Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR)

Final Environmental Impact Statement

Volume 3 of 3: Chapter 9-Appendices

July 2003

U.S. Army Space and Missile Defense Command
P.O. Box 1500
Huntsville, Alabama 35807-3801

Ground-Based Midcourse Defense (GMD)
Extended Test Range (ETR)
Final Environmental Impact Statement

Volume 3 of 3

July 2003

Missile Defense Agency

COVER SHEET
FINAL ENVIRONMENTAL IMPACT STATEMENT
GROUND-BASED MIDCOURSE DEFENSE (GMD)
EXTENDED TEST RANGE (ETR)

a. Lead Agency: Missile Defense Organization

b. Preparing Agency: U.S. Army Space and Missile Defense Command

c. Cooperating Agencies: Federal Aviation Administration, Office of the Associate Administrator for Commercial Space Transportation

d. Proposed Action: Provide operationally realistic testing for GMD ETR.

e. Affected Jurisdictions: Kodiak Launch Complex, Kodiak Island Borough, Alaska; Vandenberg Air Force Base (AFB), Santa Barbara County, California; Reagan Test Site, United States Army Kwajalein Atoll; Pacific Missile Range Facility, Barking Sands, Kauai, Hawaii; Eareckson Air Station, Shemya Island, Alaska; Midway Atoll; King Salmon, Bristol Bay Borough, Alaska; Cordova, Valdez-Cordova Census Area, Alaska; Pillar Mountain, Kodiak Island Borough, Alaska; Pashagshak Point, Kodiak Island Borough, Alaska; Homer, Kenai Peninsula Borough, Alaska; Adak, Adak Island, Alaska; Pillar Point, San Mateo County, California; Wake Island, Oceania Atoll; Bremerton, Kitsap County, Washington; Pearl Harbor, Honolulu County, Hawaii; Port Hueneme/San Nicolas Island, Ventura County, California; Naval Station Everett, Snohomish County, Washington; Valdez, Valdez-Cordova Census Area, Alaska; Beale Air Force Base, Yuba County, California; Clear Air Force Station, Denali Borough, Alaska

f. Inquiries on this document may be directed to: U.S. Army Space and Missile Defense Command, ATTN: SMDC-EN-V (Ms. Julia Elliott), 106 Wynn Drive, Huntsville, AL 35805, by e-mail at gmdetreis@smdc.army.mil, or by phone at 1-800-823-8823.

g. Designation: Final Environmental Impact Statement

h. Distribution/Availability: DISTRIBUTION A. Approved for public release; distribution is unlimited.

i. Abstract: The Missile Defense Agency is proposing to develop the capability to conduct more realistic interceptor flight tests in support of GMD. The extension of the existing GMD test range would increase the realism of GMD testing by using multiple engagement scenarios, trajectories, geometries, distances, and speeds of target and interceptors that closely resemble those in which an operational system would be required to provide an effective defense. Extended range testing would include pre-launch activities, launch of targets and Ground-Based Interceptors from a number of widely separated locations, and missile intercepts over the Pacific Ocean. Target missiles would be launched from Vandenberg AFB, Kodiak Launch Complex, Pacific Missile Range Facility, Reagan Test Site (RTS), or from mobile platforms in the western Pacific Ocean. Interceptor missiles would be launched from Vandenberg AFB, Kodiak Launch Complex, or RTS. Dual target and interceptor missile launches would occur in some scenarios. Existing, modified, or new launch facilities and infrastructure would support these launch activities at the various locations.

Missile acquisition and tracking would be provided by existing test range sensors, ship-borne sensors, a Sea-Based Test X-Band Radar, and a mobile sensor (TPS-X) positioned at Vandenberg AFB, Kodiak Launch Complex, or RTS; and existing/upgraded radars at Beale AFB, California, Clear Air Force Station, and Eareckson Air Station, Alaska. In-Flight Interceptor Communications Data Terminals would be constructed near the proposed Ground-Based Interceptor launch sites. Commercial satellite communications terminals would be constructed at launch locations that do not have fiber optic communications links.

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9.0 CONSULTATION COMMENTS AND RESPONSES

This section includes consultation and coordination letters with various state and federal agencies. Agency coordination has been accomplished through meetings with various agencies and through distribution of the Coordinating Draft EIS and the Draft EIS. Comments were requested on both the Coordinating Draft and the Draft EIS, although not all agencies provided comments.

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STATE OF ALASKA

TONY KNOWLES, GOVERNOR

OFFICE OF THE GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF GOVERNMENTAL COORDINATION

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PH: (907) 269-7470 / FAX: (907) 561-6134

March 15, 2002

Michon Washington
Federal Aviation Administration
Suite 331/AST-100
800 Independence Avenue S.W.
Washington, DC 20591

Dear Ms. Washington:

Subject: Kodiak Launch Facility
Environmental Monitoring Plan

In your letter of March 5, 2002, you requested that the Division of Governmental Coordination respond to three questions related to continued monitoring at the Kodiak Launch Facility, operated by the Alaska Aerospace Development Corporation. The following conclusions reflect my own observations; they do not reflect a consolidated State response.

On March 10, 2002 I attended a briefing that Sal Cuccarese of the Environment and Natural Resources Institute organized to review the results of the monitoring from the first five launches. After listening to the presentation and agency comments, I believe there are benefits that can be derived from a continuation of a good monitoring program. According to the Alaska Department of Environmental Conservation (DEC), Air and Water Quality (AWQ), the data collected thus far is not trendable and therefore of little use, except to come to an extrapolated decision that no environmental effects will be impacted at the Narrow Cape. The monitoring plan needs to be revised to obtain a sufficient data set.

The benefits of the monitoring program would be enhanced, however, if the existing program is modified to make it more effective. For example, some monitoring could be conducted periodically rather than immediately prior to and following a specific launch. At a minimum we should continue monitoring water quality and sediments, macro-invertebrates, and marine mammals. Procedures for monitoring bird use appear to need modification if the monitoring results are to be useful. I defer to each agency's expertise to identify the appropriate parameters to be monitored and the appropriate methodologies to conduct the monitoring.

DEC AWQ suggests the following changes to the Kodiak Launch Complex monitoring plan:

1. Alkalinity should be monitored quarterly (in first two weeks of each calendar quarter). Alkalinity will show a trendable change in water quality whereas a pH reading is a function of the buffering capacity of the water sample.

2. Perchlorates should be monitored quarterly (in first two weeks of each calendar quarter).

Your letter referenced the State's review of the Quick Reaction Launch Vehicles that was found consistent with no additional monitoring. No monitoring was required because it was part of the project description. We also noted in that letter that a state individual permit for nondomestic wastewater (0125-DB001) was being issued to the AADC for the disposal of ground water and rainwater that collects in the flame trench. The ground water near the leach field will be monitored for pH, perchlorates, and aluminum. Due to technical difficulties this permit was not issued to AADC and is undergoing additional review at this time.

The State established its initial monitoring requirements in its review of the U.S. Army Space and Missile Defense project. That review included the following monitoring requirements:

1. The U.S. Army Space and Missile Defense Command (SMDC) shall participate in monitoring the effects of its launches on land and water quality. In addition to pH, dissolved oxygen, alkalinity, conductivity, and temperature monitoring included in the Alaska Aerospace Development Corporation (AADC) Environmental Monitoring Plan, monitoring must include pre and post-launch conditions of perchlorates and total aluminum (EPA SM 3120 B, 18th Edition). In addition to the three streams identified in the AADC monitoring plan, monitoring areas must include Twin Lakes. Weather conditions (i.e., speed and direction of wind, precipitation, and humidity) at the time the launch must be included in the report.

2. Monitoring results must be submitted to DGC, Anchorage Office, DEC, Wastewater Permitting Division, DFG, Habitat and Restoration Division, Region II and KIB Community Development Department. At the end of 6 launches, SMDC shall prepare a report summarizing the monitoring results. DGC, DEC, DFG, and KIB (as noted above) shall review the results and determine the need for changes in the monitoring schedule.

Thank you for the opportunity to comment in advance of your decisions related to monitoring at the Kodiak Launch Facility. If you have any questions about this response, please contact me at (907) 269-7473 or email maureen_mccrea@gov.state.ak.us.

Sincerely,

/s/

Maureen McCrea
Project Review Coordinator

cc: via e-mail
Stefanie Ludwig, DNR/SHPO, Anchorage
Wayne Dolezal, DFG/DHR, Anchorage
Bob Scholze, KIB, Kodiak
Pat Ladner, AADC
Kerry Howard, DGC, Juneau
Karlee Gaskill, DNR/DOL, Anchorage
Alan Kukla, DEC, Anchorage
Senator Alan Austerman, District C, Kodiak
J. Clifford Stone, Juneau

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services Anchorage
605 West 4th Avenue, Room 62
Anchorage, Alaska 99501-2249

WAES

Mrs. Julia Hudson-Elliot
U.S. Army Space and Missile Defense Command
106 Wynn Drive
Huntsville, AL 35805

MAY 2 2002

Dear Mrs. Hudson-Elliot:

We have reviewed the proposal for Phase II of the Ground-Based Midcourse Defense (GMD) system. We offer the following scoping-level comments at this time.

Our comments are focused on the proposed construction of new facilities and the operations from new and existing facilities that are based out of Kodiak, Alaska, although the project encompasses a much larger geographic area. The proposed action on Kodiak as described in your April, 2002, Fact Sheet and derived from a conversation with Leroy Phillips of the Army Corps of Engineers (Corps) includes construction to develop a dual ground based interceptor with two new silos, a battle control and command center, installation of communication facilities, construction of additional test missile launch capabilities, an upgrade of existing facilities, and the utilities, equipment, and other infra-structure required to support these operations.

The proposed alternatives for the GMD extended range testing include a No-action and three other alternatives. Alternative 1 includes numerous actions for new construction (described below) near an existing launch facility on Kodiak Island. Alternative 2 includes new construction and modification of existing target launch pads and support facilities at the Kodiak Launch Facility. Alternative 3 includes all the actions for development at Kodiak described in Alternative 1 and new construction and modifications at Vandenberg Airforce Base.

As yet we have received very little information on the location, size, and specific descriptions of the actions on Kodiak, thus it is difficult for us to provide detailed information on fish, wildlife, wetlands, and other habitats that could be impacted by the project. This information should include locations and alternative locations to construct new facilities and the infra-structure (i.e., new and upgraded roads, utilities) to support these facilities. Information on potential construction camps, location and size of material site(s), and temporary fill areas should also be included in your project descriptions and environmental analysis. In addition, information on the operations (i.e., launches) proposed to occur within the facilities and the how they may affect fish and wildlife resources should also be analyzed in your environmental documentation.

An overview prepared by the Missile Defense Agency that we received from the Corps and titled "Ground Based Midcourse Defense," includes a map of the Narrow Cape area depicting locations of proposed facilities that include the dual launch ground based inceptor silos, a second target launch pad, and an integration and processing facility. However, this map only represents one alternative for developments located near the Kodiak Launch Facility. The Environmental Impact Statement should include all practicable or feasible alternatives specific to development on Kodiak, including alternative site locations. Sites with existing infrastructure, fill, or development should be considered to minimize or prevent impacts to biological resources within undeveloped areas. Based on previous surveys (ENRI 1995) a mosaic of vegetation types including wetlands, streams, and lakes occur where the new developments are proposed at Narrow Cape.

Bald eagles have been documented nesting in the vicinity of Narrow Cape and their nests may occur within the footprint or near the proposed facilities. Bald eagles in Alaska are protected under the Bald and Golden Eagle Protection Act (Act). All parties working in the vicinity of bald eagles are responsible for avoiding the taking, "at any time in any manner (of) any bald eagle... or any part, nest or egg thereof" (16 U.S.C. 688a). "Taking" is defined as to "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest or disturb" (16 U.S.C. 688a).

While the Fish and Wildlife Service can recommend distances which should eliminate the take of eagles as defined by the Act, final accountability lies with the landowner or party responsible for the action. If an action results in the abandonment of a nest or death of eaglets, the party responsible could be subject to criminal or civil penalties under the Act.

Aleutian and arctic terns and many other bird species may also nest within or adjacent to the proposed development. The development will require vegetation clearing, excavation, and fill placement which could all result in the destruction of bird nests, a violation of the Migratory Bird Treaty Act (16 U.S.C. 703). The destruction of active bird nests (i.e., those with eggs or young) can best be avoided by placing the development in an area where nesting does not occur, or if that is not feasible, by avoiding construction activities when the birds are nesting (April 15 - July 15).

In order to determine location of bird nests within the project area, bird and bald eagle nest inventories will need to be conducted within the footprint and adjacent to any proposed development for all of the alternatives specific to Kodiak. This information will help avoid potential violations of the Migratory Bird Treaty Act and Bald and Golden Eagle Protection Act by placing the development away from important nesting areas and help determine the need for a timing window. We are willing to assist with designing and/or conducting these inventories.

Any projects that are Federally funded or require a Federal permit are subject to consultation under section 7 of the Endangered Species Act. To initiate this process, the agency proposing the action first needs to request a species list from the Fish and Wildlife Service. If you need more information regarding this process please contact Charla Sterne at (907) 271-2781.

As noted above, in order to assess potential fish and wildlife habitat losses and impacts within the proposed alternatives, further resource information is required. This information is necessary in order to adequately describe the affected environment, predict environmental consequences as required by the National Environmental Policy Act, and appropriately plan a project with minimal environmental impacts.

In particular, the following elements should be identified and fully addressed in your environmental document:

1. Conduct a thorough evaluation of alternatives pursuant to the Clean Water Act Section 404(b)(1) Guidelines.

2. Conduct wetland delineations within the footprint of the proposed alternatives.

3. Identify the direct, indirect, and cumulative impacts of each alternative to fish, wildlife, and wetland resources. The scope of this assessment should include impacts related to habitat losses, construction activities, and long-term operation of the facilities (i.e., launches).

As project plans become more complete, we may identify additional resource concerns and recommend measures to avoid and minimize resource impacts. For wetlands impacts that cannot be avoided or minimized, we will recommend compensatory mitigation. For further coordination please contact Marcia Heer at (907) 271-2440.

Sincerely,

Kimberly A. Tant

for Ann G. Rappoport
Field Supervisor

cc: Corps (L. Phillips),
ADFG-Anchorage (W. Doezal)
ADFG-Kodiak (J. MuCullough)
NMFS (J. Hanson)

References

Environmental and Natural Resource Institute. 1995. Kodiak Launch Complex, Environmental Assessment and Baseline. University of Alaska, Anchorage. Vol 3.

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United States Department of the Interior

NATIONAL PARK SERVICE
Pacific West Regional Office
1111 Jackson Street, Suite 700
Oakland, California 94607
(510) 817-1300

IN REPLY REFER TO:
L7619 (PGSO-PP)
ER02\0348

MAY 2 0 2002

U.S. Army Space & Missile Defense Command
Attn: Julia Hudson-Elliott
106 Wynn Dr.
Huntsville, AL

Dear Ms. Hudson-Elliott,

The National Park Service has reviewed the Notice of Intent published by the U.S. Army Space and Missile Defense Command regarding *Preparation of the Ground-Based Midcourse Defense Extended Test Range Environmental Impact Statement* (March 28, 2002; V67, N60, PP14919-14920). This Federal Register announcement (NOI) initiates an environmental impact analysis process for the proposed enhancement of test facilities, including Ronald Reagan Ballistic Missile Test Site at Kwajalein Atoll, the Pacific Missile Range Facility in Hawaii, Vandenburg Air Force Base in California, and Kodiak Launch Complex in Alaska.

