiological strain of long-distance migration makes these birds particularly vulnerable to adverse events (e.g., storms) along the route.

Migration routes cover the entire North American continent and no two species follow exactly the same path. Migration routes tend to concentrate along coastlines, major river valleys, and mountain ranges. These broad, heavily traveled corridors comprised of many individual routes are called migration flyways. The concept of a flyway does not imply that all species migrate along definite paths or that all individuals within a species travel along the same route. Rather, flyways are a convenient generalization to help convey the idea that certain factors (e.g., geography, availability of food, etc.) guide the migration of birds along relatively regular paths. (Lincoln et. al., 1998)

Most bird species can navigate during migration using more than one type of cue depending on availability. Cues used by birds to navigate include visual cues (e.g., landmarks, polarization of light, location of setting sun, stars), sound (e.g., ocean waves on coastlines, other sources of infrasound), and 18 species of birds have been demonstrated to have a magnetic "compass" that is recalibrated periodically using other cues. (Wiltschko and Wiltschko, 1996; Hagstrum, 2000; Mouristen and Larsen, 2002; Cochran et al., 2004)

Migration flyways can be broken down into seven generalized routes for birds migrating in the fall from the U.S. to wintering grounds in the West Indies, Central America, and South America. Exhibit N-3 shows the principal migration routes from North America to wintering grounds. The same flyways are generally followed during spring migration, although many species return north over a different route than they used during fall migration. (Lincoln et. al., 1998) Exhibit N-4 describes the general characteristics of the major migration flyways in the U.S.

Exhibit N-3. Principal Migration Routes in North America



Source: Lincoln et. al., 1998

Exhibit N-4. Description of Migration Flyways

Route Name	General Characteristics
Atlantic Ocean	The Atlantic Ocean route passes over the Atlantic Ocean from northeastern Canada to mainland South America, with a stopover on the Lesser Antilles islands. This primarily oceanic route is used by shorebirds and seabirds, such as plovers, auks, and petrels.
Atlantic Coast	The Atlantic Coast route follows the Atlantic coast southward, passing over Florida, various Caribbean islands, and finally ending in South America. It is used by both land and sea birds. The western Atlantic Coast Route is a more direct coastal path to South America but involves much longer flights, and is used primarily by land birds.
Mississippi Valley	The Mississippi Valley route represents the longest migration route in the Western Hemisphere. It begins at the mouth of the Mackenzie River in Canada's Northwest Territories, passes over the Mississippi delta and across the Gulf of Mexico, and eventually ends in Argentina. The

Route Name	General Characteristics
	Mississippi Valley route is the preferred route for the majority of migratory bird species that pass through the U.S.
Great Plains-Rocky Mountains	The Great Plains-Rocky Mountains route also originates in the Mackenzie River delta and passes south through Alberta to western Montana. At this point, some birds move west to the Columbia River valley and then south to California. Other birds travel southeast across Wyoming or Colorado and then merge with Mississippi Valley route. Cranes, geese, pintails, and wigeons are the species most commonly found on the Great Plains-Rocky Mountain Routes.
Pacific Coast	The Pacific Coast Routes are the least heavily traveled migration paths in North America, beginning in western Alaska and continuing over the Gulf of Alaska to British Columbia. They then follow the coastline south, swing inland, and finally end in western Mexico. These routes are used primarily by geese, ducks, and arctic-breeding shorebirds.

Source: Lincoln et. al., 1998

N.6.1.2 Timing of Migration

Birds generally travel during two peak migratory seasons, fall and spring. Fall migration begins around late August and lasts until about early December. Spring migration generally occurs from March to May. (Birdnature.com, 2001)

During migration, some birds fly exclusively at night. The majority of nocturnal migrants are songbirds and other small birds. Radar observations have shown that nocturnal migration begins about an hour after sundown, reaches a maximum shortly before midnight, and then gradually declines until daybreak. (Lincoln et. al., 1998)
The day migrants include larger birds like ducks, geese, loons, cranes, gulls, pelicans, and hawks, and other smaller birds such as swallows and swifts. Soaring birds such as hawks, storks, and vultures can only migrate during the day because they depend on updrafts created either by thermal convection or the deflection of wind by topographic features like hills and mountain ridges. Birds that are able to feed at all hours, such as most water birds, migrate either by day or night. (Lincoln et. al., 1998)

N.6.1.3 Migration Altitude, Speed, and Flock Size

The altitude of migration is extremely variable and depends on factors such as species, location, geography, season, time of day, and weather. Nevertheless, some general conclusions about migration altitude can be drawn based on radar observations of migrating birds. Approximately 95 percent of birds migrate at altitudes under 10,000 ft. (Lincoln et al., 1998) According to the Clemson University Radar Ornithology Laboratory and the USFWS, the vast majority of birds migrate at altitudes between 500 and 4,500 ft, with the highest density of birds found at approximately 1,500 ft. (CUROL, 2005; Lincoln et. al., 1998)

Birds on long-distance flights fly at higher altitudes than short-distance migrants. Some shorebirds have been known travel at 15,000 to 20,000 ft over the ocean. Nocturnal migrants also fly slightly higher than diurnal migrants, but their altitude depends on the time of night. Birds generally gain maximum altitude shortly after sundown and maintain this peak until around midnight. Nocturnal migrants then gradually descend until daylight. (Lincoln et. al., 1998)

In general, migratory birds travel at air speeds of 20 to 50 miles per hour, with ducks and geese flying at 40 to 50 miles per hour, herons and hawks at speeds of 22 to 28 miles per hour, and flycatchers and smaller birds flying at 10 to 17 miles per hour. (Lincoln et al., 1998) In general, the northward spring flights are more direct and slightly faster than the southerly migrations in late summer and early fall.

A majority of bird species migrate in flocks numbering in the hundreds to hundreds of thousands. In general, many species breed over relatively large areas, but during migration, the population can be funneled through a more narrow area. For example, the eastern kingbirds summer breeding range extends 2,800 miles from Newfoundland to British Columbia; however, the width of the migratory path narrows to 400 miles from east-west at the latitude of the Yucatan. (Lincoln et al., 1998)

Several studies of bird migrations using NEXRAD (weather radar) have allowed researchers to estimate the density of migrating birds. (CUROL, 2005) Estimates of 120 to 230 birds per cubic kilometer (km^3) have been recorded for birds flying across the Gulf of Mexico in the spring. Densities of 230 to 490 birds per km^3 have been recorded over the Great Plains in the spring and fall. Densities as high as 500 birds per km^3 have been recorded over Houston, Texas. (CUROL, 2005) Dr. Sidney Gauthreau, the nation's leading expert on bird migration patterns using NEXRAD studies, indicated that the highest recorded density of migrating birds observed is approximately 2,000/km^3. This observation was made one evening during the first week of October above Clemson University in South Carolina after a cold front had passed through the area. (Gaurthreau, 2005) Similarly high densities, however, can be reached when flocks are initially taking off from a dense roosting site.

N.6.1.4 Migratory Bird Stopover Sites

Stopover sites are habitats or natural communities that consistently provide migrants with the necessary resources to refuel and rest during their journey. (NJAS, 2004) The following habitats typically provide the best resources and are therefore the most popular stopover sites for migrants.