Area of Possible Effect of Proposed Action - The proposed action involves enhancing current test capabilities, including additional missile launch sites at Kodiak Launch Complex in Alaska and Vandenburg Air Force Base in southern California. The missile launches and ancillary actions have potential for impacting natural soundscapes in any national park, national monument, or other unit of the National Park System in proximity to the tests.

Possible Environmental Effects - Potential sources of noise could include any aircraft participating in the tests, the missile launches themselves, and target destruction via missile ordinance. The resulting sounds could adversely impact natural processes in units of the National Park System, and disrupt experiences of many diverse people who expect to hear natural sounds or enjoy the solitude that is to be provided in parks. In part, these areas have been created to provide for solitude and protect resources and values including natural soundscapes.

Concerns Relating to the Scope of Analysis - Given the potential for adverse impacts as a consequence of this type of activity, the National Park Service (NPS) has concerns about how much and to what extent the proposed tests would occur in relative proximity to existing national parks and monuments such as Kenai Fiords National Park or Channel Islands National Park. The forthcoming Draft EIS (and any scoping or public information materials) should clearly disclose the location of all units of the National Park System which may be affected, as well as indicate the frequency and duration of the missile launches, the number of launches per unit time, the duration of the program with respect to each such unit, as well as altitudes and locations (with respect to prevailing winds) where these activities may occur.

Range of Alternatives - We note, with appreciation, that recently in other areas the U.S. Air Force has been very receptive about eliminating, reducing, or mitigating the impacts of routine flights and training exercises over national park areas, and is presently working proactively with our National Soundscape Program Center.

We feel that mutually beneficial results of such cooperation could be realized through consultations regarding the subject action being proposed. If not already included, we request consideration of an alternative that provides sufficient horizontal buffers between all noise-producing activities proposed and areas of the national parks and monuments in closest proximity. We are available to provide additional information to facilitate alternative development, identification of appropriate mitigations, and other aspects of the forthcoming environmental impact analysis effort.

Summary

Recognizing the propensity for the U.S. Army Space and Missile Defense Command to enhance this program, NPS sees no indication in the NOI that testing over national parks is intrinsic to the test systems' effectiveness or other critical parameters. The Draft EIS should identify and analyze a reasonable range of alternatives (and rationales for them), including an alternative that does not adversely impact units of the National Park System. However, if there is later deemed to be no prudent and practical alternative to directly or indirectly impacting units of the National Park System, it is requested that numbers, frequencies, and durations of launches, tests, and other activities relative to all units be minimized as much as possible, and that other reasonable measures to minimize environmental harm be identified and analyzed.

For further information regarding our comments and concerns, please contact the following individuals, as well as include them in your EIS mailing list: Sarah Creachbaum (970) 267-2117, National Soundscape Program Center, 1201 Oakridge Dr., Ste. 200, Ft. Collins CO 80525; Bruce Greenwood (907) 257-2645, Alaska Regional Office, 2525 Gambell St., Anchorage AK 99503; and Judith Rocchio (510) 817-1431, Pacific Great Basin Support Office, 1111 Jackson St., Ste. 700, Oakland CA 94607.

Sincerely,

John J. Reynolds

cc:
REO
OEPC
WASO-EQD

DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
GROUND-BASED MIDCOURSE DEFENSE
JOINT PROGRAM OFFICE
P.O. Box 1500
Huntsville, AL 35807-3801

GMS-E

November 4, 2002

Mr. Robert Arnberger, Regional Director
U.S. Department of the Interior
National Park Service
AK Area Field Office
2525 Gambell Street, Room 107
Anchorage, AK 99503-2892

Dear Mr. Arnberger:

In compliance with the National Environmental Policy Act (NEPA) and the Council on Environmental Quality regulations implementing NEPA, the U. S. Army Space and Missile Defense Command, on behalf of the Missile Defense Agency (MDA), is preparing the *Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) Environmental Impact Statement* (EIS). MDA proposes to develop the capability to conduct more realistic interceptor flight tests in support of GMD by extending the existing GMD test range. This extension would increase the realism of GMD testing by providing an area in which to conduct multiple engagement scenarios using trajectories, geometries, distances, and speed of targets and interceptors that more closely resemble those in which an operational system would be required to provide an effective defense.

The Proposed Action would include pre-launch activities, target and ground-based interceptor (GBI) missile launches from a number of widely separated locations, and missile intercepts over the Pacific Ocean. Target missile would be launched from Vandenberg Air Force Base (AFB), CA; Kodiak Launch Complex (KLC), Kodiak, AK; Pacific Missile Range Facility (PMRF), Kauai, HI; Ronald Reagan Ballistic Missile Defense Test Site (RTS), U.S. Army Kwajalein Atoll; or from mobile platforms in the western Pacific Ocean. GBI missiles would be launched from Vandenberg AFB, KLC, or RTS. Dual target and interceptor missile launches would occur in some scenarios.

Missile acquisition and tracking would be provided by existing ship-borne sensors, a new sea-based X-Band radar, and land-based sensors in the Pacific region; a mobile sensor positioned at KLC, PMRF, RTS, or Vandenberg AFB; the prototype X-Band radar at RTS; and existing/ upgraded radars at Beale AFB, CA, and Clear Air Force Station and Eareckson Air Station, AK. In-Flight Interceptor Communication System Data Terminals (IDTs) would be constructed near the proposed GBI launch sites and in the mid-Pacific region. Commercial Satellite Communications terminals would be constructed at launch locations that do not have fiber optic communications links and in the mid-Pacific region.

The EIS considers the long-term conservation and protection of the coral reef ecosystem and related marine resources and species of the Northwestern Hawaiian Islands as required by Executive Order 13196, *Final Northwestern Hawaiian Islands Coral Reef Ecosystem Reserve.* The EIS also investigates the potential for adverse impact to Essential Fish Habitat in accordance with the Magnuson-Stevens Fishery Conservation and Management Act.

This Coordinating Draft EIS is being distributed to various agencies, including your office, for review and comment prior to preparing the Draft EIS for public review. It is our desire to ensure that any concern you might have about our efforts to identify natural resources and assess potential impacts is fully addressed.

Please review this information and provide comments by December 5, 2002 to Deputy Commanding General, U.S. Army Space and Missile Defense Command, Attention: SMDC-EN-V (Ms. Sharon Mitchell), P.O. Box 1500, Huntsville, AL 35807-3801 or by data facsimile 256-955-5074 or e-mail sharon.mitchell@smdc.army.mil. If you have any questions or comments, please contact Ms. Mitchell at 256-955-4392.

Mike Holland
for STEVE DAVIS
Colonel, U.S. Army
Director, Site Activation World Wide
Ground-Based Midcourse Defense

Enclosure:
As stated

Similar letters were sent to the following agencies:

ALASKA

Mr. Greg Ballogh, U.S. Fish and Wildlife Service, Anchorage Ecological Services Office, 605 W 4th Ave Rm G62, Anchorage AK 99501
Mr. Chuck Bell, State Conservationist, U.S. Department of Agriculture, Natural Resource Conservation Service, Alaska State Office, 949 East 36th Ave Ste 400, Anchorage AK 99508-4302
Ms. Judith E. Bittner, State Historic Preservation Officer, Alaska Department of Natural Resources, Office of History and Archaeology, Division of Parks and Outdoor Recreation, 550 West 7th Ave Ste 1310, Anchorage AK 99501
Ms. Michele Brown, Commissioner, Alaska Department of Environmental Conservation, 401 Willoughby Ave Ste 105, Juneau AK 99801-1795
Ms. Michelle Davis, Alaska Regional Coordinator, Native American Fish and Wildlife Society, 707 A St, Anchorage AK 99501
Mr. Samuel Demientieff, Fairbanks Agency, Bureau of Indian Affairs, Federal Building & Courthouse, 101 12th Ave Box 16, Fairbanks AK 99701
Mr. Clarence Goward, FAA Anchorage, 222 West 7th Ave Box 14, Anchorage AK 99513
Ms. Jeanne L. Hanson, Field Office Supervisor for Habitat Conservation, U.S. Department of Commerce, National Marine Fisheries Service, 222 West Seventh Ave No 43, Anchorage AK 99513-7577
Mr. Kevin Harun, Executive Director, Alaska Center for the Environment, 806 G St Ste 100, Anchorage AK 99501
Mr. Jeff Hughes, Alaska Department of Fish and Game, Division of Wildlife Conservation, Region 2, 333 Raspberry Rd, Anchorage AK 99518-1599
Mr. Albert Kahklen, Field Representative, Bureau of Indian Affairs, 3601 C Street, Suite 1100, Anchorage AK 99503
Mr. Ronald G. King, Chief, Alaska Department of Environmental Conservation, Division of Air and Water Quality, Air Quality Improvement Section, 610 University Ave, Fairbanks AK 99709-3643
Mr. William D. McGee, Regional Environmental Supervisor, Alaska Department of Environmental Conservation, 610 University Ave, Fairbanks AK 99501
Mr. Ervin McIntosh, Field Supervisor, U.S. Department of the Interior, U.S. Fish and Wildlife Service, Ecological Service/Fairbanks, 101-12th Ave, Fairbanks AK 99701-6267
Ms. Maureen McCrae, Alaska Office of Management and Budget, Division of Governmental Coordination, Project Review Coordinator, 550 W 7th Avenue Ste 1660, Juneau AK 99501
Ms. Cynthia Navarrette, Alaska Native Health Board, 3700 Woodland Drive Ste 500, Anchorage AK 99517
Mr. Alvin G. Ott, Regional Supervisor, Alaska Department of Fish and Game, Region III, Habitat Protection Division, 1300 College Rd, Fairbanks AK 99701-1599
Mr. Steven Pennoyer, Regional Administrator, U.S. Department of Commerce, National Marine Fisheries Service, Alaska Regional Office, 709 West 9th, Juneau AK 99802-1668

Mr. Curt Wilson, U.S. Bureau of Land Management, 222 West 7th Ave, Anchorage AK 99513
Mr. Everett Robinson Wilson, U.S. Department of the Interior, U.S. Fish and Wildlife Service, Aleutian Ecological Services, Region 7, 1101 East Tudor Rd, Anchorage AK 99503

CALIFORNIA

California Regional Water, Quality Control Board, Central Coast Region, 81 Higuera St Ste 200, San Luis Obispo CA 93401-5427
Mr. Rodney McInnis, Acting Regional Administrator, Department of Fish and Game, California Coastal Commission, National Marine Fisheries Service Director, Southwest Region, 501 West Ocean Boulevard, Suite 4200, Long Beach CA 90802-4213
Mr. Jim Raives, Federal Consistency Coordinator, California Coastal Commission, 45 Fremont St Ste 200, San Francisco CA 94105-2219
Santa Barbara County Air Pollution Control District, 26 Castilian Drive, Goleta CA 93117

HAWAII

Mr. Gilbert Coloma-Agaran, SHPO, Department of Land and Natural Resources, Kakuhihewa Bldg Rm 555, 601 Kamokila Blvd, Kapolei, HI 96707
Mr. Charles Karnella, NOAA, 1601 Kapiolani Blvd Suite 1110, Honolulu HI 96814-4700
Mr. Curtis Martin, Hazard Evaluation and Emergency Response Office, 919 Ala Moana Blvd Rm 201, Honolulu HI 96814
Ms. Barbara Maxfield, U.S. Fish and Wildlife Service, 300 Ala Moana Blvd Rm 3-122, Honolulu HI 96850
Mr. Mike Molina, U.S. Fish and Wildlife Service, 300 Ala Moana Blvd Rm 3108, Honolulu HI 96580
Mr. Ben Nakamiyo, Federal Aviation Administration, 300 Ala Moana Blvd Ste 7-128, Honolulu HI 96850-4953
Mr. John Naughton, National Marine Fisheries Service, Pacific Islands Office, 1601 Kapiolani Blvd Ste 1110, Honolulu HI 96814-4700
Mr. Francis Oishi, Hawaii DLNR, 1151 Punchbowl St Rm 330, Honolulu HI 96813
Mr. Howard Park, Federal Aviation Administration, 760 Worchester Ave, Honolulu HI 96818-5125
Ms. Debbie Saito, Federal Aviation Administration, Honolulu Control Facility, 760 Worchester Ave, Honolulu HI 96818

REPUBLIC OF THE MARSHALL ISLANDS

Mr. John Bungitak, General Manager, Republic of the Marshall Islands Environmental Protection Authority, P.O. Box 1322, Majuro Atoll, Republic of the Marshall Islands 96960
Mr. Lenest Lanki, Secretary to the RMI Minister of Internal Affairs/Historic Preservation Officer, P.O. Box 1454, Majuro Atoll, Republic of the Marshall Islands MH 96960-1454

WASHINGTON

Mr. Terry Barton, Environmental Affairs, Naval Station Everett
2000 West Marine View Drive, Everett WA 98207-5001
Mr. Robert Donnelly, NWR/NMFS, 7600 Sand Point Way, Seattle WA 98115
Ms. Ann Kenny, Department of Ecology, NW Regional Office, 3190 160th Ave SE, Bellevue WA 98008-5452
Mr. John Miller, Environmental Affairs, Naval Station Everett, 2000 West Marine View Drive, Everett WA 98207-5001
Mr. Michael Motta, Environmental Affairs, Naval Station Everett, 2000 West Marine View Drive, Everett WA 98207-5001

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Santa Barbara County
Air Pollution Control District

December 2, 2002

Deputy Commanding General
Attention: SMDC-EN-V (Ms. Sharon Mitchell)
P. O. Box 1500
Huntsville, AL 35807-3801

RE: Ground-Based Midcourse Defense Extended Test Range Draft EIS

Dear Ms Mitchell:

The Santa Barbara County Air Pollution Control District (APCD) appreciates the opportunity to provide comments on the Draft Environmental Impact Statement (DEIS) for the above referenced project.

1. Page 4-144, Section 4.5.1.3.1: the text states that the "(c)onstruction of GBI silos and associated facilities at Vandenberg AFB is analyzed in the ABV EA and determined to cause no significant air quality impacts to the regional air." As the APCD did not receive a copy of the Alternate Boost Vehicle Verification Test EA, we suggest that the subject analysis be included in this document.
2. Page 4-145, Section 4.5.1.3.3, Table 4.5.1-2: As Santa Barbara County is classified as a non-attainment area for the federal and state one-hour ozone standards, exhaust emissions of nitrogen oxides and hydrocarbons from construction equipment should be included in this table.
3. Please be aware that APCD permits may be required for activities and equipment enumerated in the DEIS – e.g., application of architectural coatings and generators which are used more than 200 hours annually. As this DEIS does not satisfy California Environmental Quality Act (CEQA) Guideline requirements, the APCD will need to prepare CEQA documentation necessary to support any of its permitting actions.

Please call me at 961-8812 or contact me by e-mail tanr@sbcapcd.org, if you have questions.