Mountain Ridges

The forests along the slopes of mountain ridges typically provide important food resources like insects and fruit. (NJAS, 2004) Higher elevation sites along the slopes or tops of ridges are especially important in the fall, when insect populations peak. (Deinlein, 2005)

Riparian Areas

Major rivers typically support extensive wetlands and woodlands. The vegetation in these riparian areas provides concentrated food sources and sheltered resting areas for migrants. (NJAS, 2004) In the fall, foothill riparian areas provide important fruiting plants for birds such as tanagers and grosbeaks. (Deinlein, 2005) Throughout much of the arid western U.S., riparian forests are oases that offer the only trees to the landscape, and birds rely heavily on them for shelter. (Sterling, 2005)

Barrier Islands and Coastal Marshes

For many migrants, coastal woodlands and barrier islands represent the first opportunity to refuel after a long journey across a large body of water. For this reason, the northern Gulf coast contains many key stopover sites and hosts large numbers of migratory birds during the spring migration. (Deinlein, 2005)

Other key stopover sites, especially for shorebirds, are as follows: the Copper River Delta in southern Alaska; Gray's Harbor in Washington; the Bay of Fundy in Nova Scotia and New Brunswick; the Cheyenne Bottoms in Kansas; the Delaware Bayshore of New Jersey and Delaware; and the prairie pothole region of the northern U.S. and southern Canada. (Deinlein, 2005)

N.6.2 Operation of the PAVE PAWS Phased Array Radar

This section discusses the operation of one of the phased array radars that operates in the UHF frequency, the PAVE PAWS radar, as an example of the operation of radar used both to detect and track incoming missiles. There are three PAVE PAWS radars in the U.S. (Cape Cod, northern California, and Alaska). The PAVE PAWS radar operates at frequencies between 420 and 450 MHz.

Each PAVE PAWS radar is a two-faced phased array radar. Exhibit N-5 depicts the geometry for a single face of the PAVE PAWS radar. The PAVE PAWS phased array aperture is tilted backwards by twenty degrees with respect to the vertical. The array is able to scan a region 60 degrees on either side of the antenna center. Thus a single face of the PAVE PAWS radar can scan a range of 120 degrees (the azimuth).

Exhibit N-6 shows both faces of the PAVE PAWS radar that provides a total coverage of 240 degrees in azimuth. The orientation of the apertures in azimuth is site dependent. Exhibit N-7 shows the actual azimuth directions for each of the PAVE PAWS radars. The Clear, Alaska radar coverage is centered on North, while that of the Beale radar is West, and the Cape Cod radar is oriented East.

Exhibit N-5. Geometrical Orientation of PAVE PAWS Array Face

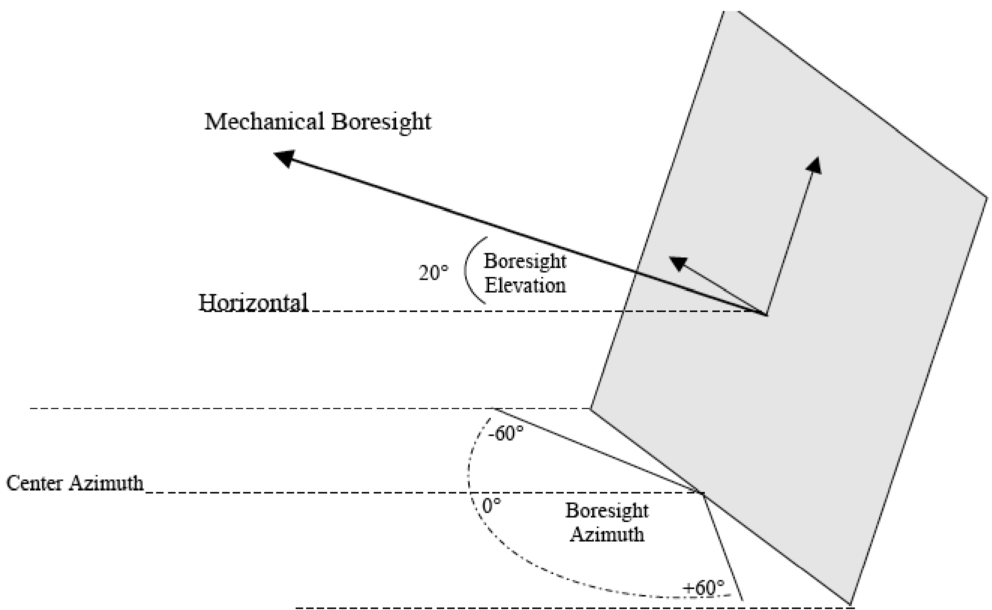


Exhibit N-6. Azimuth Spatial Coverage of PAVE PAWS Two Array Faces

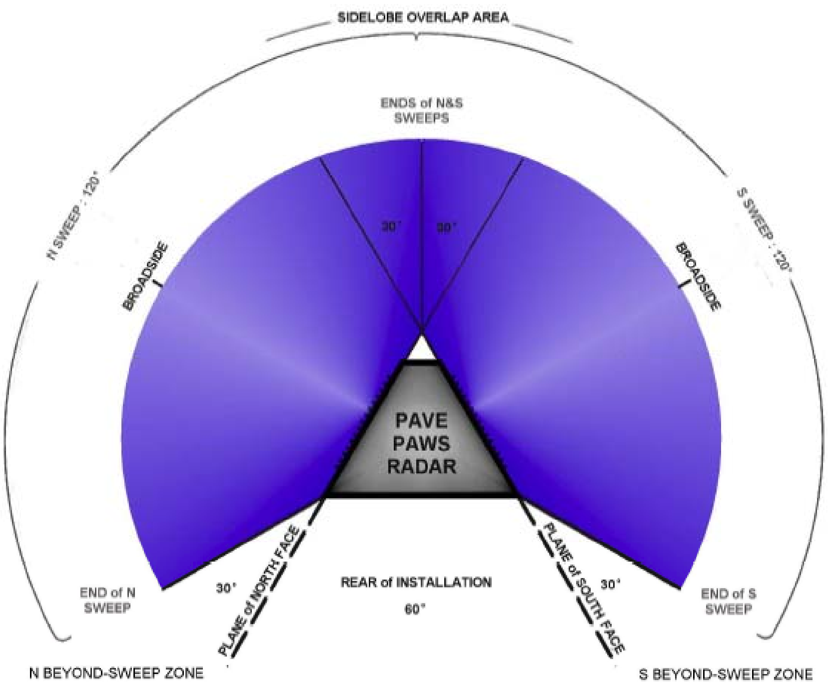
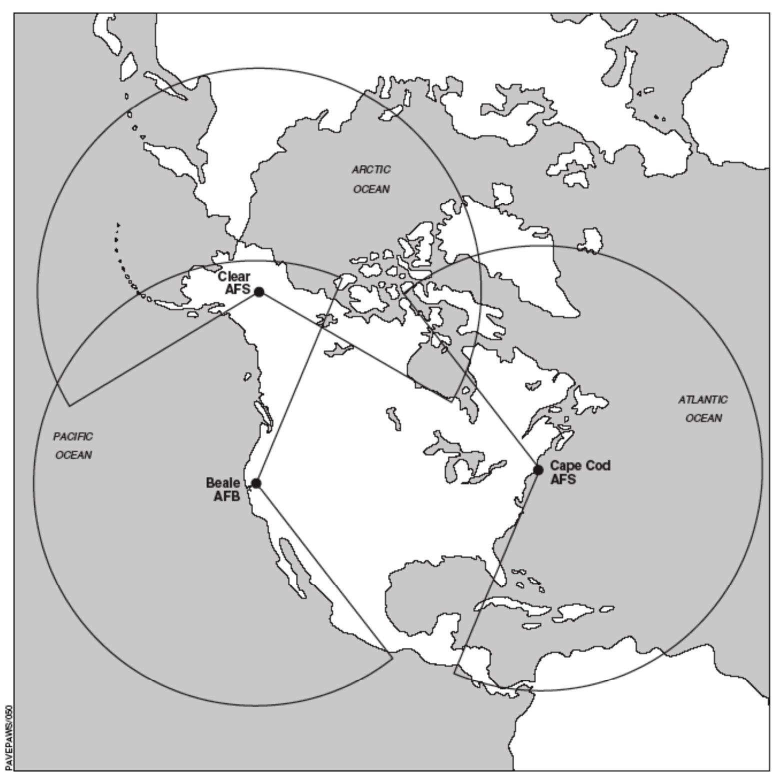


Exhibit N-7. PAVE PAWS Coverage Zones



The PAVE PAWS radar has a maximum duty cycle of 25 percent with the surveillance function occupying 44 percent of the available transmit time. The tracking function occupies the remaining transmit time. The surveillance area for each radar face covers an elevation angle of three to ten degrees above horizontal and an azimuth angle of ± 120 degrees. The array face is tilted 20 degrees back from vertical so that each array scans from -17 to -10 degrees in elevation, with respect to the radar face, to provide the required elevation coverage.