Sincerely,

Ron Tan
Technology and Environmental Assessment Division

cc: TEA Chron File

Douglas W. Allard
26 Castilian Drive B-23, Goleta, CA 93117 Fax: 805-961-8801 Phone: 805-961-8800
Air Pollution Control Officer

Our Vision: Clean Air

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UNITED STATES DEPARTMENT OF COMMERCE
Office of the Assistant Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

December 20, 2002

Steve Davis
Colonel, U.S. Army
Director, Site Activation World Wide
Department of Defense
Missile Defense Agency
Ground-Based Midcourse Defense
Joint Program Office
P. O. Box 1500
Huntsville, Alabama 35807-3801

Dear Colonel Davis:

In early November, various offices of the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA Fisheries) received copies of the November 4, 2002, Coordinating Draft Environmental Impact Statement for the Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) (EIS). Ms. Sharon Mitchell, Chairman, GMD ETR EIS Team, is the designated point of contact for comments that NOAA Fisheries has regarding this action.

As the action analyzed in the EIS is multi-faceted and ranges across multiple NOAA Fisheries regions, one set of comprehensive NOAA comments cannot be issued by December 27, 2002. We understand that this is a coordinating draft, with the anticipated draft due to be issued in late January 2003. To assist the Missile Defense Agency (MDA) in the NEPA process, I will provide a complete list of NOAA offices/programs which will be involved in reviewing and commenting on the draft EIS.

Additionally, it appears that there are a variety of actions originating from the MDA that are related. For instance, NOAA has been involved in preliminary discussions with entities responsible for the ground-based test X-ban radar system which is proposed to be deployed and tested at the Pacific Missile Range Facility, Kauai. Similarly, NOAA has reviewed the environmental assessment (EA) for the Theater High Altitude Air Defense (THAAD) and is in the process of reviewing an EA for the Long Range Air Launch target System (LRALT). Also, NOAA Fisheries had reviewed the July 2000 Final EIS "National Missile Defense Deployment" prepared by the Ballistic Missile Defense Organization; describing a land-based missile defense system consisting of ground-based interceptors, X-band radar, upgraded early warning systems, satellite detection systems, and battle management, command, control and communications elements; to be located in various locations including Alaska, California, North Dakota, and Massachusetts.

To best serve the MDA on this and other actions and ensure that all actions receive appropriate and thorough review under our statutory authorities, NOAA will need a comprehensive description of related actions proposed for our regions. It would be helpful if the MDA would

provide NOAA with an understanding of the context of these projects in the anti-missile defense program.

We look forward to working with representatives of the MDA on these and future ongoing projects. If there are questions, or if the MDA would like to provide further information, please contact Steve Kokkinakis of my staff at (202) 482-3639; U.S. Department of Commerce, NOAA/Strategic Planning, Rm 6121, 14th and Constitution, NW, Washington D.C., 20230.

Sincerely,

James P. Burgess
NEPA Coordinator

cc:
James Balsiger, NMFS, Juneau, AK
Brad Smith, NMFS, Juneau, AK
Jeanne Hanson, NMFS, Anchorage, AK
Rodney McInnis, NMFS, Long Beach, CA
Charles Karnella, NMFS, Honolulu, HI
Margaret Akamine Dupree, Honolulu, HI
John Naughton, NMFS, Honolulu, HI
Robert Lohn, NMFS, Seattle, WA
Robert Donnelly, NMFS, Seattle, WA
Donna Wieting, NMFS, PR2, Silver Spring, MD
Phil Williams, NMFS, PR, Silver Spring, MD
Dan Basta, NOS, National Marine Sanctuaries Program, Silver Spring, MD
Carol Bernthal, Olympic Coast NMS, Port Angeles, WA
Chris Mobley, Channel Islands NMS, Santa Barbara, CA
Allen Tom, Regional Director, NMS, Kihei, HI
Robert Smith, NWHI Coral Reef Ecosystem Reserve
Naomi McIntosh, Hawaiian Islands Humpback Whale NMS, Honolulu, HI

STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF PARKS AND OUTDOOR RECREATION
OFFICE OF HISTORY AND ARCHAEOLOGY

FRANK H. MURKOWSKI
GOVERNOR

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ANCHORAGE, ALASKA 99501-3565
PHONE: (907) 269-8721
FAX: (907) 269-8908

December 26, 2002

File No.: 3130-1R Army

SUBJECT: Ground-Based Midcourse Defense, Extended Test Range
Kodiak Launch Complex, AK
Review of Coordinating Draft EIS

Ms. Sharon Mitchell, Chairman
U. S. Army Space and Missile Defense Command
P. O. Box 1500
Huntsville, Alabama 35807-3801

Dear Ms. Mitchell:

We have reviewed the *Ground-Based Defense (GMD) Extended Test Range (ETR) Coordinating Draft Environmental Impact Statement (EIS),* (November 4, 2002). Based on our records, two of the proposed Barge Landing Points are near reported prehistoric sites.

- Barge Landing Point #1: near KOD-66 (Narrow Cape Vicinity, Koniag house pits and refuse).
- Barge Landing Point #2: no reported prehistoric sites, however area may not have been previously archaeologically surveyed.
- Barge Landing Point #3: near KOD-67 (Pasagashak Bay I, Koniag house pits and shell midden).

Our office recommends that all three Barge Landing Points be archaeologically surveyed to determine if the reported archaeological sites are indeed present or if there are previously unreported sites within the area of potential effect (APE). Any archaeological sites within the APE should be evaluated for eligibility for inclusion to the National Register of Historic Places.

The EIS states that the Kodiak Launch Complex was investigated by Office of History and Archaeology (OHA) archaeologists in 1994. While it is true that OHA archaeologists surveyed portions of the Launch Complex at that time, it is not clear if the currently proposed construction may be impacting areas that were not previously surveyed. Additional survey of this area may be needed.

Please contact Stefanie Ludwig at 269-8720 if you have any questions or if we can be of further assistance.

Sincerely,

Judith E. Bittner
State Historic Preservation Officer
JEB:sll

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UNITED STATES DEPARTMENT OF COMMERCE
Office of the Assistant Secretary for
Oceans and Atmosphere
Washington, D.C. 20230

MAR 20 2003

Colonel Steve Davis
Department of Defense Missile Defense Agency
Ground-Based Midcourse Defense Joint Program Office
Huntsville, AL 35807-3801

Dear Colonel Davis:

The National Oceanic and Atmospheric Administration (NOAA) has reviewed the Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) Draft Environmental Impact Statement (DEIS) dated January 2003.

The proposed action is the construction and operation of additional launch and test facilities in the Pacific Region in order to conduct more realistic interceptor flight tests in support of GMD development. Under the No Action Alternative, the GMD Extended Test Range would not be established and the Sea Based Test X-Band Radar (SBX) would not be developed. However, GMD testing would continue at the existing launch areas, including the Kodiak Launch Complex (KLC) as it does now. Three alternatives propose new Ground-Based Interceptor (GBI) missile launch site construction with new and existing test components at KLC or Vandenberg Air Force Base (AFB), California or both, and development of the SBX Radar with possible home ports in Valdez or Adak, Alaska.

Based on the information provided, it appears that the proposed activities may affect the listed Steller sea lions, Hawaiian monk seals, sea turtles, and other species. Because of this, MDA will likely need to consult with NOAA Fisheries (and Fish and Wildlife Service for species listed under their jurisdiction). Additional comments are provided regarding potential impacts on habitats and marine resources in the vicinity of the KLC. Monitoring needs are addressed as well.

Please refer any questions with respect to Alaska's resources to Mr. Brad Smith or LT Mark Boland in our NOAA Fisheries Anchorage office at (907) 271-5006. For questions regarding activities affecting Pacific Islands resources, please contact Margaret Akamine in our Pacific Islands Area Office at (808) 973-2935.

Sincerely,

James P. Burgess, III

James P. Burgess, III
NEPA Coordinator

NOAA Comments on Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) Draft Environmental Impact Statement (DEIS)

General Comments

The draft Environmental Impact Statement (DEIS) includes alternatives that would launch up to five (5) missiles annually from the existing Kodiak Launch Complex (KLC), and would construct new facilities at or near KLC such as launch pads, silos, and barge docks. Several authorizing entities exist for the KLC, including the Federal Aviation Administration, the Alaska Aerospace Development Corporation (AADC), and the various launch entities, which are often Federal agencies (e.g. the US Air Force, Department of the Army, Missile Defense Agency). This DEIS should contain a discussion of the cumulative effects of activities and the responsibilities of these parties concerning the KLC and the environmental impacts of the facility and launches. For instance, efforts to monitor certain environmental and physical conditions are ongoing near Narrow Cape, as well as operational conditions agreed to by the vendor, AADC.

The DEIS should clarify what environmental monitoring is to be done during these additional launches, what the objectives are, who is funding it or responsible for it, what existing agreements or operational constraints require, and which, if any, are inconsistent with the proposed project. For instance, the Ugak Island Steller sea lion haulout was monitored during earlier launches to understand the effect of launches on the behavior of these endangered species. No conclusive results were obtained and, while launch noise may not be injurious to these animals, periodic monitoring remains appropriate and necessary. We recommend the DEIS indicate that this monitoring would occur for the first two launches that coincide with periods when the Ugak Island haul out is occupied.

Additionally, we recommend continuing a water quality monitoring program in the streams and lakes around the KLC launch facility. Sampling should include testing for the potentially hazardous materials emitted from the missiles plus standard water chemistry parameters (e.g., pH, dissolved oxygen, temperature, and conductivity). This sampling program should also include a non-impacted control site outside the area of influence of missile emissions.

Specific Comments

The DEIS references Best Management Practices (BMP) and Standard Operating Procedures (SOP) but does not include a description of these. We recommend you include a section describing the BMPs and SOPs.

The proposed configuration of the EKV presently uses liquid propellants that would be very hazardous to local fish and wildlife if lost due to vehicle failure in the early phase of a launch. Please explain why solid propellants cannot be used here.

The Narrow Cape area is a prominent point of land and a popular viewing area for wildlife, especially gray whales during spring migrations. The DEIS notes that access will be restricted during certain activities associated with this project. However, Table ES-2 does not include the Resource Category "Recreation" or "Wildlife Viewing." The DEIS should include an expanded

assessment of impacts to this use.

ES1.4 Proposed Action. Please explain the need for construction of launch silos at the KLF, and why existing launch complex configuration is not suitable for launching of either the target or interceptor vehicles. The DEIS should also present more detail on the design of any barge or dock facilities to be constructed on Kodiak Island.

Please explain whether the flight corridor depicted in Figure 4.1.7-2 or Figure 4.1.7-3 is correct; or are multiple corridors proposed?

Impacts to Marine Species

This document contains little information regarding protected marine species and their habitats. We request the Missile Defense Agency (MDA) provide full information regarding the potential effects of these activities on protected species and their habitats. Based on the limited information provided in the DEIS, it appears that the activities may affect the listed Steller sea lions, Hawaiian monk seals, sea turtles, and other species. Because of this, MDA will need to consult with NOAA Fisheries (and Fish and Wildlife Service for species listed under their jurisdiction). MDA should provide additional information on the effects of the various activities on listed species that would be applied to an Endangered Species Act (ESA) section 7 consultation. Without this information, NOAA cannot provide MDA with substantive comments regarding the proposed actions.

In addition, other marine mammals may be affected by launch, debris recovery, or other activities. It seems marine mammals will be disturbed during target missile launches (such as on page 4-29 to 4-30) and debris recovery (such as on page 4-176). Such disturbance would constitute a "take" by harassment. MDA should seek a Marine Mammal Protection Act authorization to exempt such take of marine mammals, and in the case of listed marine mammals (e.g., Steller sea lion) a formal consultation as well.

There is no discussion on the impacts of x-band radar to animals that remain at the water surface for extended periods. The DEIS states on page 4-215, "*It is highly unlikely that an individual would be on or substantially above the surface of the water for a significant amount of time within the main beam or side lobe areas during the 3 to 6 hours per week that the SBX would be operating.*" Further biological information is needed to support this position.

TPS-X Radar will be used at PMRF but there is no discussion of potential impacts to protected species in the PMRF area (page 4-148).

The U.S. Navy acknowledges "*that acoustic emissions from various products and activities could be interacting with marine mammals' hearing*" (page 4-286). We would like further discussion on the potential or expected harassment.

Construction activities at Midway, Northwestern Hawaiian Islands need further discussion. NOAA Fisheries guidelines recommend remaining 150 feet from Hawaiian monk seals (not 100 ft as stated on page 4-113). However, it may be necessary to increase this distance depending on

construction activities (noise levels, etc.). More information regarding the construction activities is necessary in order to assess the potential for impacts to protected species and their habitats.

Appendix B of the DEIS lists the laws that were considered by MDA, but the list simply describes the various laws. It does not state MDA's intentions on how they will proceed with an ESA consultation and/or Essential Fish Habitat consultation per the Magnuson-Stevens Fishery Conservation and Management Act, and whether they will seek an MMPA authorization.

STATE OF ALASKA

OFFICE OF THE GOVERNOR

FRANK H. MURKOWSKI, GOVERNOR

OFFICE OF MANAGEMENT AND BUDGET
DIVISION OF GOVERNMENTAL COORDINATION

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March 20, 2003

Ms. Julia Elliot
SMDC-EN-V
U.S. Army Space and Missile Defense Command
106 Wynn Drive
Huntsville, Alabama 35805

Dear Ms. Elliot:

SUBJECT: **Ground-based Midcourse Defense, Extended Test Range**
State I.D. No. AK 0302-03AA
DEIS NEPA Response

The Division of Governmental Coordination received the Draft Environmental Impact Statement (DEIS) for the Ground-based Midcourse Defense, Extended Test Range. The Missile Defense Agency (MDA) prepared this document to satisfy the requirements of the National Environmental Policy Act (NEPA). The Alaska Departments of Environmental Conservation, Fish and Game and Natural Resources have reviewed the DEIS document in accordance with NEPA and with an awareness of future requirements for executing decisions that would involve State of Alaska authorizations and consistency with Alaska's Coastal Management Program.

We offer the following comments:

Kodiak Launch Complex Barge Landing Sites (KLC). Section 4.1.8.2.1, Operation, Pre-Launch Activities, discusses the use of barge landing sites. The Alaska Department of Fish and Game (ADF&G) notes that there are differences in potential effects at the three sites that are not addressed in the DEIS. Barge landing site number 2, the ADF&G's preferred alternative, is not in proximity to an anadromous fish stream. Barge landing site number 1 is in close proximity to ADF&G anadromous fish stream 259-30-10060 which supports pink salmon. Barge landing site number 3 is in close proximity to ADF&G anadromous fish stream 259-30-10060. In addition, boaters use the area around barge landing site 3 for launching and mooring, and the beach is used for recreational purposes.

Public access to the area continues to be a primary public concern. The DEIS states that restrictions and closures can be expected both during construction and during operations. During the meetings

that GMD personnel held with State and federal agency staff, staff learned that closures and security restrictions during operations are anticipated to be about the same as is going on now with launches. The only anticipated change relates to the greater frequency of the launches so the frequency of closures will increase. To clarify exactly what the effects might be, it would be useful to include specific closure and restriction information related to the approximate number of hours per launch day and number of launch days per month or season, types of restrictions and closures, and areas to be closed. Including this information in the DEIS would address and may alleviate local concerns surrounding this issue. It also would be useful to address construction closure schedules and areas.