In the far field, the main radar beam is more focused and narrow.[1] For the PAVE PAWS radar, approximately 60 percent of the energy is directed within an angle of 2.2 degrees (-3 dB beam width) (Ballistic Missile Defense Organization [BMDO], 2000), and approximately 90 percent of the energy is directed within an angle of 5 degrees (the -6 dB beam width; Figure 3 in MITRE, 2000). The remaining 10 percent of the energy is located in "sidelobes" where the transmitted waves do not completely cancel each other out. The maximum power density of the sidelobes is typically between 1/100 and 1/1000 of the main beam power density. (MITRE, 2000)

The scanning action of each radar beam occurs rapidly; the beam is redirected in azimuth and elevation on the order of tens of microseconds (μsec) to milliseconds. A pulse duration of 0.3 to 16 milliseconds is used, and the beam is off ("dwells") for approximately 10 to 50 milliseconds "listening for echoes." The beam is then redirected to another azimuth and elevation according to a predetermined schedule. Thus, the maximum duration of the radar beam in any one location is 16 milliseconds (0.016 sec).

The "instantaneous" beam intensity profile of the far field in terms of power density (in mW/cm^2) depends on the radar peak power, the antenna gain, and the distance from the radar. The maximum antenna gain at the center of the main beam in this case is 38.4 dB.

The width of the radar main beam depends on distance from the radar array and orientation of the main beam relative to the direction perpendicular to the antenna arrays. When the radar transmits a beam perpendicular to the radar array, it is said to be "looking at broadside," and when it is in this direction the radar beam is most tightly focused. As the beam is scanned up or down, left or right, from the broadside orientation, the beam widens.

The peak power of the PAVE PAWS radar is 582 kW, which the radar transmits at every energy pulse independent of the pulse width or the waveform. (MITRE, 2000) The average power varies depending on the transmitted pulse width and the length of the

---

[1] The distances to the beginning of the far field is calculated using Equation 5. With the diameter of the active antenna array equal to 22.1 m in this case and the wavelength equal to 0.69 m at center frequency, the nominal far field zone begins at 1,416 m (4,645 ft) for this radar. The distance to the far field reported in MITRE , 2000 was 2,322 ft and by Global Security (http://www.globalsecurity.org/space/systems/pavepaws.htm) is 1,440 ft.

listening period (during surveillance activities). The average power is the peak power multiplied by the fraction of the time that the transmitter is "on."

To determine the "worst case" long-time average power, it was assumed that the radar is operating at its maximum duty cycle (i.e., 25 percent of the duty cycle the transmitter is on, 75 percent of the time it is off, in the "listening" mode). All waveforms have the same peak power (in this case 582 kW). Thus, the maximum average power would be $582 \cdot 0.25 = 146$ kW. A worst-case average power density at the 1,000-ft fence of 0.012 W/cm^2 (12 mW/cm^2) was calculated based on the near field antenna patterns and an elevation of three degrees above horizontal, such that only EMR from the side lobes would reach a human standing on the ground at the fence line. (MITRE, 2000)

The average power density at 460 meters also was calculated in the main direction of the beam using the far field equation (Equation 2). An average source power of 146 kW equals 81.6 dB. Adding the antenna gain of 38.4 dB, the effective radiated power would be 120 dB, or 1,000,000 kW. Using Equation 2, at 460 m, the power density of the main beam would equal 33 mW/cm^2. Note that the far field actually begins at a further distance from the radar in this case. Thus, the value 33 mW/cm^2 somewhat overestimates the power density at 460 m.

N.6.3 Estimates of Exposure Duration

During surveillance tasks, the beam of a phased array radar system changes position every 10 to 100 milliseconds to scan the appropriate air space for potential incoming missiles. The actual duration of a single pulse is less than 16 milliseconds. Dish radars, which move the beam mechanically rather than by varying the phase of emissions from an array of radar antenna, move the beam more slowly when scanning. However, during target tracking tasks and during testing of these systems, the radar beam might be aimed in essentially a single direction. Thus, to estimate maximum possible exposure durations that might occur when testing target tracking functions, a stationary beam was assumed through which migrating birds fly. Exposure durations during surveillance tasks generally will be less than 0.02 seconds owing to the movement of the radar beam.

The -6 dB radar beam widths were used to estimate the maximum amount of time that a single migrating bird is likely to remain in a stationary main radar beam at varying distances from the radar. In Exhibit N-2, the width of a radar beam is specified in degrees, where 360 degrees equals a full circle. Thus, the width of the beam increases with increasing distance from the source. The duration of time a bird might spend flying through only the main beam was estimated. The -6 dB beam width contains approximately 90 percent of the energy emitted. The width of a radar beam for birds flying perpendicular to the direction of the beam at distances between 100 and 3,000 meters from the radar antenna was examined. The distance a bird would fly through a radar beam for birds flying parallel to the direction of the beam was also examined.

For birds flying perpendicular to the direction of the beam, the length of an arc in a beam intersecting an imaginary circle centered at the radar antenna is calculated at distance r from the radar antenna in Equation 9.

Equation 9

$$\mathbf{arc}\ (\mathrm{m}) = 2 \cdot \pi \cdot \mathbf{r} \cdot (\mathbf{w}/360)$$

where

$\mathbf{r}$ = radius or distance from the source (m)

$\mathbf{w}$ = beam width (degrees)

The calculations using Equation 9 are appropriate for the far field. In the near field the width of the beam was estimated using radar-specific models for the SBX (X-band), COBRA DANE (L-band), and PAVE PAWS (UHF) radars. For the C- and S-bands the analysis assumes that the minimum beam width is equal to the diameter of the radar antenna. Thus, as a conservative measure, Equation 9 was only used to estimate beam width when it resulted in wider arcs than the antenna diameter. The estimated beam widths are listed in Exhibit N-8 for each radar type.

The slowest moving migrants would spend the most time in a stationary radar beam; therefore, the time required for a small bird (e.g., warbler) flying at 10 mph (4.5 meters per second) to fly perpendicularly through a stationary beam at various distances from the radar was estimated, as shown in Exhibit N-9. Note that for the maximum beam width evaluated (2.2 degrees), a small bird could fly through the beam in about 47 seconds at a distance of 3,000 meters and in 2 to 15 seconds at a distance of 100 meters from the radar, where the power density of the beam would be much higher. For birds flying 20 to 40 mph, as do many migrant species, the exposure durations of the birds flying perpendicularly through a stationary radar beam would be one half to one quarter of the values listed in Exhibit N-9.

Exhibit N-8. Width of Main Radar Beam at Increasing Distance from the Source for Different Radars

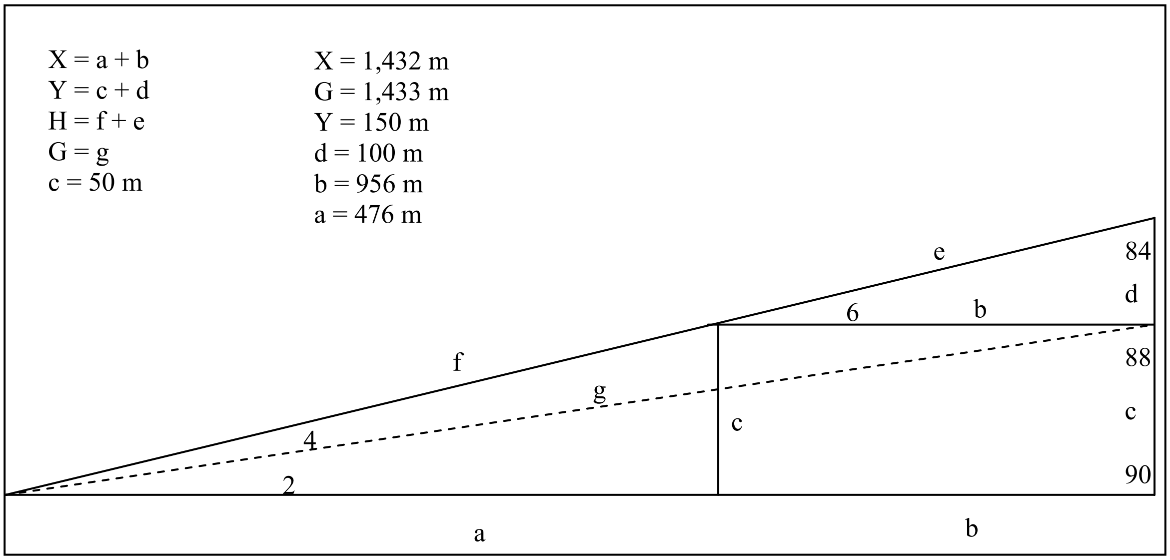
Radar Type	-3 dB Beam width (degrees)	Antenna Width (m)	Width of radar beam (m) with distance from a radar						
			100 m	300 m	500 m	700 m	900 m	1,500 m	3,000 m
X-band	0.2	9	65.9	108.0	117.8	109.4	124.2	115.0	115.4
C-band	0.4	10	10	10	10	10	12.6	20.9	41.9
S-band	2.0	5	7.0	21.0	34.9	48.9	62.9	104.8	209.5
L-band	0.7	30	59.9	57.0	65.9	64.4	62.6	46.0	64.4
UHF	2.2	22	40.4	27.6	36.8	39.9	47.8	71.8	131.5