The DEIS notes on page 3-13 that there are no paleontological resources identified in any of the upland areas of the Kodiak Launch Complex. However, there are numerous paleontological resources in the area -- Fossil Beach derives its name from those resources and rock outcroppings on both sides of the beach contain a variety of fossil remains. Rock outcropping from the ridge that the new missile silos will be excavated into and built upon likewise contains fossils.

Two typographical errors in the DEIS should be corrected.

- Section 3.1.1.1 describes the location of the highest concentration of launch emissions on a mountaintop to the east of the KLC. The mountains are not 3 miles to the east of the KLC.
- Section 3.1.2.2 describes the location of the Kodiak airport as being northeast of the KLC; in fact, it is north and slightly to the west of the KLC.

The DEIS does not dwell on authorizations that would be needed for anticipated activities. As noted on page IV-67, GMD would submit a coastal project questionnaire and consistency determination prior to any construction activities. The questionnaire will help identify any necessary authorizations. As advisory information for future authorizations:

- There are no state legislatively designated special areas (i.e., state game refuges, sanctuaries, or critical habitat areas) over which ADF&G exerts Title 16 special areas permitting authority near the project site.
- A Fish Habitat Permit issued by ADF&G, Habitat and Restoration Division, would be required for any project related activities that are to be conducted below the ordinary high water level of a specified anadromous fish stream or that may affect the free, unhindered movement of any species of fish.
- The Alaska Department of Environmental Conservation requires information that will come later in the process to determine if any wastewater permits are needed.
- Extracting potable water from ground water or surface water sources would require an authorization from the Alaska Department of Natural Resources.
- Docking or mooring the floating X-band radar on state tidelands for more than 14 days would require either a permit or lease from the. In issuing the permit or lease, the Alaska Department of Natural Resources will consider the facilities impacts on other resources and users, including recreational boat users, commercial vessel traffic, fishing interest, visual impacts, and impacts on habitat.

- Changes that affect the Kodiak Launch facility that are not undertaken by the Alaska Aerospace Corporation may require approval from the Alaska Department of Natural Resources, Division of Mining, Land, and Water.

The State of Alaska appreciates your cooperation. Please contact me at 269-7473, or email maureen_mccrea@gov.state.ak.us if you have any questions.

Sincerely,

Maureen McCrea
Project Review Supervisor

Enclosures

cc: via e-mail
Wayne Dolezal, DFG
Lance Trasky, DFG
Ed Weiss, DFG
Karlee Gaskill, DNR
Mary Walter, DNR
Dick Mylius, DNR
Tim Rumfelt, DEC
Alan Kukla, DEC
Alan Wien, DEC
Pat Ladner, AADC
Leroy Phillips, COE Regulatory
David Hasley, SMDC
Cliff Stone, AK Legislature
Chris Nelson, AK
Duane Dvorak, KIB
Karol Kolehmainen, AWCRSA
Mary Siroky, DEC

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

MAR 2 4 2003

OFFICE OF
ENFORCEMENT AND
COMPLIANCE ASSURANCE

U.S. Army Space and Missile Defense Command
Attn: Ms. Sharon Mitchell
(SMDC-EN-V) TERC
P.O. Box 1500
Huntsville, Alabama 35807-3801

Dear Ms. Mitchell:

The U.S. Environmental Protection Agency (EPA) has reviewed the Draft Environmental Impact Statement (DEIS) for the project entitled **Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) (CEQ #030048)**. Our review is pursuant to the National Environmental Policy Act (NEPA), Council on Environmental Quality (CEQ) regulations (40CFR Parts 1500-1508), and Section 309 of the Clean Air Act.

EPA commends the comprehensive approach taken by U.S. Army Space and Missile Defense Command to analyze the potential impacts to the environment as a result of the proposed construction, operation, and test activities associated with the proposed GMD/ETR. The DEIS is well written, and clearly lays out the issues associated with the operation of flight testing operations in the North Pacific Region. Although EPA supports your efforts to comprehensively evaluate the impacts of the proposed GMD/ETR, we have several concerns about impacts of proposed actions due to a lack of information in the DEIS.

We have rated this DEIS as EC-2, Environmental Concerns - Insufficient Information (see attached "Summary of EPA Rating System"). In particular, the DEIS lacks information on potential perchlorate contamination to soil and water.

We appreciate the opportunity to review this DEIS. If you have any questions, please call me at (202) 564-5400, or Marguerite Duffy, of my staff at (202) 564-7148.

Sincerely,

Anne Norton Miller
Director, Office of Federal Activities

Enclosures: EPA Rating Sheet

EPA COMMENTS ON U.S. ARMY SPACE AND MISSILE DEFENSE COMMAND
GROUND-BASED MIDCOURSE DEFENSE (GMD) EXTENDED TEST RANGE (ETR)
DRAFT ENVIRONMENTAL IMPACT STATEMENT (DEIS)

Perchlorate

Documentation of Analytical Methods

The DEIS discusses perchlorate which is used as the primary ingredient of solid rocket propellant. Salts such as ammonium perchlorate are readily soluble in water and the resultant anion, perchlorate, has increasingly been discovered in soil and water raising concerns about potential human health risks from exposure. However, recent technological improvements have better enabled sampling level detection.

The DEIS concludes that there will be no environmental contamination of perchlorate from additional launch emissions. EPA is concerned with the lack of information regarding the analytical methods used to make such determination. Using old sampling methods, levels could be between 1 and 200 ppb and not be detected. To note a few examples in the DEIS, table 4.1.14.1 and pages 4-105-106, indicate "non-detect" for perchlorate. To understand your impact analysis, critical information about the sampling technique is needed. Newer methods could yield different results. EPA has found that certain analytical methods will show false negatives (non-detect) although perchlorate levels may be as high as 200 ppb. The newer EPA method is "Method 314.0 for Perchlorate in Water," which can be found at http://www.epa.gov/ncea.[1] This is an ion chromatograph (IC) method. If the Army is using other methods or is extending the method to other media (e.g., soil), EPA requests that the Army provide the details as to type of column used (if IC), any pre-column treatment (e.g., dilution to remove TDS), minimum reporting level (MRL) and minimum detection level (MDL). The current MRL for Method 314 is 4 ppb and MDL is 0.53 ppb. Other methods are achieving lower MRL.

Recommendation: EPA recommends that the Army provide the methodologies and analytical profiles used before finalizing the conclusions on perchlorate. This information is a critical factor in determining if additional launches will add perchlorate contamination to the surrounding ecosystem.

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[1] This website contains perchlorate information and also the 314.0 method as printed in the Federal Register (2000): Unregulated contaminant monitoring regulation for public water systems: analytical methods for perchlorate and acetochlor; announcement of laboratory approval and performance testing (PT) program for the analysis of perchlorate; final rule and proposed rule. FR (March 2) 42: 11, 371-11, 385.

Sample Plan

Perchlorate is notorious for moving with seasonal changes. EPA has seen seasonal variation in sampling due to temperature (e.g., turnover of surface with bottom water in large bodies like Lake Mead). Also, hot seasons can increase evaporation and increase concentration. Therefore, we do not recommend relying on one sample to characterize a site (either negative or positive).

Recommendation: EPA requests that the Army provide transport and transformation determinants for perchlorate, as well as developing a strategy for repeated measures.

Construction

It was not clear in the document whether construction will take place at a site that has previously handled perchlorate, munitions, or other contaminants.

Recommendation: EPA recommends sampling those sites to ensure that contamination does not exist.

Tsunami

The DEIS examines the impact of a possible tsunami in the Alaska (Kodiak) area. Similar impact analyses were not conducted for the other Pacific sites. We believe that information, such as tsunami elevations on Hawaiian Flood Insurance Maps, exists. This would indicate that tsunamis are reasonably foreseeable events.

Recommendation: EPA recommends that tsunami impact analyses for the other Pacific sites be included in the FEIS.

General Comment

As written, the text on page 3-98, under the heading Installation Restoration Program, is misleading. It states that IRP sites at Vandenberg AFB are being addressed in a manner generally consistent with the CERCLA process. The Army is required to be consistent with CERCLA and the National Contingency Plan, not merely "generally consistent with."

Recommendation: EPA recommends that you eliminate the word generally.

SUMMARY OF RATING DEFINITIONS AND FOLLOW-UP ACTION

Environmental Impact of the Action

LO--Lack of Objections
The EPA review has not identified any potential impacts requiring substantive changes to the proposal. The review may have disclosed opportunities for application of mitigation measures that could be accomplished with no more than minor changes to the proposal.

EC--Environmental Concerns
The EPA 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. EPA would like to work with the lead agency to reduce these impacts.

EO--Environmental Objections
The EPA review has identified significant environmental impacts that must be avoided in order to provide adequate protection for 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). EPA intends to work with the lead agency to reduce these impacts.

EU--Environmentally Unsatisfactory
The EPA review has identified adverse environmental impacts that are of sufficient magnitude that they are unsatisfactory from the standpoint of public health or welfare or environmental quality. EPA intends to work with the lead agency to reduce these impacts. If the potential unsatisfactory impacts are not corrected at the final EIS stage, this proposal will be recommended for referral to the CEQ.

Adequacy of the Impact Statement

Category 1--Adequate
EPA believes that 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 for EPA to fully assess environmental impacts that should be avoided in order to fully protect the environment, or the EPA 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 action. The identified additional information, data, analyses, or discussion should be included in the final EIS.

Category 3--Inadequate
EPA does not believe that the draft EIS adequately assesses potentially significant environmental impacts of the action, or the EPA reviewer has identified new, reasonably available alternatives that are outside of the spectrum of alternatives analysed in the draft EIS, which should be analyzed in order to reduce the potentially significant environmental impacts. EPA believes that the identified additional information, data, analyses, or discussions are of such a magnitude that they should have full public review at a draft stage. EPA does not believe that the draft EIS is adequate for the purposes of the NEPA and/or Section 309 review, and thus should be formally revised and made available for public comment in a supplemental or revised draft EIS. On the basis of the potential significant impacts involved, this proposal could be a candidate for referral to the CEQ.

PUGET SOUND
Clean Air Agency

Working Together For Clean Air

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110 Union Street
Suite 500
Seattle, WA 98101-2038

April 15, 2003

U.S. Army Space and Missile Defense Command
Attn: SMDC-EN-V (Ms. Julia Elliott)
106 Wynn Drive
Huntsville, AL 35805

Dear Ms. Elliott:

Draft Environmental Impact Statement (DEIS)
Sea Based Test X-Band Radar (SBX)

Puget Sound Clean Air Agency has reviewed the executive summary of the SBX DEIS proposed for the Puget Sound Naval Base in Everett, Washington and has concluded that the air quality assessment is incomplete and needs to be expanded in the EIS.

To protect public health, increase clarity, and define the mitigation options available for this project, the Agency requests that the following elements be addressed in the EIS:

- a proactive dust control plan that is not reliant on "frequent rains" to minimize dust emissions during construction,
- an emission estimate of criteria and hazardous air pollutants including benzene, formaldehyde, and 1,3-butadiene,
- screening modeling to ensure that National Ambient Air Quality Standards will not be violated and the Washington State Acceptable Source Impact Levels (ASIL) will not be exceeded, and
- an evaluation of mitigation options to reduce emissions from diesel generators such as the substitution of cleaner diesel fuels (e.g., on-road and ultra-low sulfur diesel fuel, biodiesel fuel blends, and oil/water emulsion fuels); combustion modification (e.g., low NOx burners, water injection, and improving combustion aerodynamics); and post-combustion controls (e.g., selective noncatalytic reduction and selective catalytic reduction) similar to those used on stationary diesel generators.

The Agency would like to participate and comment on any future review of this project. Please send the EIS and any other correspondence to:

Thomas J. Hudson
Puget Sound Clean Air Agency
110 Union Street, Suite 500
Seattle, WA 98101

If you need any clarification of these comments, please contact Tom Hudson of my staff. He can be reached at (206) 689-4025 or e-mail to tomh@pscleanair.org. Thank you for your consideration in this matter.

Sincerely,

Dennis J. McLerran
Executive Director

9-35

DJM/lh

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STATE OF ALASKA

DEPARTMENT OF NATURAL RESOURCES

DIVISION OF MINING, LAND AND WATER
SOUTHCENTRAL REGION LAND OFFICE

FRANK H. MURKOWSKI
GOVERNOR

550 W. 7TH AVE., SUITE 900C
ANCHORAGE, ALASKA 99501-3577

30 April 2003

Pat Ladner, President and CEO
Alaska Aerospace Development Corporation
4300 B Street, Suite 101
Anchorage, AK 99503

Dear Mr. Ladner:

This responds to your request for comment on three questions raised during the ETR DEIS comment process on the Interagency Land Management Assignment (ILMA), Alaska Division of Land file 226285(ADL 226285) issued to your agency for lands at Narrow Cape, Kodiak Island. Those questions include:

1) Whether excavations done in support of construction activities constitute unauthorized use of the subsurface estate,
2) Whether the ILMA as issued authorizes or otherwise allows for the expansion of your existing facility, and
3) Whether the ILMA provides authority for closures of the road on the site during construction and for security related reasons.

With regard to question number 1, the ILMA does not limit your right to excavate and subsequently site below surface structures. Paragraph 4 in the ILMA does limit your right to mine the site for minerals, such as gold however. With regard to question number 2, the ILMA was issued specifically to support development of an orbital launch or other aerospace related facilities at Narrow Cape, and it does not restrict you from further developing the site for these purposes. The ILMA requires that you inform ADNR of your development plans (paragraph 3 of ADL 226285) and our office prior to construction must approve the revised plans. Improvements must also be designed and located by a professional architect, engineer or surveyor (paragraph 7 of ADL 226285). Finally, with regard to question 3, the ILMA states the road may be closed for safety reasons, and this reasonably applies to safety concerns related to construction and special security situations that involve public safety, as well as launch-related operations.

Sincerely,

Mike Sullivan
Natural Resource Manager

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DEPARTMENT OF DEFENSE
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Huntsville, AL 35807-3801

GMW

May 23, 2003

Mr. James P. Burgess, III
NEPA Coordinator
United States Department of Commerce
National Oceanic and Atmospheric Administration
Washington, D.C. 20230

Dear Mr. Burgess:

Thank you for your comments regarding the Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) Draft Environmental Impact Statement (DEIS).

Per our conversation with your office and the Federal Aviation Administration (FAA) on April 17, 2003, we agreed that the FAA would take the lead in the formal Section 7 consultation to be initiated under the Endangered Species Act. To meet the requirements for consultation, the FAA will prepare a Biological Assessment to address possible impacts to whales and to Steller sea lions from proposed launch activities at the Kodiak Launch Complex.

It was also agreed that the EIS would be sufficient to support the proposed rulemaking determination, and that the rulemaking process needed for National Marine Fisheries Service's development of regulations to support a Letter of Authorization would resume.

In addition, we wish to acknowledge your May 6, 2003 letter to Vandenberg Air Force Base that determined Ground Based Interceptor launches would not result in an increase in the number of missile launches authorized to take pinnipeds by Level B harassment under Vandenberg's Letter of Authorization.

Furthermore, the analysis in the EIS determined that no adverse impacts to marine mammals or sea turtles are anticipated for the Hawaiian Islands, Midway Island or Reagan Test Site in the Kwajalein Islands.

Responses to specific comments are enclosed. I look forward to working with your office and the National Marine Fisheries Service in Alaska to complete the consultation process.

For any questions concerning the EIS, please contact Ms. Sharon Mitchell, (256) 955-4392 or Mr. Eric Sorrells (256) 313-9575.

Sincerely,

STEVE DAVIS
Colonel, U. S. Army
Director, Site Activation World Wide
Ground-Based Midcourse Defense

Enclosure:
As stated

cc:
Ms. Michon Washington, Federal Aviation Administration, Commercial Space Transportation, 800 Independence Avenue S.W., Room 331, Washington DC 20591

Mr. Brad Smith, National Marine Fisheries Service, Protected Resources Division and Habitat Conservation Division, 222 West 7th Avenue, Box 43, Anchorage, AK 99513

Ms. Margaret Akamine, National Marine Fisheries Service, Pacific Islands Area Office, National Oceanic and Atmospheric Administration, 1601 Kapiolani Blvd., Suite 1110, Honolulu, Hawaii 96813

Mr. Pat Ladner, Alaska Aerospace Development Corporation, 4300 B Street, Suite 101, Anchorage, AK 99503

NOAA Comments, 20 March 2003

General Comments

The Draft Environmental Impact Statement (DEIS) includes alternatives that would launch up to 5 missiles annually from the existing KLC, and would construct new facilities at or near KLC such as launch pads, silos, and barge docks. Several authorizing entities exist for the KLC, including the FAA, AADC, and the various launch entities, which are often federal agencies (eg. USAF, Army, MDA). This DEIS should contain a discussion of the cumulative effects of activities and the responsibilities of theses parties concerning the KLC and the environmental impacts of the facility and launches. For instance, efforts to monitor certain environmental and physical conditions are ongoing near Narrow Cape, as well as operational conditions agreed to by the vendor, AADC.

The DEIS should clarify what monitoring is to be done during these additional launches, what the objectives are, who is funding it or responsible for it, what existing agreements or operational constraints require, and which, if any, are inconsistent with the proposed project. For instance the Ugak Island Stellar sea lion haulout area was monitored during earlier launches to understand the effects of launches on the behavior of these endangered species. No conclusive results were obtained and, while launch noise may not be injurious to these animals, periodic monitoring remains appropriate and necessary. We recommend the DEIS indicate that this monitoring would occur for the first two launches that coincide with periods when the Ugak Island haulout is occupied.

Per our conversation with your office and the Federal Aviation Administration (FAA) on April 17, 2003, we agreed that the FAA would take the lead in the formal Section 7 consultation to be initiated under the Endangered Species Act. To meet the requirements for consultation, the FAA will prepare a Biological Assessment to address possible impacts to whales and to Steller Sea Lions from proposed launch activities at the Kodiak Launch Complex.

It was also agreed that the EIS would be sufficient to support the proposed rulemaking determination and that the rulemaking process needed for National Marine Fisheries Service's development of regulations to support a Letter of Authorization would resume.

Please note that the proposed MDA launches are not "additional" launches, but fall within the 9 launches analyzed and permitted under the FAA site license.

Additionally, we recommend continuing a water quality monitoring program in the streams and lakes around the KLC launch facility. Sampling should include testing for the potentially hazardous materials emitted from the missiles plus standard water chemistry parameters (e.g. pH, dissolved oxygen, temperature, and conductivity). This sampling program should also include a non-impacted control site outside the area of influence of missile emissions.

AADC will continue to coordinate with Alaska Department of Environmental Conservation regarding required water quality monitoring.

Specific Comments

The DEIS references Best Management Practices (BMP) and Standard Operating Procedures (SOP) but does not include a description of these. We recommend you include a section describing the BMPs and SOPs.

Please see enclosed list of Best Management Practices and Standard Operating Procedures.

...EKV presently uses liquid propellants...Please explain why solid propellants cannot be used here.

The current designs for the Exoatmospheric Kill Vehicle call for a liquid propellant in the guidance system of the missile. The boost system for the EKV uses solid propellant. The fourth stage of the Peacekeeper target missile is also designed to use a liquid propellant.

The Narrow Cape area...Table ES-2 does not include the Resource Category "Recreation" or Wildlife Viewing." The DEIS should include an expanded assessment of impacts to this use.

Pages 2-63, 4-65, and 4-68, Land Use, provides a discussion of the impacts to recreational opportunities of Narrow Cape. Public access to Fossil Beach would be limited or denied for each launch day, which would result in denial of access less than 2 percent of the year.

ES1.4...Please explain the need for construction of launch silos at the KLC, and why existing launch complex configuration is not suitable for launching of either the target or interceptor vehicles. ...more detail on the design of any barge or dock facilities to be constructed on Kodiak Island.

The purpose for the ETR testing is to duplicate real world scenarios for the deployed system. The deployed system will launch the Ground-Based Interceptor from underground silos. No barge or dock facilities are currently proposed for KLC. Barge landing sites would not involve construction.

Please explain whether the flight corridor depicted in Figure 4.1.7-2 or Figure 4.1.7-3 is correct; or are multiple corridors proposed?

Figure 4.1.7-2 shows a "representative" flight trajectory. Figure 4.1.7-3 shows the flight corridor for the westernmost proposed launch azimuth of 225 degrees. Page 4-60 states that proposed launches at KLC would utilize launch azimuths between 125 and 225 degrees, so yes multiple corridors are being proposed.

<u>Impacts to Marine Species</u>

This document contains little information regarding protected marine species and their habitats. ...MDA will need to consult with NOAA Fisheries (and Fish and Wildlife Service for species listed under their jurisdiction). ...

An appendix with descriptions of the applicable species and their habitat can be added to ***the EIS. Please see the response under general comments.***

In addition, other marine mammals may be affected by launch, debris recovery, or other activities. It seems marine mammals will be disturbed during target missile launches (pages 4-29 to 4-30) and debris recovery (page 4-176). Such disturbance would constitute a "take" by harassment. MDA should seek a Marine Mammal Protection Act authorization to exempt such a take of marine mammals, and in the case of listed marine mammals (e.g. Steller sea lion) a formal consultation as well.

Please see the response under general comments.

There is no discussion on the impacts of x-band radar to animals that remain at the water surface for extended periods. ...Further biological information is needed to support this position.

The SBX is designed to track an incoming target missile. Its narrow beam is always moving and looking up in order to track a moving object in space. In order for tissue damage to occur, the radar's main beam would have to rest on an animal (or human) for several minutes. Since the main beam will not come in contact with the water's surface or remain stationary, the main beam will not come in contact with any animal at the water's surface for any significant period of time. The only potential hazard to personnel or animals from the radar beam would be from the grating lobes that result from steering the beam. The grating lobes would be suppressed using the radar's software for the safety of personnel on the deck of the SBX platform. Power density levels from the grating lobes at the water's surface would be below the IEEE threshold for human exposure and at a low enough level to pose little or no chance for harm to an animal remaining at the water's surface for extended periods of time.

Results from modeling of power density levels from the SBX, in a scenario where it is tracking multiple targets, show that the power density levels are below IEEE safety levels for human exposure in an uncontrolled environment (IEEE C95.1, IEEE Standard for Safety levels with Respect to Human Exposure to Radiofrequency Electromagnetic Fields, 3 kHz to 300 GHz, 16 April 1999). An uncontrolled environment includes locations where there is exposure of individuals who have no knowledge or control of their exposure. Based on these results, marine species would be exposed to power density levels that are below the standard for human exposure.

TPS-X Radar will be used at PMRF but there is no discussion of potential impacts to protected species in the PMRF area (page 4-148).

Page 4-148 discusses air quality impacts. The potential for impacts to biological resources from the TPS-X Radar, including protected species, is discussed on pages 4-153 through 4-155.

The U.S. Navy acknowledges "that acoustic emissions from various products and activities could be interacting with marine mammals' hearing" (page 4-286). We would like further discussion on the potential or expected harassment.

Additional discussion on the potential for harassment will be added to the EIS.

Construction activities at Midway…need further discussion. NOAA Fisheries guidelines recommend remaining 150 feet from Hawaiian monk seals (not 100 ft as stated on page 4-113). However it may be necessary to increase this distance depending on construction activities (noise levels, etc.). More information regarding the construction activities is necessary in order to assess the potential doer impacts to protected species and their habitats.

The distance will be changed to 150 feet. As described in 2.1.3.1.1 and 2.1.3.5, the construction would involve less than an acre for the IDT and less than ¼ acre for the COMSATCOM.

Appendix B …describes the various laws. It does not state MDA's intentions on how they will proceed with …consultation…and whether they will seek an MMPA authorization.

The purpose of the Appendix is to describe the various laws. Please see the response under general comments.

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DEPARTMENT OF DEFENSE
MISSILE DEFENSE AGENCY
GROUND-BASED MIDCOURSE DEFENSE
JOINT PROGRAM OFFICE
P.O. Box 1500
Huntsville, AL 35807-3801

GMW-E

JUN 26 2003

Ms. Anne Norton Miller
Director, Office of Federal Activities
United States Environmental Protection Agency
Office of Enforcement and Compliance Assurance
Washington, D.C. 20460

Dear Ms. Miller:

Thank you for your March 24, 2003 comments on the Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) Draft Environmental Impact Statement (DEIS).

Responses to specific comments are enclosed. I look forward to working with your office to complete the consultation process.

For any questions concerning the EIS, please contact Ms. Sharon Mitchell, U.S. Army Space and Missile Defense Command at (256) 955-4392, or Mr. Eric Sorrells, GMD, (256) 313-9575.

Sincerely,

STEVE DAVIS
Colonel, U. S. Army
Director, Site Activation Worldwide
Ground-Based Midcourse Defense

Enclosure:
As stated

(1) Perchlorate

- **Documentation of Analytical Methods** – The University of Alaska Anchorage Environment and Natural Resources Institute (ENRI) used EPA method 314.0 for Perchlorate in Water. ENRI completed the standard quality control (QC) steps including a standard calibration curve, a spike and duplicate spike, and also determined the instrumental and method detection limits according to the EPA defined protocol. The instrumental detection limit by conductivity detection is 2 ppb and the method limit is 6 ppb. None of the samples from Kodiak contained perchlorate. As an aside, ENRI can now also do this analysis by GCMS/MS which provides a slightly lower detection limit, however all future samples will be analyzed in accord with EPA method 314.0 to assure conformity with EPA standards. Again as an aside, ENRI has developed a new method for analysis of perchlorate in fish tissue, and will be submitting a paper to the Journal of Chromatography. ENRI has also been asked to present the method to the International Conference on Ion Chromatography in September 2003 in San Diego. If you have any questions remaining about ENRI's analysis methods or capabilities, you are encouraged to contact Dr. John Kennish, who conducted the analyses, at (907) 786-1236.

- **Sampling plan** – Water samples were collected by ENRI from 1998 to 2001 to monitor potential water quality impacts of the first six missile launches from Kodiak Launch Complex (KLC). The water samples were collected from nine different study sites within a 6-mile radius of the KLC launch site. Samples were primarily collected in the summer and late fall; samples were not collected in spring (March) because study sites were frozen. In-situ pH, dissolved oxygen, temperature, and conductivity measurements were taken after all launches and compared with results from previous baseline studies, conducted by ENRI between 1995 and 1998, in order to detect any changes in stream chemistry following rocket flight operations.

  Prior to and following the fifth and sixth launches from KLC, water samples from four of the nine study sites were collected and also analyzed for ammonium perchlorate, total aluminum, and alkalinity. This was done at the request of the Alaska Department of Environmental Conservation (ADEC). The water samples for perchlorate were analyzed by ion chromatography using EPA method 314.0 for Perchlorate in Water as previously discussed. Perchlorate was not detected in any of the water samples collected for analysis.

  The ENRI monitoring studies determined that water quality within a 6-mile radius of KLC was not affected by the launch of six missiles over a three year period. As background, Alaska Aerospace Development Corporation (AADC) conducted environmental monitoring of the first five launches from KLC under terms of an Environmental Monitoring Plan (EMP) that was developed as a stipulation to the

Finding of No Significant Impact rendered for the Environmental Assessment done in support of KLC construction and operation. The EMP was developed by ENRI in cooperation with interested agencies, which included the U.S. Fish and Wildlife Service (USFWS), National Marine Fisheries Service (NMFS), and ADEC. The EMP's life span was set at five launches, provided that no adverse affects were noted (in keeping with predictions in the referenced EA's Finding of No Significant Impact) and that at least one launch of the five was of the largest class of rocket that could be flown from KLC as it was then permitted. Both conditions were met and the EMP has lapsed. However, AADC is still obligated to conduct certain environmental monitoring tasks, including monitoring of water quality, with an emphasis on perchlorate and aluminum and basic stream chemistry under terms dictated by the ADEC. As such, monitoring of interest to EPA will continue to be conducted. Water chemistry parameters will include pH, dissolved oxygen, temperature, and conductivity (in-situ) as well as total recoverable aluminum and perchlorate. The data collected during such monitoring will be sent to ADEC and summarized in an annual *Environmental Monitoring and Natural Resources Management Report.* This analysis will help to determine impacts, if any, of individual launches and will allow for timely mitigation.

(2) Construction – Text has been added to the EIS to address sampling for areas that may have previously handled missile propellants. None of the construction sites at KLC, Vandenberg Air Force Base (AFB), or Reagan Test Site (RTS) have been identified as propellant handling or storage areas.

(3) Tsunami – Information regarding tsunamis is not yet available for Vandenberg AFB. Modeling is underway but the results are not expected until the end of 2003. Geologic hazards are not evaluated for RTS or the Pacific Missile Range Facility, and therefore tsunami information is not included for those locations. No impacts from tsunamis to ongoing activities at those locations have been identified in previous environmental documentation.

(4) Chapter 3 – The word 'generally' has been removed from the Installation Restoration Program (IRP) discussion in Chapter 3.

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10.0 REFERENCES

10.0 REFERENCES

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Oxnard CA

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Channel Islands CA

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Lompoc CA

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Virginia Gibson
Key Largo FL

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D Bowman
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Wai'anae HI

Pete Doktor
Honolulu HI

Kima Douglas
Princeville HI

Michael Douglas
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Eleawani Felix
Kilauea HI

Jean Flint
Kaneohe HI

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Captain Cook HI

Sachiko Fujita
Aria HI

Lauryn Galindo
Hanalei HI

Kekama Galioto
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Graeme Marsh
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James Nordlund
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LOUISIANA

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MARYLAND

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MASSACHUSETTS

Joy Chambers
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MICHIGAN

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Robert Blackiston
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Tina Horowitz
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John Kesich
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Pat Porter
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Carlos Altieri
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Jeremiah Spense
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VIRGINIA

Katie Johnson
Reston VA

Mark Reif
Winchester VA

WASHINGTON

Kitty and Gordy Adams
Clinton WA

Victoria Adlum
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Robin and Steve Ahmann
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Stephanie Allen
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J C and Mary Ellen O'Donnell
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Nena O'Neil
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Doris Olivers
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Jan Olsen
Everett WA

Frederick and Carol Olson
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Gary Olson
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Gloria Olson
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Jack Olson
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Mark Underwood
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Paul Waller
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Loren Waxler
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NEW JERSEY

Peter Allan
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NEW ZEALAND

Martini Gotjé
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OREGON

Allison Tolliver
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VIRGINIA

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Alan Taylor

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APPENDIX A
RELATED ENVIRONMENTAL DOCUMENTATION

SEE SEPARATE LINKED FILE □
(http://www.smdcen.us/gmdetreis/ □
Link active on EIS publication date.)