Exhibit N-9. Maximum Duration of Flight Perpendicular to and Within a Stationary Main Radar Beam at Increasing Distance from the Radar for a Bird Flying 10 mph

Radar Type	-3 dB Beam width (degrees)	Flight duration (seconds) in main radar beam with distance from radar						
		100 m	300 m	500 m	700 m	900 m	1,500 m	3,000 m
X-band	0.2	14.7	24.2	26.4	24.5	27.8	25.7	25.8
C-band	0.4	2.2	2.2	2.2	2.2	2.8	4.7	9.4
S-band	2.0	1.6	4.7	7.8	10.9	14.1	23.4	46.9
L-band	0.7	13.4	12.8	14.7	14.4	14.0	10.3	14.4
UHF	2.2	9.0	6.2	8.2	8.9	10.7	16.1	29.4

For birds flying parallel to the radar beam, the distance the bird must cover to fly through the beam horizontally will be longer than for flight perpendicular to the radar beam. Thus, as the beam moves closer to horizontal, the longer a bird would be in the beam to fly through it horizontally. Exhibit N-10 analyzes a case where a radar that has a -6 dB beam width of 4 degrees is directed with an angular elevation of 4 degrees above horizontal (most proposed BMDS radars do not project less than 3 degrees above horizontal). We further assumed a worst case of the bird flying as low as an altitude of 50 meters above the height of the radar (e.g., as during bad weather), which would result in the bird flying through higher power densities than if the bird were flying at higher altitudes. Because in the far field, power density diminishes with the reciprocal of the square of the distance to the source (see Equation 2), whereas duration of a horizontal flight through the beam increases linearly with the distance from the source at which the bird intersects the beam, the highest risk to the bird will be the closest intersection with the beam, which occurs at the lowest altitude, assumed to be 50 m, relative to the altitude of the radar. In Exhibit N-10, the distance covered by a bird flying through such a radar beam is represented by line segment b. Line segment g (entire dashed line) represents the lower edge of the 4 degree radar beam, which would be 2 degrees above horizontal. Line H (line segments f plus e) represents the upper edge of the 4-degree radar beam, which is elevated 6 degrees above horizontal. Using the relationships depicted in Exhibit N-10, the bird would fly along a distance of 956 m to fly through this beam if it were stationary. A bird flying 4.5 m/sec (10 mph) could traverse 956 m in approximately 214 seconds, or 3.6 minutes. However, the power density associated with this flight would range between the power densities associated with a distance of 478 m (line segment f) to 1,422 m (line G) from the source.

Exhibit N-10. Side View of Radar Beam 4 Degrees in Width Elevated 4 Degrees from Horizontal



Thus, for stationary radar beams, the total time a bird is likely to be in the main beam will be a function of the beam's elevation, the altitude of the bird, and the air speed of the migrating bird. The power densities encountered will depend on the distance from the radar.

For moving radar beams, as during surveillance testing and operations, the maximum duration of an EMR pulse in one direction, and thus the maximum likely exposure duration for a given bird encountering a beam, would be on the order of milliseconds. Of the proposed BMDS radars, the PAVE PAWS has the longest pulse width of up to 16 milliseconds. Pulse widths for PAVE PAWS usually are less than that (as short as 0.3 millisecond), and pulse widths for other radars generally are 1 millisecond or less.

N.6.4 Estimates of Exposure Magnitude

The previous section demonstrated that exposure durations for birds migrating through an area in which BMDS radar is operating in a tracking or calibration mode such that the beam is stationary, are on the order of seconds to tens of seconds, even for the slowest migrants traveling at approximately 4.5 m/sec. Migrating bird exposure durations for radars in surveillance mode are likely to be no longer than 16 milliseconds and usually less than 1 millisecond. The analysis evaluates whether it is possible for some of the radars to be sufficiently powerful to exceed the power density thresholds described in Section N.5.3 for migratory birds flying at low altitudes and slow flying speeds.

The far field equation for calculating EMR power density (S) at a specified distance from a radar source was provided in Section N.4.1 (Equation 2). Because the duration of the “on” pulse is generally under 0.01 to 0.001 sec and the duty cycle is less than 0.1 sec, it is most appropriate to use the average, not peak, power at the source to calculate average power densities that would apply to exposure durations of longer than 0.1 sec, as would be the case for birds flying through a stationary radar beam.

For birds flying at distances less than the far field from a radar, the power densities are less, and may be substantially less, than calculated using Equation 2. Therefore, near field power densities for the X-, L- and UHF bands were calculated using radar-specific models. For the C and S bands, Equation 2 was used for the near field power density calculations. Equation 5 is used to calculate the beginning of the far field region. For the X-, C-, S-, L- and UHF band radars described in Exhibit N-2, use of Equation 5 and the midpoint of the range of wavelengths listed indicate that the far field region begins at approximately 5,200; 3,300; 440; 7,600; and 1,400 meters, respectively.

Exhibit N-11 presents the power density results in mW/cm^2 for each radar type. In Exhibit N-11, the far field equation (Equation 2) was used to estimate power density, unless radar-specific near field power densities were calculated, which are italicized in Exhibit N-11. Radar-specific near field power densities were calculated because Equation 2 overestimates power densities in the near field. This effect can be observed for the 3,000 meter value for the XBR, which is substantially higher than all of the other X-band values. For the XBR 3,000 meters is still well within the near field region, which ends at 5,200 meters. Note that the reference power density of 10 mW/cm^2 identified in Section N.5.3 for use as a value indicating no impacts on migrating birds is associated with a six-minute averaging period. Higher power densities are allowed for correspondingly shorter periods of time, as will be discussed in Section N.7.

For comparison with the IEEE Standard c95.1-1999 peak power density limit of 2,652 W/cm^2, the peak power output for each radar (i.e., the power during the on phase) was also used to estimate peak power densities at varying distance from each radar type. Exhibit N-12 presents those results. The peak power densities in Exhibit N-12 were calculated using the same methods as in Exhibit N-11. The radar-specific near field power densities are in italics. Thus, Exhibit N-12 is a worst-case estimate of peak power densities with distance from the radar antenna.