APPENDIX A
RELATED ENVIRONMENTAL DOCUMENTATION

Table A-1 summarizes some of the most pertinent related National Environmental Policy Act documentation that has been used in the preparation of the *Ground-Based Midcourse Defense Extended Test Range Environmental Impact Statement*. These Environmental Assessments and Environmental Impact Statements have previously been prepared to support the development of the specific technologies that may be used as part of the Ground-Based Midcourse Defense System. The information and analyses contained in these National Environmental Policy Act documents were used in the development of this Environmental Impact Statement. Several of the documents have been incorporated by reference and are cited in the Environmental Impact Statement where applicable. This appendix is available in digital format at the following website: http://www.smdc.us/gmdetreis/defaultflash. This link was in operation when the *Ground-Based Midcourse Defense Extended Test Range Environmental Impact Statement* was completed, and every effort will be made to maintain the website for the duration of the Proposed Action.

Table A-1: Related Environmental Documentation

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
1. *Final Environmental Impact Statement Proposed Actions at U.S. Army Kwajalein Atoll* (U.S. Army Strategic Defense Command, 1989) (Web Link)	U.S. Army Kwajalein Atoll launches from Meck, Omelek, and Roi-Namur; construction on Kwajalein	Exoatmospheric Reentry Interceptor System, Space Based Interceptor, High Endoatmospheric Defense Interceptor Strategic Target System	Kiernan Reentry Measurement System, Ground-Based Radar, Airborne Optical Adjunct, High Altitude Learjet Observatory and Infrared Instrumentation System, Mid-Course Sensors Experiment, Optical Aircraft Measurement System, Ground-Based Surveillance and Tracking System	Demonstration/validation interceptor and target launches, concept development activities, construction
2. *Final Environmental Impact Statement for the Strategic Target System* (U.S. Army Strategic Defense Command, 1992) (Web Link)	Kauai Test Facility, Pacific Missile Range Facility	Strategic Target System	Not applicable	Construction of flight support facilities and the launch of Strategic Target System vehicles
3. *Kauai Test Facility (KTF) Environmental Assessment* (U.S. Department of Energy, 1992) (Web Link)	Kauai Test Facility, not Pacific Missile Range Facility	Strategic Target System and Exoatmospheric Discrimination Experiment	FPO-14 equivalent	Evaluate the impact of continuing test operations at Kauai Test Facility on the environment (continuing the existing Kauai Test Facility and program; constructing new roadways, fencing, fuel handling, and launch pad facilities; and vertical and rail launch vehicles)

Table A-1: Related Environmental Documentation (Continued)

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
4. *Final Ground Based Radar (GBR) Family of Radars Environmental Assessment* (U.S. Army Program Executive Office, 1993) (Web Link)	Raytheon, Massachusetts for manufacture; White Sands Missile Range, New Mexico; Fort Bliss, New Mexico; U.S. Army Kwajalein Atoll	Not applicable	Theater Missile Defense Ground Based Radar and Ground Based Radar–Test	Fabrication and testing of the Ground Based Radar to demonstrate discrimination capabilities and validation of the technology
5. *Final Supplemental Environmental Impact Statement Proposed Actions at U.S. Army Kwajalein Atoll* (U.S. Army Space and Strategic Defense Command, 1993) (Web Link)	Launches from Meck, Omelek, Illeginni, and Roi-Namur; sensors on Gagan, Gellinam, Eniwetak, Ennylabegan, Kwajalein, Legan, Meck, Omelek	Theater High Altitude Area Defense, PATRIOT, Terrier, Nike Hercules, Extended Range Interceptor SR-19, M55A1, M56A1, Castor I, M57A1, Talos, Antares II, Black Brant VB, Orbus I, NIHKA (liquid), meteorological and sounding rockets	Kiernan Reentry Measurement System, Ground-Based Element, Airborne Optical Adjunct, High Altitude Learjet Observatory and Infrared Instrumentation System, Optical Aircraft Measurement System, Ground-Based Surveillance and Tracking System	Up to 172 annual launches, construction of new launch facilities and other facilities, installation of new sensor systems and fiber-optic communication
6. *Environmental Assessment (EA) for Theater Missile Defense (TMD) Ground Based Radar (GBR) Testing Program at Fort Devens, Massachusetts* (U.S. Army Program Executive Office Missile Defense, 1994) (Web Link)	Fort Devens, Massachusetts	Not applicable	Theater Missile Defense–Ground Based Radar	System testing as part of demonstration/validation of the Ground-Based Radar program, full power antenna radar tests
7. *Theater Missile Defense Extended Test Range Environmental Impact Statement* (U.S. Army Space and Strategic Defense Command, 1994) (Web Link)	White Sands Missile Range, New Mexico; Eglin Air Force Base, Florida; Western Range (Vandenberg Air Force Base, California); U.S. Army Kwajalein Atoll; Wake Island	Theater High Altitude Area Defense, Extended Range Interceptor, PATRIOT, Corps Surface-to-Air Missile, PATRIOT Advanced Capability-3, Army Tactical Missile System Hera family (M56A-1, SR19-AJ-1, Castor IV, Castor IVB, M57A-1, Orbus I)	Theater Missile Defense - Ground Based Radar, PATRIOT radar	Extended range tests of target and interceptor missiles and sensor systems (ground- and sea-based), 100 flight tests; construction, use of simulants (TEP, diatomaceous earth)

Table A-1: Related Environmental Documentation (Continued)

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
8. *Wake Island Environmental Assessment* (U.S. Space and Strategic Defense Command, 1994) (Web Link)	Wake Island	Theater High Altitude Area Defense, Extended Range Interceptor, PATRIOT, Corps Surface-to-Air Missile, PATRIOT Advanced Capability-3, Army Tactical Missile System Hera, (M56A-1, SR19-AJ-1, Castor IV, Castor IVB, M57A-1, Orbus I)	Theater Missile Defense - Ground Based Radar, Kwajalein Missile Range Safety System, AN/MPS-36 C-band tracking radar, telemetry receivers, optical sensors, PATRIOT radar (AN/MPQ-53)	Long distance missile flight tests in support of TCMP tests (75 to 100 surface-to-air and surface-to-surface defensive missiles), use of simulants (TEP), ground- and sea-based tests, use of MLS
9. *U.S. Army Kwajalein Atoll Temporary Extended Test Range Environmental Assessment* (U.S. Army Space and Strategic Defense Command, 1995) (Web Link)	Kwajalein, Meck, Roi-Namur, Illeginni, Gellinam, Legan, Omelek, and Aur islands	PATRIOT Hera, liquid target missile	Theater High Altitude Area Defense radar, PATRIOT radar, U.S. Army Kwajalein Atoll Range sensors	Construction of temporary target launch site on Bigen Island, launch of liquid and/or solid target missiles, PATRIOT missile launches from Meck or Illeginni, intercept over Kwajalein Lagoon or open ocean
10. *Environmental Assessment of the Kodiak Launch Complex* (Federal Aviation Administration, 1996) (Web Link)	Kodiak Island, Alaska	Lockheed Martin Launch Vehicles 1 and 2, Minuteman II (modified for commercial use), Taurus, and Conestoga	Not applicable	Examine the potential for environmental impacts resulting from the proposed Kodiak Launch Complex construction and operation; the proposed Kodiak Launch Complex would support commercial rocket launches to place small satellites into orbit

Table A-1: Related Environmental Documentation (Continued)

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
11. *Final Environmental Assessment for the Proposed Refuge Logistics and Operations Support and Public Use Program at Midway Atoll National Wildlife Refuge* (U.S. Department of the Interior, Fish and Wildlife Service, 1996) (Web Link)	Midway Atoll	Not applicable	Not applicable	Public use of Midway Atoll National Wildlife Refuge
12. *Environmental Assessment for the U.S. Air Force atmospheric interceptor technology Program* (U.S. Department of the Air Force, 1997) (Web Link)	Kodiak Island, Alaska	Minuteman II	Phased Array Warning System (PAVE PAWS) radar, HAVE STARE tracking radar	Two sub-orbital missile launches

Table A-1: Related Environmental Documentation (Continued)

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
13. *Final Theater Ballistic Missile Targets Programmatic Environmental Assessment* (U.S. Department of the Air Force, 1997) (Web Link)	Vandenberg Air Force Base, California	Lance, HERMES Target System, PATRIOT as a Target, Black Brant IX, Two-stage (or DR-2) Terrier, Terrier/Orion, Castor I, and STRYPI II, Storm, ARIES, Hera, Theater High Altitude Area Defense, PATRIOT Advanced Capability-2 and PATRIOT Advanced Capability-3, Corps Surface-to-Air Missile; Navy Standard Missile 2, Block III or IVA; and Air Force theater ballistic missile	Ground-based optical sensors, radar, and telemetry stations may be supplemented by ship-based or airborne sensors	In cooperation with Vandenberg Air Force Base, the U.S. Army Space and Missile Defense Command proposes to launch up to 30 small, solid- and liquid-propellant theater ballistic missiles and sounding rockets from mobile launchers on several launch sites on Vandenberg Air Force Base; in addition, it is proposed that larger target missiles, such as the Storm, ARIES, and Hera, be launched from a 50k rail launcher located on Space Launch Complex -5
14. *Supplemental Environmental Assessment for the Proposed Public Use Program at Midway Atoll National Wildlife Refuge* (U.S. Department of the Interior, Fish and Wildlife Service, 1997) (Web Link)	Midway Atoll National Wildlife Refuge	Not applicable	Not applicable	Proposes that shore-based fishing, the taking of lobsters, night-diving, night-fishing, glass-bottom boating, kayaking tours, and the development of a designated trail system through a closed area of Sand Island be included in the Public Use Plan for the Refuge

Table A-1: Related Environmental Documentation (Continued)

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
15. *Programmatic Environmental Assessment Air Drop Target System Program (Department of Defense, Ballistic Missile Defense Organization, 1998)* (Web Link)	No specific area	SR-19-AJ-1 rocket motor	C-band beacon tracking	Air launch of target booster
16. *Pacific Missile Range Facility Enhanced Capability Final Environmental Impact Statement* (U.S. Department of the Navy, 1998) (Web Link)	Pacific Missile Range Facility, Niihau, Kaula, Kaena Point, Space Surveillance System on the island of Maui, Tern Island, Johnston Atoll, Open Pacific Ocean	Interceptor missiles (Standard Missile-2 Block IV, Theater High Altitude Area Defense, PATRIOT Advanced Capability-2, PATRIOT Advanced Capability-3, Advanced Medium-Range, Air-to-Air Missile, Medium Extended Air Defense System) Solid and liquid propellant target missiles (Strategic Target System, Hermes, PATRIOT as a Target, Storm, Hera; Lance, FMA)	Precision tracking, surveillance, and identification-friend-or-foe radars	Ground-, air-, and sea-launches of target and interceptor missiles with intercepts over the broad ocean area
17. *Theater Missile Defense Extended Test Range Supplemental Environmental Impact Statement – Eglin Gulf Test Range* (U.S. Department of the Air Force, 1998) (Web Link)	Eglin Air Force Base, Florida; Florida Keys; Gulf of Mexico	Theater High Altitude Area Defense, Standard Missile-2 Block IV, Standard Missile-3, PATRIOT Advanced Capability-2, PATRIOT Advanced Capability-3, Medium Extended Air Defense System, Hera, Storm II, PATRIOT as a Target, Lance, HERMES, Black Brandt 9, Pegasus	Ground Based Radar, airborne sensors, ship-based sensors, and space-based sensors	Ground-, air-, and sea-launches; intercepts in Gulf of Mexico

Table A-1: Related Environmental Documentation (Continued)

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
18. *Booster Verification Tests Environmental Assessment* (U.S. Department of the Air Force, 1999) (Web Link)	Vandenberg Air Force Base	Booster Verification Flight Vehicle	Not applicable	Two booster verification test flights; the Environmental Assessment covers all pre-flight, in-flight, and post-flight operational activities; modification of the existing Minuteman II silo at LF-21, minor modifications to the communications and launch control buildings, and installation of a temporary above-ground fiber-optic communication line connecting LF-21 to the base communication system
19. *Wake Island Launch Center (WILC) Supplemental Environmental Assessment* (U.S. Army Space and Missile Defense Command, 1999) (Web Link)	Wake Island	Liquid propellant target missile	Not listed	Minimal new site preparation, liquid propellant transfer and fueling, liquid propellant missile launches
20. *Final Supplemental Environmental Impact Statement for the Evolved Expendable Launch Vehicle Program* (U.S. Department of the Air Force, 2000) (Web Link)	Cape Canaveral Air Force Station, Florida; Vandenberg Air Force Base, California	Atlas V, Delta IV	Not applicable	To allow the addition of up to five strap-on solid rocket motors to the Atlas V lift vehicle and to allow the use of larger solid rocket motors on the Delta IV lift vehicle; both vehicles are part of the Evolved Expendable Launch Vehicle program

Table A-1: Related Environmental Documentation (Continued)

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
21. *National Missile Defense Deployment Environmental Impact Statement* (Department of Defense, 2000) (Web Link)	Alaska, North Dakota	Ground-Based Interceptor	X-Band Radar, Upgraded Early Warning Radar (PAVE PAWS), Satellite Detection Systems	This Environmental Impact Statement examines the potential for impacts to the environment as a result of the potential deployment of a land-based National Missile Defense system
22. *Final Environmental Assessment for U.S. Air Force Quick Reaction Launch Vehicle Program* (U.S. Department of the Air Force, 2001) (Web Link)	Kodiak Island, Alaska	Minutemen I M-56 motor, Minuteman II/III SR-19 motor, Minuteman II/III SR-19/Minuteman I/II M-57, Delta II Castor IVB Minuteman I/II M-57	Not applicable	Consists of eight sub-orbital missile launches from the Kodiak Launch Complex on Kodiak Island, Alaska; one Quick Reaction Launch Vehicle per year
23. *Final Environmental Assessment for the North Pacific Targets Program* (U.S. Army Space and Missile Defense Command, 2001) (Web Link)	Kodiak, Alaska; Kauai Test Facility, Pacific Missile Range Facility; Open Ocean near U.S. Army Kwajalein Atoll	Strategic Target System	Not applicable	The Proposed Action is to increase launch capability of the Strategic Target System in order to provide ballistic missile targets to test North American sensors, and for possible use in testing various sensors and ground-based interceptors at U.S. Army Kwajalein Atoll/Kwajalein Missile Range and various sensors and ship-based interceptors at Pacific Missile Range Facility

Table A-1: Related Environmental Documentation (Continued)

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
24. *Alternate Boost Vehicle Verification Tests Environmental Assessment* (U.S. Army Space and Missile Defense Command, 2002) (Web Link)	Vandenberg Air Force Base, California	Alternate Boost Vehicle	Not applicable	Modification of the existing Minuteman II silo at LF-23 Confirm the Alternate Boost Vehicle and silo designs, demonstrate silo egress, test the booster under operationally representative conditions through test flights of the Alternate Boost Vehicle (10 intercontinental ballistic missiles per year)
25. *Ground-Based Midcourse Defense(GMD) Validation of Operational Concept (VOC) Environmental Assessment* (U.S. Army Space and Missile Defense Command, 2002) (Web Link)	Fort Greely, Alaska; Clear Air Force Station, Alaska; Eareckson Air Force Station, Alaska; Eielson Air Force Base, Alaska; Beale Air Force Base, California	Ground-Based Interceptor	X-Band Radar, In-flight Interceptor Communication System Data Terminal, Upgraded Early Warning Radar, COBRA DANE, Space-Based Detection System	Prove construction techniques for Ground-Based Midcourse Defense components and validate the operational concept of Ground-Based Midcourse Defense
26. *Final Environmental Impact Statement/ Overseas Environmental Impact Statement Point Mugu Sea Range* (U.S. Department of the Navy, 2002) (Web Link)	Naval Air Warfare Center Weapons Division Point Mugu/Naval Air Warfare Center Weapons Division Point Mugu Sea Range	Vandal Smaller	Range Radars and Telemetry	In addition to conducting current test and training operations at the Naval Air Warfare Center Weapons Division Point Mugu Sea Range, Naval Air Warfare Center Weapons Division Point Mugu proposes to accommodate Theater Missile Defense testing and training, accommodate an increase in current levels of training exercises, and modernize facilities to enhance the existing testing and training capabilities at Naval Air Warfare Center Weapons Division Point Mugu

Table A-1: Related Environmental Documentation (Continued)

Date/Document Title	Locations of Actions	Missiles Analyzed	Sensors Analyzed	Activities Analyzed
27. *Development and Demonstration of the Long Range Air Launch Target System Environmental Assessment* (U.S. Department of Defense, 2002) (Web Link)	Yuma Proving Ground, Central Pacific Broad Ocean Area	Long Range Air Launch Target	Not applicable	Two validation tests; the Long Range Air Launch Target demonstration would test a ballistic missile target comprising a launch vehicle delivery system and a simulated re-entry vehicle

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APPENDIX B
RESOURCE DESCRIPTIONS INCLUDING LAWS AND REGULATIONS CONSIDERED

APPENDIX B
RESOURCE DESCRIPTIONS INCLUDING LAWS AND REGULATIONS CONSIDERED

AIR QUALITY

Air quality in a given location is described as the concentration of various pollutants in the atmosphere, generally expressed in units of parts per million (ppm) or micrograms per cubic meter ($\mu g/m^3$), or in a pollution standard index. Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. The significance of a pollutant concentration is determined by comparing it to federal and state ambient air quality standards (AAQS).

The Federal Clean Air Act (42 United States Code [USC] 7401) requires the adoption of national ambient air quality standards (NAAQS) to protect the public health, safety, and welfare from known or anticipated effects of air pollution. Air quality is defined by ambient air concentrations of specific pollutants. Seven air pollutants have been identified by the U.S. Environmental Protection Agency (EPA) as being of concern nationwide: carbon monoxide, ozone, nitrogen dioxide, particulate matter equal to or less than 10 microns in size (PM-10) (also called respirable particulate and suspended particulate), fine particulate matter equal to or less than 2.5 microns in size (PM-2.5), sulfur dioxide, and lead. The EPA has established NAAQS for these pollutants, which are collectively referred to as criteria pollutants, as shown in table B-1. Alaska, Hawaii, California, and Washington have established state AAQS. Emissions of air pollutants from operations in each state are limited to the more restrictive standard (federal or state). Table B-1 compares the NAAQS and the state AAQS. The NAAQS are applicable at sites within the United States; applicability at the other project sites is discussed in the individual sections that follow.

According to EPA guidelines, an area with air quality better than the NAAQS is designated as being in attainment; areas with worse air quality are classified as nonattainment areas. A nonattainment designation is given to a region if the primary NAAQS for any criteria pollutant is exceeded at any point in the region for more than 3 days during a 3-year period. Pollutants in an area may be designated as unclassified when there is insufficient data for the EPA to determine attainment status.

The Clean Air Act Amendments of 1990 (Public Law [PL] 101-549, 104 Statute 2399) required the EPA to promulgate rules to ensure that federal actions in areas classified as nonattainment or maintenance areas conform to the appropriate state implementation plan. These rules, known together as the General Conformity Rule (40 Code of Federal Regulations [CFR] 51.850-860 and 40 CFR 93.150-160), require any federal agency responsible for an action to determine if its action conforms to pertinent guidelines and regulations. Certain actions are exempt from conformity determinations if the projected emission rates would be less than specified emission rate thresholds, known as *de minimis* limits.

Table B-1: Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	Alaska State Standard	Hawaii State Standard	California State Standard	Washing ton State Standard	National Primary Standard	National Secondary Standard
Carbon Monoxide	8-hour	10 mg/m^3 (9 ppm)	5 mg/m^3 (4.5 ppm)	10 mg/m^3 (9 ppm)	10 mg/m^3 (9 ppm)	10 mg/m^3 (9 ppm)	None
	1-hour	40 mg/m^3 (35 ppm)	10 mg/m^3 (9 ppm)	23 mg/m^3 (20 ppm)	40 mg/m^3 (35 ppm)	40 mg/m^3 (35 ppm)	None
Nitrogen Dioxide	Annual (1)	100 µg/m^3 (0.053 ppm)	70 mg/m^3 (0.037 ppm)	None	94 µg/m^3 (0.05 ppm)	100 µg/m^3 (0.053 ppm)	Same as Primary
	1-hour	None	None	470 µg/m^3 (0.25 ppm	None	None	None
Ozone	8-hour (2)	None	None	None	None	157 µg/m^3 (0.08 ppm) (1)	Same as Primary
	1-hour	235 µg/m^3 (0.12 ppm)	100	180 µg/m^3 (0.09 ppm)	235 µg/m^3 (0.12 ppm)	235 µg/m^3 (0.12 ppm)	Same as Primary
Lead	30-day average	None	None	1.5 µg/m^3	None	None	None
	Quarterly (1)	1.5 µg/m^3	1.5 mg/m^3	None	None	1.5 µg/m^3	Same as Primary
PM-2.5	Annual (3)	None	None	None	None	15 µg/m^3	Same as Primary
	24-hour (4)	None	None	None	None	65 µg/m^3	Same as Primary
PM-10	Annual (arithmetic mean)	50 µg/m^3	50 mg/m^3	None	50 µg/m^3	50 µg/m^3	Same as Primary
	24-hour (5)	150 µg/m^3	150 mg/m^3	50 µg/m^3	150 µg/m^3	150 µg/m^3	Same as Primary
	Annual (geometric mean)	None	None	30 µg/m^3	None	None	None
Sulfur Dioxide (6)	Annual (1)	80 µg/m^3 (0.03 ppm)	80 µg/m^3 (0.03 ppm)	None	53.3 µg/m^3 (0.02 ppm)	80 µg/m^3 (0.03 ppm)	None
	24-hour	365 µg/m^3 (0.14 ppm)	365 µg/m^3 (0.14 ppm)	105 µg/m^3 (0.04 ppm)	262 µg/m^3 (0.10 ppm)	365 µg/m^3 (0.14 ppm)	None
	3-hour	1300 µg/m^3 (0.5 ppm)	1300 µg/m^3 (0.5 ppm)	None	None	None	1300 µg/m^3 (0.5 ppm)
	1-hour	None	None	655 µg/m^3 (0.25 ppm)	1050 µg/m^3 (0.4 ppm)	None	None
Ammonia	8-hour	2.1 mg/m^3 (3.0 ppm)	None	None	None	None	None
Reduced Sulfur (6)	30-minute	50 µg/m^3 (0.02 ppm)	None	None	None	None	None
Hydrogen Sulfide	1-hour	None	35 µg/m3 (0.025 ppm)	42 µg/m3 (0.03 ppm)	None	None	None
Total Suspended Particles	Annual (geometric mean)	None	None	None	60 µg/m3	None	None
	24-hour	None	None	None	150 µg/m3	None	None

Table B-1: Federal and State Ambient Air Quality Standards (Continued)

Pollutant	Averaging Time	Alaska State Standard	Hawaii State Standard	California State Standard	Washing ton State Standard	National Primary Standard	National Secondary Standard
Sulfates	24-hour	None	None	25 µg/m3	None	None	None
Visibility Reducing Particles	8-hour (10 am to 6 pm, PST)	None	None	Insufficient amount to produce an extinction coefficient of 0.23 per kilometer - visibility of 16 kilometers (10 miles) or more due to particles when the humidity is less than 70 percent.		None	None

Source: Alaska Department of Environmental Conservation, Division of Air and Water Quality, 2002; State of Hawaii, Department of Health, Clean Air Branch, 2001; Ventura County Air Pollution Control District, Air Quality Planning and Evaluation Division, 2000; Washington State Department of Ecology, Air Quality Program, 1999.

(1) Calculated as the arithmetic mean

(2) Calculated as the 3-year average of the fourth highest daily maximum 8-hour ozone concentration

(3) Calculated as the 3-year average of the arithmetic means

(4) Calculated as the 98th percentile of 24-hour PM-2.5 concentration in a year (averaged over 3 years) at the population-oriented monitoring site with the highest measured values in the area.

(5) Calculated as the 99th percentile of 24-hour PM-10 concentrations in a year (averaged over 3 years).

(6) Measured as sulfur dioxide

mg/m^3 = milligrams per cubic meter
µg/m^3 = micrograms per cubic meter
PM-2.5 = fine particulate matter equal to or less than 2.5 microns in size
PM-10 = particulate matter equal to or less than 10 microns in size (also called respirable particulate and suspended particulate)
ppm = parts per million
PST = Pacific Standard Time

The federal laws and regulations also define a group of pollutants called hazardous air pollutants, toxic air contaminants, or air toxics. These pollutants are regulated by the National Emissions Standards for Hazardous Air Pollutants section of the Clean Air Act. Exposure to these pollutants can cause or contribute to cancer, birth defects, genetic damage, and other adverse health effects. The source and effects are generally local rather than regional. Evaluation is based on case studies, not standards for ambient concentration. Examples of air toxics include benzene, asbestos, and carbon tetrachloride.

AIRSPACE

Types of Airspace

Controlled and Uncontrolled Airspace

As part of the national airspace system, controlled and uncontrolled airspace is divided into six classes, dependent upon location, use, and degree of control. Figure B-1 depicts the various classes of controlled airspace. Class A airspace, which is not specifically charted, includes airspace overlying the waters within 22.2 kilometers (12 nautical miles) of the coast. Unless otherwise authorized, all aircraft must be operated under Instrument Flight Rules (IFR).

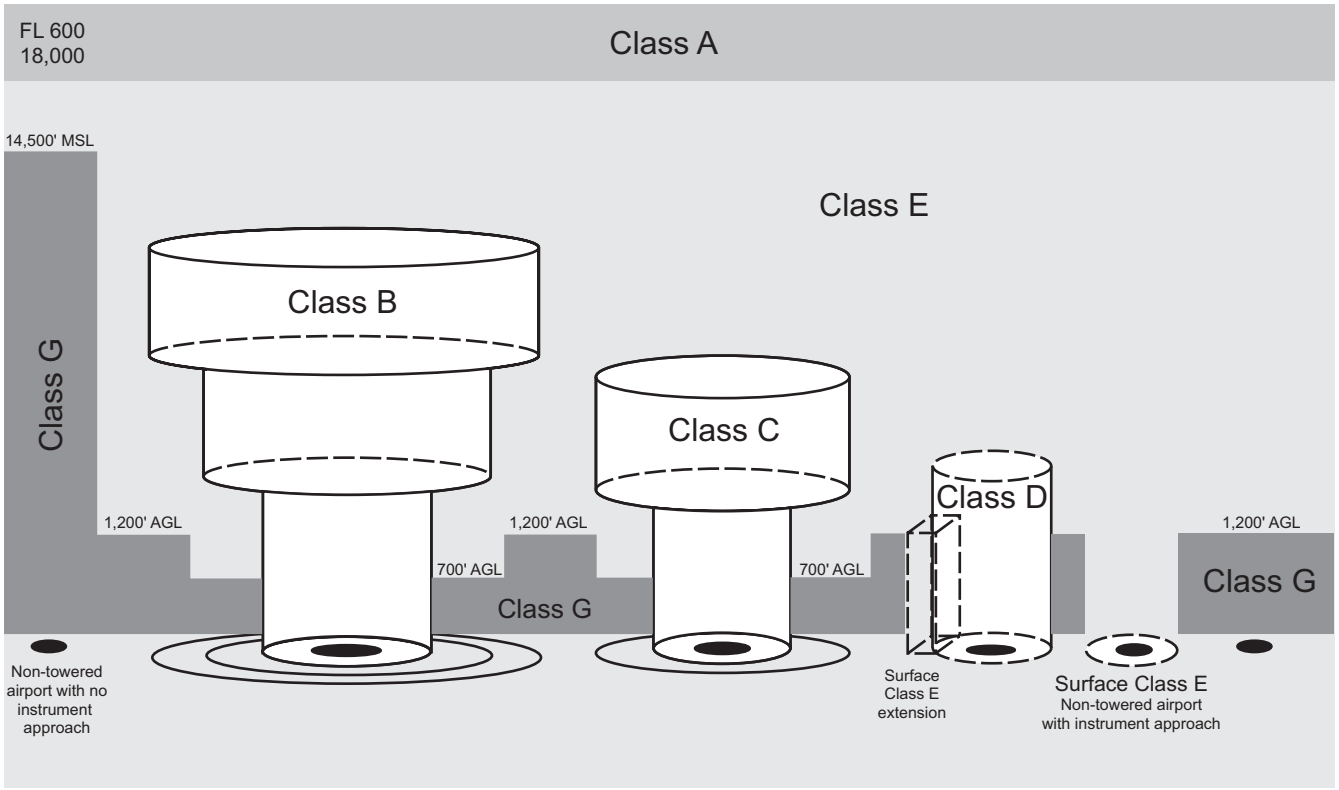
Class B airspace is generally that airspace surrounding the nation's busiest airports in terms of IFR operations or passenger enplanements. An air traffic control clearance is required for all aircraft to operate in the area, and all aircraft that are so cleared receive separation services within the airspace.

Class C airspace is generally that airspace surrounding those airports that have an operational control tower, are serviced by a radar approach control, and that have a certain number of IFR operations or passenger enplanements. Class D airspace is generally that airspace surrounding those airports that have an operational control tower. Class E airspace is controlled airspace that is not Class A, Class B, Class C, or Class D airspace. Uncontrolled airspace, or Class G airspace, has no specific definition but generally refers to airspace not otherwise designated and operations below 365.8 meters (1,200 feet) above ground level. No air traffic control service to either IFR or Visual Flight Rules (VFR) aircraft is provided other than possible traffic advisories when the air traffic control workload permits and radio communications can be established (Illman, 1993).