Exhibit N-11. Average Power Density at Increasing Distance from the Source for Different Radars

Radar Type	Avg kW	Gain (dB)	Average power density (mW/cm^2) with distance from radar (m)						
			100 m	300 m	500 m	700 m	900 m	1,500 m	3,000 m
X-band	150	53.2	*4.1*	*1.5*	*1.3*	*1.5*	*1.2*	*1.4*	77.3
C-band	6	51.7	699.9	77.8	28.0	14.3	8.6	3.1	0.8
S-band	65	38.6	375.5	41.7	15.0	7.7	4.6	1.7	0.4
L-band	1,000	49.5	*137.4*	*151.9*	*113.5*	*118.9*	*126.0*	*287.4*	*118.8*
UHF	146	38.0	*4.2*	*4.4*	*3.8*	*3.2*	9.1	3.3	0.8

Exhibit N-12. Peak Power Density at Increasing Distance from the Source for Different Types of Radars

Radar Type	Peak kW	Gain (dB)	Peak power density (W/cm^2) with distance from radar (m)						
			100 m	300 m	500 m	700 m	900 m	1,500 m	3,000 m
X-band	500	53.2	*0.02*	*0.01*	*0.01*	*0.01*	*0.00*	*0.01*	0.31
C-band	2,500	51.7	291.6	32.4	11.7	5.9	3.6	1.3	0.32
S-band	2,200	38.6	12.7	1.4	0.51	0.26	0.16	0.06	0.01
L-band	15,500	49.5	*0.55*	*0.61*	*0.45*	*0.48*	*0.50*	*1.15*	*0.48*
UHF	582	38.0	*0.02*	*0.02*	*0.02*	*0.01*	0.04	0.01	0.00

N.7 Impact Characterization and Mitigation

In this section, the exposures estimated in Section N.6 are compared with the reference values for assuming no impact discussed in Section N.5 to characterize potential impacts on a bird that does encounter a radar beam. The potential for population-level impacts are addressed by considering the likelihood that one or more birds in a migrating flock would actually encounter the radar beam. Both subsections N.7.1 and N.7.2 consider the key uncertainties in the estimates used to prepare this appendix and whether those uncertainties will tend to over- or underestimate risks. At the end of this section, recommended mitigation actions are provided for the radars that might, at certain times of the year, at certain locations, and under certain conditions of operation, pose risk to some birds.

N.7.1 Risks to Individual Migrating Birds

This section considers whether the reference values for no harm would be exceeded when a bird encounters a beam. This analysis was performed for each category of radar for a variety of exposure durations and power densities. Specifically, four evaluations were performed: (1) the potential to exceed the IEEE Standard c95.1-1999 peak power density limit of 2,652 W/cm^2, (2) the potential for the average power density encountered from a stationary radar beam (e.g., tracking or calibration operations) to exceed the reference value of 10 mW/cm^2 averaged over six minutes, after adjusting for duration of exposure, (3), the potential for single 10 milliseconds pulse at peak power to result in an encounter that exceeds a relevant reference value, and (4) the potential for exposures from radars in surveillance mode to exceed the reference value of 10 mW/cm^2 averaged over six minutes.

N.7.1.1 Peak Power Density Limit

The peak power densities in Exhibit N-12 were calculated using the far field equation and radar-specific near field calculations. The peak power density values calculated within the near field using Equation 2 for the C- and S-bands are likely to overestimate the actual power density. Examination of Exhibit N-12 reveals that no birds encountering radar beams would be exposed to EMR that exceeds the IEEE Standard c95.1-1999 peak power density limit of 2,652 W/cm^2.

N.7.1.2 Average Power Density Limits

The reference value for this impact assessment for migrating birds is an average power density of 10 mW/cm^2 associated with a six-minute exposure period. The applicable power density for shorter exposures is higher. For this assessment, both the closest exposures to the highest power densities for birds flying across (perpendicular to) a radar beam and the longest exposures for birds flying along the direction of a near horizontal radar beam were evaluated.

For birds flying perpendicular to the radar beam, the exposure-duration estimates in Exhibit N-9 and the estimates of average power density presented in Exhibit N-11 are used to estimate risk. Exhibit N-13 lists the product of the exposure duration in Exhibit N-9 for a warbler flying 10 mph and the power density in Exhibit N-11 divided by the six-minute averaging time for each of the corresponding cells. The product of exposure duration and power density was divided by six-minutes to normalize the values to allow direct comparison with the 10 mW/cm^2 reference value that is averaged over six minutes. Exhibit N-13 values are in units of mW/cm^2. Where Exhibit N-13 values exceed 10 mW/cm^2, a bird at that distance from that type of radar could be exposed to more EMR than represented by the no-harm reference value.

Exhibit N-13. Average Power Density (mW/cm^2) Multiplied by Exposure Duration Divided by Six Minutes, with Increasing Distance from the Source for Different Types of Radar for Bird Flight Paths Perpendicular to the Radar Beam

Radar Type	Avg kW	Gain (dB)	Power density (mW/cm^2) multiplied by exposure duration (minutes) / six minutes						
			100 m	300 m	500 m	700 m	900 m	1,500 m	3,000 m
X-band	150	53.2	0.2	0.1	0.1	0.1	0.1	0.1	5.5
C-band	6	51.7	4.3	0.5	0.2	0.1	0.1	0.0	0.0
S-band	65	38.6	1.7	0.5	0.3	0.2	0.2	0.1	0.1
L-band	1000	49.5	5.1	5.4	4.6	4.8	4.9	8.2	4.8
UHF	146	38.0	0.1	0.1	0.1	0.1	0.3	0.1	0.1

Exhibit N-13 indicates that there is no concern for slow flying (10 mph) small birds, and thus there is no concern for faster flying larger birds, flying perpendicularly through any of the radar beams. Using the bird-specific six-minute reference values of 38 to 61 mW/cm^2 for birds ranging in size from warblers to 7.7 pounds in weight developed in the 1993 EA, none of the radars would pose a risk to migrating birds.

Note that the values presented in Exhibit N-13 represent a conservative assessment that may overestimate risks. An air speed of 10 mph was assumed for migrating warblers, the slowest of the migrating birds. Exhibit N-13 also assumes that the radar beam is stationary, which is approximately true for phased-array radars only when the radar is tracking targets or during calibration operations. For the dish radars operating in the C-band, mechanical movement of the radar will be slower, but for this radar, even the assumption of a stationary beam does not result in risks of exceeding the no-harm reference value of 10 mW/cm^2 (six-minute average).

Potential risks to birds flying in the direction of stationary beams elevated only 4 degrees above horizontal also was evaluated. For example, for birds flying at an altitude of 50 meters over an S-band radar with a 2.0 degree wide beam (Exhibit N-10), the estimated product of the average power density (between 478 and 1,433 meters; i.e., 9.3 mW/cm^2) and a 214-second exposure divided by six minutes, or 5.5 mW/cm^2, did not exceed our reference value of 10 mW/cm^2. Neither did the combinations of beam width and corresponding exposure duration calculated for altitudes of 50 meters above the X-band, C-band, and UHF radars using the relationships in Exhibit N-10 exceed the no-harm reference value for beam elevations between three and 90 degrees.

For the L-band radar, the reference value, 10 mW/cm^2, was exceeded at flight altitudes of less than 1,700 meters above the radar, when the beam is elevated between four and fifty degrees above horizontal. Exhibit N-14 shows how flight duration, average power density, and the product of the power density and exposure duration divided by 6 minutes changes with increasing altitude of the bird above the antenna for the L-band radar (COBRA DANE), when the beam is 20 degrees above horizontal, which is when the beam is perpendicular to the radar face and is expected to have the highest power densities. Note that the closest horizontal distance in the right-hand column represents line segment “a” and the farthest horizontal distance represents line “X” in Exhibit N-10. For larger, faster flying birds the exposures would be less. For example, for birds flying 18 meters per second (40 mph) the maximum exposure would be 28 mW/cm^2, except for birds flying at an elevation of 100 meters with a radar beam at three degrees, who would have exposures of 42 mW/cm^2.

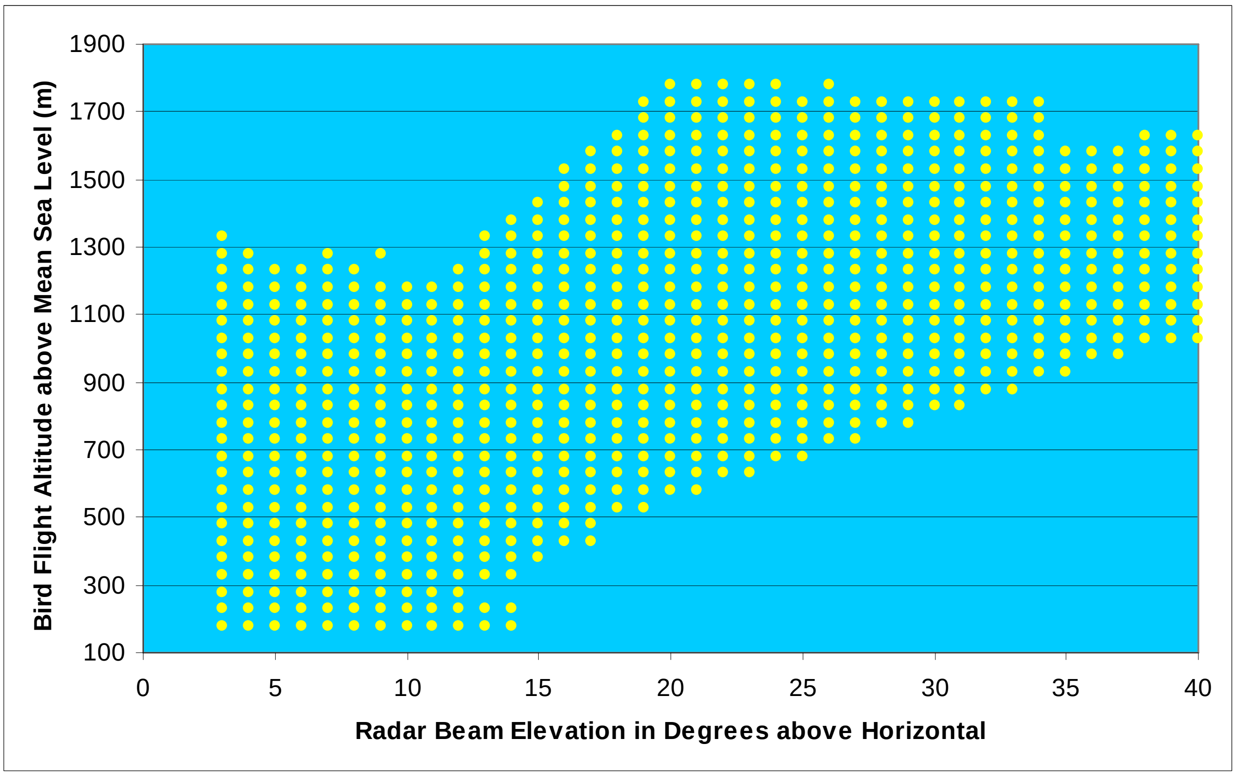
Exhibit N-14. L-Band Radar: Average Power Density (mW/cm^2) Multiplied by Exposure Duration Divided by 6 minutes, for Birds Flying Through a Stationary Radar Beam Elevated at 20 Degrees At Varying Altitudes Above the Radar

Bird Altitude Above Radar (m)	Flight Duration (T) (sec)	Avg. Power Density (S) (mW/cm^2)	(T · S)/360 sec (mW/cm^2)	Horizontal Distance from Radar (m)
200	20	115.3	6.3	560 - 610
400	20	152.3	8.3	1,130 – 1,210
600	28	278.0	21.7	1,700 – 1,820
800	37	206.3	21.4	2,260 – 2,420
1,000	47	129.2	16.8	2,830 – 3,030
1,200	56	90.1	14.1	3,390 – 3,630
1,400	65	66.3	12.1	3,960 – 4,240
1,600	75	50.1	10.4	4,530 – 4,840
1,700	80	39.5	8.7	4,810 – 5,140

Given the geometry depicted in Exhibit N-10, as the angle of the radar beam increases from 3 to 90 degrees above horizontal, the duration of exposure decreases as a bird begins to fly more perpendicularly to the radar beam. The magnitude of exposure, given by the power density, of the COBRA DANE radar beam changes non-uniformly in the near field as the radar beam moves from an elevation of 3 degrees to 90 degrees. Thus, the analysis shows that for the COBRA DANE radar, a flight altitude of 1,700 meters above the radar would represent a no-harm altitude. This maximum no harm flight altitude occurs when the beam elevation is between about 20 and 40 degrees above horizontal. The COBRA DANE radar face is tilted back 20 degrees from the vertical, thus these elevations represent zero to 20 degrees above the radar bore site.

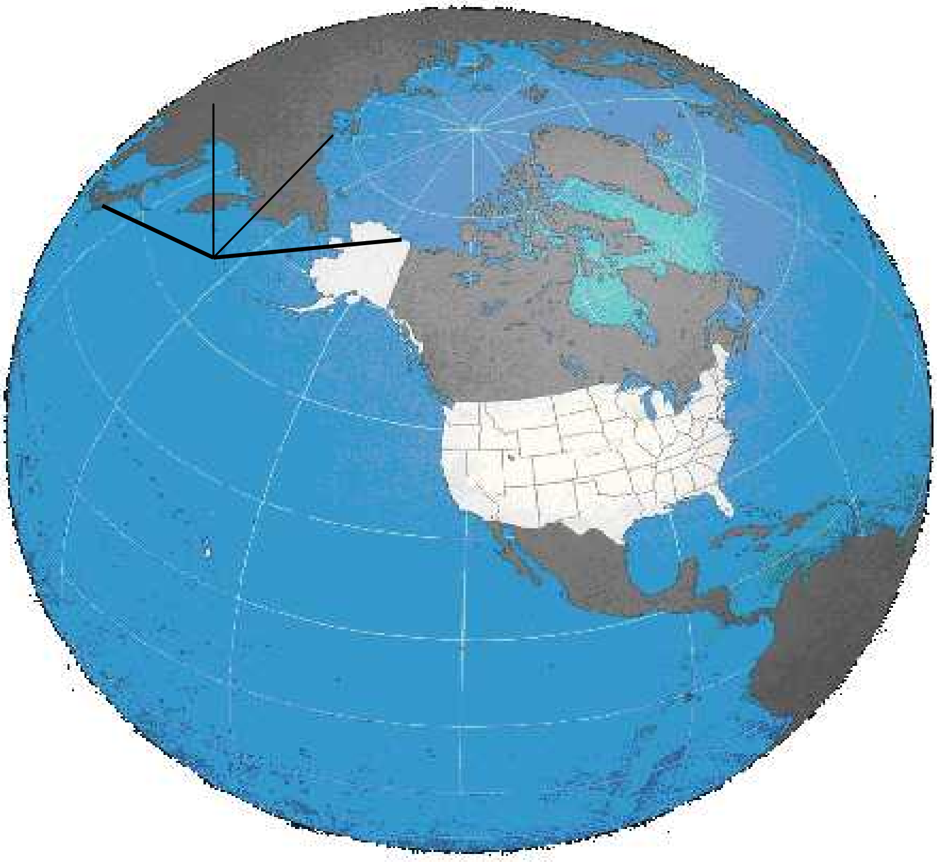
The COBRA DANE radar is situated near the edge of a cliff 100 meters above sea level and is approximately 30 meters in height. Thus, birds flying at altitudes of less than 1,830 meters above sea level at that location might fly through a stationary beam from the COBRA DANE at levels exceeding the no-harm reference value, 10 mW/cm^2, averaged over six minutes. Exhibit N-15 shows the combinations of radar beam elevation and bird flight altitudes that may result in birds receiving exposures above the no-harm reference value of 10 mW/cm^2. Exhibit N-15 also shows that for beam elevations above about 15 degrees and for birds flying at altitudes less than 400 meters, the flight times through the radar beam are sufficiently short that the exposure is less than the no-harm reference value. Thus, at higher beam elevations and for lower flying birds, migrating birds flying parallel to the beam may not receive exposures above the no-harm reference value.

Exhibit N-15. COBRA DANE Radar Beam Elevation and Bird Flight Altitude Combinations Resulting in Exposures above 10 mW/cm^2



The assessment presented here is conservative. The analysis assumes that the birds will be flying directly into the radar beam, which is a worst case scenario. Some of the power densities in Exhibit N-14 are in the near field for the COBRA DANE radar, but were estimated using the far field Equation 2, and thus may overestimate the power densities likely to be encountered by a bird flying through the beam at the altitudes listed. Also, for lower beam elevations and higher bird flight altitudes the time for a bird to fly through the radar beam may be significantly longer than the radar beam would actually stay stationary. For beam elevations between 3 and 10 degrees above horizontal the flight times through the beam range from 40 seconds to 42 minutes. Exhibit N-16 shows the COBRA DANE radar scan area between the heavy lines as well as the high quality tracking area between the lighter lines. From Exhibit N-16, we can see that birds migrating from Alaska along the Pacific Oceanic migration route might fly parallel to the

Exhibit N-16. COBRA DANE Radar Beam Azimuth Coverage Area



radar beam for a portion of their flight. Also birds migrating from Alaska to Asia are likely to be flying more perpendicular to the radar beam than parallel to the beam. Thus the scenario presented above is a worst case, with birds flying only parallel to the radar beam. Migrating birds are more likely to be flying at an angle to the radar beam and thus there would only be a component of their flight that is parallel to the beam.

N.7.1.3 Single Pulse Exposures

This section presents an estimate of risks to birds that encounter a single beam pulse from a radar, and is appropriate to radars operating in the surveillance mode. After each pulse is emitted, the radar "listens" for returning echoes and then changes direction before emitting the next pulse. The chance of the direction change coinciding with the direction the bird is traveling is very small. Thus a bird would not encounter subsequent pulses. This assessment uses the estimates of peak power density at varying distances from the radar in Exhibit N-12. Exposure duration of 10 milliseconds was assumed as the emitted pulse duration for each BMDS radar. This is a conservative estimate; most radars use pulse widths of 1 millisecond or less in most situations.

Exhibit N-17 shows the results of multiplying the peak power densities at the varying distances from the radar antenna (Exhibit N-12) by 0.010 sec pulse duration and dividing by 360 sec (six minutes). In Exhibit N-17, values less than the no-harm reference value of 10 mW/cm^2 indicate a negligible risk of impacting a bird encountering the beam at the specified distance. Exhibit N-17 indicates that there is negligible risk to individual birds encountering a single pulse of a radar beam.

Exhibit N-17. Peak Power Density (mW/cm^2) Multiplied by Exposure Duration (0.010 seconds) Divided by 360 seconds, with Increasing Distance from the Antenna for Different Types of Radar

Radar Type	Peak kW	Gain (dB)	Peak power density (mW/cm^2) multiplied by 0.010 sec / 360 sec						
			100 m	300 m	500 m	700 m	900 m	1,500 m	3,000 m
X-band	500	53.2	0	0	0	0	0	0	0
C-band	2,500	51.7	8	1	0.3	0.2	0.1	0	0
S-band	2,200	38.6	0.4	0	0	0	0	0	0
L-band	15,500	49.5	0	0	0	0	0	0	0
UHF	582	38.0	0	0	0	0	0	0	0

Note that the values presented in Exhibit N-17 represent conservative estimates, primarily because the far field equation (Equation 2) was used to estimate some of the near field power densities, which will be lower, possibly substantially lower. Second, a 10-millisecond pulse width was assumed, which overestimates pulse width (and therefore exposure duration) for most radars and most situations by an order of magnitude. Based on these conservative assumptions, it can be concluded that none of the radars (when operating in surveillance mode with the direction of the radar beam changing between pulses) are likely to pose a threat to migrating birds.

N.7.1.4 Radars in Surveillance Mode

This section evaluates whether birds flying in the surveillance zone for phased array radars, whose main function is surveillance, namely the PAVE PAWS and COBRA DANE radars, would experience exposures above the threshold of 10 mW/cm^2 averaged over six minutes. The X-band (SBX) radar is not evaluated because it is primarily a tracking radar and not a surveillance radar. The S-band radar is not evaluated because it does not impact birds in tracking operations where the radar beam is stationary, and thus will not impact birds during surveillance operations.

In the surveillance mode of the radar the surveillance zone is covered repetitively, and the surveillance pulses have longer pulse duration than for tracking. The analysis estimates the surveillance zone and beam area in steradians (solid angle measurement) to determine the number of beam positions required to cover the surveillance zone. A bird in the surveillance zone will be exposed to one beam dwell time per surveillance period. Thus the number of times a bird in the surveillance zone is exposed to the beam over a six minute period depends on the time to complete a survey of the entire surveillance zone.

For PAVE PAWS, the surveillance region is 240 degrees in azimuth and 3 to ten degrees in elevation or 0.508 steradians (= 240/360 2π (Sin (10) – Sin (3))). The PAVE PAWS beam width is approximately 0.0011 steradians, so that there are about 438 beam positions to be covered by the two radar faces. For COBRA DANE, the surveillance region is 120 degrees in azimuth and is assumed to be 3 to ten degrees in elevation or 0.254 steradians (= 120/360 2π (Sin (10) – Sin (3))). The assumed COBRA DANE beam width is 0.0003 steradians, so that there are about 835 beam positions to be covered.

The specific revisit time is dependent on the pulse duration assigned to each surveillance pulse. For the PAVE PAWS radar, assuming a pulse-duration of ten milliseconds, the eleven per cent duty time devoted to surveillance, and the use of two radar faces, the 438 beam positions would be covered in about 20 seconds. Thus, a bird flying through the surveillance zone would experience one pulse encounter every 20 seconds or 18 encounters every six minutes. Using similar assumptions for the single faced COBRA DANE radar for pulse duration and duty time, the surveillance zone would be covered in about 76 seconds. Thus, a bird flying through the surveillance zone would experience one pulse encounter every 76 seconds, or five encounters every six minutes.

Exhibit N-18 shows the results of these calculations. The results indicate that birds in the surveillance zones of the L-band or UHF band radars would not be exposed to EMR above the threshold of 10 mW/cm^2 average over six minutes while these radars are in the surveillance mode.

Exhibit N-18. Peak Power Density (mW/cm^2) Multiplied by the Number of Exposures in Six Minutes Divided by 360 seconds, with Increasing Distance from the Antenna for Different Types of Radar

Radar Type	Peak kW	Gain (dB)	Peak power density (mW/cm^2) with distance from radar (m)						
			100 m	300 m	500 m	700 m	900 m	1,500 m	3,000 m
L-band	15,500	49.5	0.1	0.1	0.1	0.1	0.1	0.3	0.1
UHF	582	38.0	0.01	0.01	0.01	0.01	0.02	0.01	0.00

N.7.2 Risks to Migratory Bird Populations

Sections N.7.1.3 and N.7.1.4 concluded that none of the radars proposed for the BMDS are likely to pose threats to migrating birds while operating in surveillance mode. However, it was not possible to exclude the possibility that a stationary radar beam, as might occur during tracking or calibration operations of the radars, might be hazardous to migrating birds crossing the beam (flying perpendicular to the beam) in the range of 1,400 to 1,700 meters of the COBRA DANE radar. For birds that might fly along the direction of a stationary beam from the COBRA DANE radar at altitudes of less than 1,830 meters (or less than 1,700 meters above the radar), the no-harm reference value might be exceeded. This section evaluates the likelihood that a flock of migrating birds flying by the COBRA DANE radar would be exposed to EMR above the no-harm reference value.

As indicated in Section N.6.1, most bird migration occurs between altitudes of 150 and 1,370 meters, with a majority of migrants flying around 460 meters, except during periods of poor weather when migrants may fly at altitudes of 50 or 100 to 300 meters or so. The calculations in Section N.7.1 indicate that risks of exposure to levels of EMR above the no-harm reference value near the COBRA DANE radar are likely during both good weather and poor weather when migrating birds are flying at lower altitudes. Section N.7.1.2 also showed that during poor weather, and thus lower migration altitudes, that some birds may fly "under" the COBRA DANE radar when its beam is at elevations of 15 degrees or more and not be exposed above the no-harm reference value.

There is unlikely to be population-level impacts on non-endangered bird species. If, however, the majority of migrants were to fly at altitudes of only a few hundred meters, as during periods of poor weather, with many possibly passing directly in front of the radar, and the radar beam is stationary, a majority of birds might be exposed to levels of EMR above the 10 mW/cm^2 reference level. That might have population-level effects on bird species or populations that are in decline.

The estimate of the number of birds that might be exposed to EMR above the no-harm reference value near the COBRA DANE radar are appropriate only to a limited set of conditions and are likely to be overestimates even for those conditions. First, it was assumed that all birds migrate at an altitude less than 500 meters. Second, the reference exposure density, 10 mW/cm^2 (six-minute average), is a conservative estimate of a threshold for possible adverse effects. Finally, this assessment assumes the radar beam is stationary.

For radars in surveillance mode, the sweeping motion of the radar beam may result in all birds flying in the surveillance area of the radar encountering the beam, but the exposure durations in this case are so short that the estimated risk of harm is negligible for all radars when operating in the surveillance mode (see Exhibits N-16 and N-17 and accompanying text on conservative assumptions).

Thus, risks to migrating birds from radars for the proposed BMDS appear limited to the COBRA DANE radar and are limited to testing conditions when the radar beam might remain stationary for tens of seconds to several minutes (e.g., tracking a test target or during calibration). For the COBRA DANE radar, the risks are only to birds flying at altitudes less than 1,700 meters. None of the radars operating in surveillance mode are expected to pose risks to birds.

N.7.3 Mitigation Measures

The conservative analyses above indicate that the only radar type for which there is some risk in spring and fall to some migrating birds is the COBRA DANE, and the primary concern is for testing with the radar beam held stationary for some period of time (e.g., minutes). To mitigate possible risks to migrating birds, MDA should evaluate the possibility that the COBRA DANE radar might be tested with stationary beams during spring and fall migrations. If so, MDA should evaluate whether the locations where the COBRA DANE radar would be used are in a significant migratory route or near to a migratory stopover, such that large migratory flocks might on occasion pass through the radar beam. If such a risk is deemed to exist, it would then be advisable for MDA to consider use of a local NEXRAD to help evaluate when large flocks might be in the vicinity of the radar so that the timing of a test does not coincide with particularly large flocks of birds flying close to the radar.

N.8 References

Air Force Research Laboratory (AFRL). No date. "Radiofrequency Electromagnetic Fields (RFEMF) and Cancer: A Comprehensive Review of the Literature Pertinent to Air Force Operations." www.brooks.af.mil/AFRL/HED/hedr/reports/rfemf_cancer/can-cont.htm, accessed April 2005.

Ballistic Missile Defense Organization (BMDO), 2000. "Appendix H, Upgraded Early Warning Radar Analysis." *National Missile Defense Deployment Final Environmental Impact Statement*, July.

Birdnature.com, 2001. "Migration Timetable." http://www.birdnature.com/timetable.html, accessed April 2005.

Busnel, R.G., J. Giban, P. Gramet, and F. Pasquinelly, 1956. Absence d'action des ondes du radar sur la direction de vol de certains oiseaux. *Comptes rendus des seances de la Societe de biologie et de ses filiales*. 60:18. (as cited in Bruderer et al. 1999)

Clemson University Radar Ornithology Laboratory (CUROL), 2005. "Homepage: Birds on NEXRAD and Migrating Birds." http://virtual.clemson.edu/groups/birdrad/, accessed April 2005.

Cochran, W.W., H. Mouritsen, and M. Wilelski, 2004. Migrating songbirds recalibrate their magnetic compass daily from twilight cues. *Science*. 304: 405-408.

Deinlein, Mary., 2005. "Fact Sheet: Stopover Sites in Decline." Migratory Bird Center, Smithsonian National Zoological Park. http://nationalzoo.si.edu/ConservationAndScience/MigratoryBirds/Fact_Sheets/default.cfm?fxsht=6, accessed April 2005.

Drost, R., 1949. Zugvögel perzipieren Ultrakurzwellen. *Vogelwarte*. 2:57-59. (as cited in Bruderer et al. 1999)

Durney, C.H., H. Massoudi, and M.F. Iskander, 1986. *Radio-frequency Radiation Dosimetry Handbook*, 4th ed. Brooks Air Force Base, TX: USAF School of Aerospace Medicine, Report No. USAFSAM-TR-85-73.

Gauthreaux, S., 2005. Personal communication with M.E. McVey, ICF Consulting, February 7, 2005. (sagth@clemson.edu, 864-656-3584).

Hagstrum, J, 2000. Infrasound and the avian navigational map. *Journal of Experimental Biology*. 203:1103-1111.

Hild, J., 1971. Beeinflussung des Kranichzuges durch elektromagnetische Strahlung? *Wetter Leben*. 23:45-52. (as cited in Bruderer et al. 1999)

Institute of Electrical and Electronics Engineers (IEEE), 1999. *IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.* IEE Std C95.1, 1999 Edition (Incorporating IEEE Std C95.1-1991 and IEEE Std C95.1a-1998). New York, NY: IEEE Inc.

Knorr, O.A, 1954. The effect of radar on birds. *Wilson Bulletin*. 66:264. (as cited in Bruderer et al. 1999)

Kramer, G., 1951. Versuche zur Wahrnehmung von Ultrakurzwellen durch Vögel. *Vogelwarte*. 16:55-59. (as cited in Bruderer et al. 1999)

Kreithen, M.L., and E. Davis, 1995. Development of a pulsed microwave warning system to reduce avian collisions with obstacles (abstract only). Bird Strike Committee, USA. (as cited in Bruderer et al. 1999)

Lasiewski, R.C., and W.R. Dawson. 1967. A reexamination of the relation between standard metabolic rate and body weight in birds. *Condor*. 69:12-23.

Lincoln, Frederick C., Steven R. Peterson, and John L. Zimmerman. 1998. *Migration of Birds*. U.S. Department of the Interior, U.S. Fish and Wildlife Service, Washington, D.C. Circular 16. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. ttp://www.npwrc.usgs.gov/resource/othrdata/migratio/migratio.htm (Version 02APR2002), accessed February 2005.

Mouritsen, H., and O.N. Larsen, 2002. Migrating songbirds tested in computer-controlled Emlen funnels use stellar cues for a time-independent compass. *Journal of Experimental Biology*. 204: 3855-3865.

MITRE, 2000. *RF Power Density Exposure at Ground Level for the PAVE PAWS Radar at Cape Cod – Questions and Answers.* Kramer, A.G., B.P. Nelson, and R.E. Wakefield. MITRE Technical Report. Bedford, MA: MITRE Center for Air Force C2 Systems. MTR B0021V00S00R00, August.

Naval Air Warfare Center (NAWC), 2005. "EW and Radar Systems Engineering Handbook." https://ewhdbks.mugu.navy.mil/pwr-dens.htm accessed on April 2005.

New Jersey Audubon Society (NJAS), 2004. "Stopover Sites." http://www.njaudubon.org/Education/Oases/Stopover.html, accessed April 2005.

Poor, H.H., 1946. Birds and radar. *Auk*. 63:631. (as cited in Bruderer et al. 1999)

Richardson, W.J., 2000. "Bird migration and wind turbines: migration timing, flight behavior, and collision risk." Proceedings of the National Avian-Wind Power Planning Meeting III, May 1998. Prepared by LGL Ltd., Environmental Research Associates. King City, Ontario, Canada, June. http://www.nationalwind.org/publications/avian/avian98/20-Richardson-Migration.pdf, accessed May 2005.

Sterling, John. 2005. "Fact Sheet: Western Riparian Systems: Magnets for Migrants." Migratory Bird Center, Smithsonian National Zoological Park. http://nationalzoo.si.edu/ConservationAndScience/MigratoryBirds/Fact_Sheets/default.cfm?fxsht=5, accessed April 2005.

U.S. Army Space and Missile Defense Command, 2003. *Ground-Based Midcourse Defense Extended Test Range Environmental Impact Statement*, July.

U.S. Army Space and Strategic Defense Command, 1993. *Final Ground-Based Radar Family of Radars Environmental Assessment*, June.

Wiltschko, W., and R. Wiltschko, 1996. Magnetic orientation in birds. *Journal of Experimental Biology*. 199: 29-38.

This page intentionally left blank.

INDEX VOLUME 3