Special Use Airspace

Complementing the classes of controlled and uncontrolled airspace described above are several types of special use airspace used by the military to meet its particular needs. Special use airspace consists of that airspace wherein activities must be confined because of their nature, or wherein limitations are imposed upon aircraft operations that are not a part of these activities, or both. Except for controlled firing areas, special use airspace areas are depicted on aeronautical charts. Special use airspace, except controlled firing areas, are charted on IFR or visual charts and include hours of operation, altitudes, and the controlling agency. Only the kinds of special use airspace found in the region of influence are described. These include the following:

- Restricted Areas contain airspace identified by an area on the surface of the earth within which the flight of aircraft, while not wholly prohibited, is subject to restriction. Activities within these areas must be confined, because of their nature, or limitations imposed upon aircraft operations that are not a part of these activities, or both.



Source: U.S. Department of Transportation, 2002a

EXPLANATION
AGL = Above Ground Level
FL = Flight Level
MSL = Above Mean Sea Level

The Six Classes of Non-Military Airspace

Figure B-1

Restricted Areas denote the existence of unusual, often invisible, hazards to aircraft such as artillery firing, aerial gunnery, or guided missiles. Restricted Areas are published in the Federal Register and constitute Federal Aviation Regulation Part 73 (Aviation Supplies and Academics, Inc., 1996)

- Warning Areas are airspace that may contain hazards to non-participating aircraft in international airspace. Warning Areas are established beyond the 5.6-kilometer (3-nautical-mile) limit. Although the activities conducted within Warning Areas may be as hazardous as those in Restricted Areas, Warning Areas cannot be legally designated as Restricted Areas because they are over international waters (Aviation Supplies and Academics, Inc., 1996). By Presidential Proclamation No. 5928, dated 27 December 1988 (issued in 1989), the U.S. territorial limit was extended from 5.6 to 22.2 kilometers (3 to 12 nautical miles). Special Federal Aviation Regulation 53 establishes certain regulatory warning areas within the new (5.6- to 22.2-kilometer [3- to 12-nautical-mile]) territorial airspace to allow continuation of military activities while further regulatory requirements are determined.

Other Airspace Areas

Other types of airspace include airport advisory areas, military training routes, temporary flight restrictions areas, flight limitations and prohibitions areas, parachute jump aircraft operations areas, published VFR routes, and terminal radar service areas (Aviation Supplies and Academics, Inc., 1996).

Special Airspace Use Procedures

Other types of airspace, and special airspace use procedures used by the military to meet its particular needs, include air traffic control assigned airspace and altitude reservation (ALTRV) procedures. Both of these are described below:

- Air Traffic Control Assigned Airspace, or airspace of defined vertical and lateral limits, is assigned by air traffic control to provide air traffic segregation between specified activities being conducted within the assigned airspace and other IFR air traffic. Air Traffic Control Assigned Airspaces are usually established in conjunction with Military Operations Areas, and serve as an extension of Military Operations Area airspace to the higher altitudes required. These airspace areas support high altitude operations such as intercepts, certain flight test operations, and air refueling operations.
- ALTRV Procedures are used as authorized by the Central Altitude Reservation Function, an air traffic service facility, or appropriate Air Route Traffic Control Center, under certain circumstances, for airspace utilization under prescribed conditions. An ALTRV receives special handling from FAA facilities. According to Chapter 3 of FAA Handbook 7610.4H, *Special Military Operations,* ALTRVs are classified as either moving or stationary, with the latter normally defining the fixed airspace area to be occupied as well as the specific altitude(s) and time period(s) the area will be in use. ALTRVs may encompass certain rocket and missile activities and other special operations as may be authorized by FAA approval procedures.

BIOLOGICAL RESOURCES

Native or naturalized vegetation, wildlife, and the habitats in which they occur are collectively referred to as biological resources. Existing information on plant and animal species and habitat types in the vicinity of the proposed activities was reviewed with special emphasis on the presence of any species listed as rare, threatened, or endangered by federal or state agencies to assess their sensitivity to the effects of the Proposed Action and alternatives. Biological studies consisted of literature review, field reconnaissance, agency and installation consultation, and map documentation. For the purpose of discussion, biological resources have been divided into the areas of vegetation, wildlife, threatened and endangered species, and environmentally sensitive habitats.

The Endangered Species Act of 1973 (16 USC 1531 *et seq.*) declares that it is the policy of Congress that all federal departments and agencies shall seek to conserve endangered species and threatened species. Further, the act directs federal agencies to use their authorities in furtherance of the purposes of the act. Under the Endangered Species Act, the Secretary of the Interior creates lists of endangered and threatened species. The term endangered species means any species which is in danger of extinction throughout all or a significant portion of its range. The act defines a threatened species as any species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

A key provision of the Endangered Species Act for federal activities is Section 7 consultation. Under Section 7 of the act, every federal agency must consult with the Secretary of the Interior, U.S. Fish and Wildlife Service (USFWS), to ensure that any agency action (authorization, funding, or execution) is not likely to jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of habitat of such species.

Through the Fish and Wildlife Coordination Act of 1958 (16 USC 661 *et seq.*), Congress encourages all federal departments and agencies to utilize their statutory and administrative authority, to the maximum extent practicable and consistent with each agency's statutory responsibilities, to conserve and promote conservation of nongame fish and wildlife and their habitats. Further, the act encourages each state to develop a conservation plan.

The Fish and Wildlife Coordination Act requires a federal department or agency that proposes or authorizes the modification, control, or impoundment of the waters of any stream or body of water (greater than 4.1 hectares [10 acres]), including wetlands, to first consult with the USFWS. Any such project must make adequate provision for the conservation, maintenance, and management of wildlife resources. The act requires a federal agency to give full consideration to the recommendations of the USFWS and to any recommendations of a state agency on the wildlife aspects of a project.

The Migratory Bird Treaty Act of 1918, as amended (16 USC 703-712) protects most species of migratory birds. Specifically, the act prohibits the pursuit, hunting, taking, capture, possession, or killing of such species or their nests and eggs.

The Clean Water Act (33 USC 1251 *et seq.*), Section 404, regulates the dredging and filling of jurisdictional wetlands. Permits from the U.S. Army Corps of Engineers are required for conducting dredging and filling operations.

The Marine Mammal Protection Act of 1972, as amended (16 USC 1361 *et seq.*), gives the USFWS and National Marine Fisheries Service co-authority and outlines prohibitions for the taking of marine mammals. The act also provides for penalties for the use of fishing methods in contravention of any regulations or limitations enacted by governmental agencies to achieve the purposes of the act. A take would result from an attempt to harass, hunt, capture, or kill marine mammal. Subject to certain exceptions, the act establishes a moratorium on the taking and importation of marine mammals. Exceptions to the taking prohibition allow USFWS and National Marine Fisheries Service to authorize the incidental taking of small numbers of marine mammals in certain instances. The Marine Mammal Commission, which was established under the act, reviews laws and international conventions, studies world-wide populations, and makes recommendations of federal officials concerning marine mammals.

The Bald and Golden Eagle Protection Act (16 USC 668 *et seq.*) establishes penalties for the unauthorized taking, possession, selling, purchase, or transportation of bald or golden eagles, their nests, or their eggs. Any federal activity that might disturb eagles requires consultation with the USFWS for appropriate mitigation.

The National Wildlife Refuge System Administration Act of 1966 (16 USC 668dd-668ee) consolidates the authorities for categories of areas previously established that are administered by the Secretary of the Interior for the conservation of fish and wildlife, including species that are threatened with extinction. All lands, waters, and interests therein administered as wildlife refuges, etc., are designated as the National Wildlife Refuge System.

The Magnuson–Stevens Fishery Conservation and Management Act (16 USC 1801 *et seq.*) requires that federal agencies consult with the National Marine Fisheries Service on activities that could harm Essential Fish Habitat areas. Essential Fish Habitat refers to “those waters and substrate (sediment, hard bottom) necessary to fish for spawning, breeding, feeding or growth to maturity.”

The Plant Protection Act, which became law in June 2000, consolidates all or part of 10 existing U.S. Department of Agriculture plant health laws into one. The act gives the Secretary of Agriculture the ability to prohibit or restrict the importation, exportation, and interstate movement of plants, plant products, some biological control organisms, noxious weeds, and plant pests.

Executive Order 13112, Invasive Species, orders the prevention of invasive species introduction and provides means for their control in order to minimize economic, ecological, and the human health impacts they cause.

The conservation of species and habitats of special concern at U.S. Army Kwajalein Atoll (USAKA), including threatened and endangered species, are addressed in the USAKA Environmental Standards (UES). The objective of the UES is to ensure that actions taken at USAKA are not likely to jeopardize the continued existence of these species or to result in destroying or adversely changing the habitats on which they depend.

CULTURAL RESOURCES

Cultural resources include prehistoric and historic artifacts, archaeological sites (including underwater sites), historic buildings and structures, and traditional resources (such as Native American and Native Hawaiian religious sites). Paleontological resources are fossil remains of prehistoric plant and animal species and may include bones, shells, leaves, and pollen. Cultural resources of particular concern include properties listed or eligible for inclusion in the National Register of Historic Places (National Register). Section 106 of the National Historic Preservation Act (NHPA) requires federal agencies to take into consideration the effects of their actions on significant cultural properties. Implementing regulations (36 CFR 800) specify a process of consultation to assist in satisfying this requirement. To be considered significant, cultural resources must meet one or more of the criteria established by the National Park Service that would make that resource eligible for inclusion in the National Register. The term "eligible for inclusion in the National Register" includes all properties that meet the National Register listing criteria which are specified in Department of Interior regulations at 36 CFR 60.4. Therefore, sites not yet evaluated may be considered potentially eligible to the National Register and, as such, are afforded the same regulatory consideration as nominated properties. In some cases, cultural resources that have been determined not eligible for the National Register may still require some level of management activity, protection, or mitigation when threatened by an undertaking. Whether prehistoric, historic, or traditional, significant cultural resources are referred to as historic properties.

Numerous laws and regulations require that possible effects to cultural resources be considered during the planning and execution of federal undertakings. These laws and regulations stipulate a process of compliance, define the responsibilities of the federal agency proposing the action, and prescribe the relationship among other involved agencies (e.g., State Historic Preservation Officer, the Advisory Council on Historic Preservation). In addition to the National Environmental Protection Act, the primary laws that pertain to the treatment of cultural resources during environmental analysis are the National Historic Preservation Act ([16 USC 470 *et seq*.] especially Sections 106 and 110); the Archaeological Resources Protection Act of 1979 (16 USC 470aa-470mm), which prohibits the excavation or removal of items of archaeological interest from federal lands without a permit; the Antiquities Act of 1906 (16 USC 431); and the Native American Graves Protection and Repatriation Act (25 USC 3001 et seq.), which requires that federal agencies return "Native American cultural items" to the federally recognized native groups with which they are associated, and specifies procedures to be followed if such items are discovered on federal land.

GEOLOGY AND SOILS

Geology and soils are those earth resources that may be adversely affected by the proposed action. This resource is described in terms of landforms, geology, and soil conditions as they could contribute to erosion, depletion of mineral or energy resources, and soil contamination resulting from proposed construction and launch activities. The potential for geologic hazards is also described as relative to each site's geologic setting. A geologic hazard is a naturally occurring or man-induced geologic condition that presents a risk or a potential danger to life and property. Such hazards could include phenomena such as landslides, flooding, ground subsidence, volcanic activity, faulting, earthquakes, and tsunamis.

Although there are no regulations pertaining specifically to geology and soils in the project areas, some water quality regulations are indirectly related with respect to erosion and resultant turbidity in surface waters (National Pollutant Discharge Elimination System [NPDES] permitting

program), avoidance of development in floodplains (Executive Order 11988, *Floodplain Management*), and spill response plans to ensure that groundwater is not adversely impacted.

HAZARDOUS MATERIALS AND HAZARDOUS WASTE

The Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (PL 96-510, 42 USC 9601, *et seq.*) authorizes the EPA to enforce remediation of past contamination. The law authorized federal agencies to respond to the release or imminent release of hazardous substances into the environment through emergency response procedures coordinated with state governments.

The Emergency Planning and Community Right-to-Know Act of 1986 (PL 99-499, 42 USC 11001, *et seq.*) as part of the Superfund Amendments and Reauthorization Act of 1986 Title III (PL 99-499, 42 USC 9611, *et seq.*) establishes the emergency planning efforts at state and local levels and provides the public with potential chemical hazards information.

The Federal Insecticide, Fungicide, and Rodenticide Act of 1972 (PL 92-516, 7 USC 136, *et seq.*) regulates the labeling requirement and disposal practices of pesticide usage.

The Hazardous Materials Transportation Act of 1975 (PL 93-633, 49 USC 1801, *et seq.*) gives the U.S. Department of Transportation authority to regulate shipments of hazardous substances by air, highway, or rail. These regulations, found at 49 CFR 171–180, may govern any safety aspect of transporting hazardous materials, including packing, repacking, handling, labeling, marking, placarding, and routing (other than with respect to pipelines).

The Military Munitions Rule (62 FR 6621, 40 CFR 260, *et seq.*) identifies when conventional and chemical military munitions become a hazardous waste under the Resource Conservation and Recovery Act, and provides safe storage and transport of such waste. It amends existing regulations regarding emergency responses involving both military and non-military munitions and hazardous waste and explosives. The rule also exempts hazardous waste generators and transporters from needing Resource Conservation and Recovery Act manifests when traveling through or close to adjacent properties under the control of the same person.

The Nuclear Regulatory Commission (PL 93-438, 42 USC 5801, *et seq.*) regulates radioactive materials, including depleted uranium; enforcement of this statute is conducted under 10 CFR 19, 20, 21, 30, and 40, Nuclear Regulatory Commission Standards for Protection Against Radiation. These health and safety standards were established as protection against ionizing radiation resulting from activities conducted under the licenses issued by the Nuclear Regulatory Commission. The handling, storage, establishing radiation protection programs, record keeping, transport, and disposal of radioactive materials are subject to Nuclear Regulatory Commission standards.

The Ocean Dumping Act (PL 92-532, 33 USC 1401, *et seq.*) is Title I of the Marine Protection, Research, and Sanctuaries Act of 1972. The Ocean Dumping Act regulates what can be dumped into the ocean in order to protect the marine environment. It restricts allowed dumping to designated locations, and strictly prohibits dumping of materials such as radioactive and biological warfare substances. The U.S. Coast Guard conducts surveillance as a regulatory measure.

The Oil Pollution Act of 1990 (PL 101-380, 33 USC 2701, *et seq.*) requires oil storage facilities and vessels to submit to the federal government plans detailing how they will respond to large discharges. The Oil Pollution Act also established a trust fund for cleaning up oil spills when the responsible party is incapable or unwilling to do so. The Oil Pollution Act requires the development of Area Contingency Plans to prepare and plan for oils spill response on a regional scale.

The Pollution Prevention Act of 1990 (PL 101-508, 42 USC 13101, *et seq.*) requires the EPA to develop standards for measuring waste reduction, serve as an information clearinghouse, and provide matching grants to state agencies to promote pollution prevention. Facilities with more than 10 employees that manufacture, import, process, or otherwise use any chemical listed in and meeting threshold requirements of Emergency Planning and Community Right-to-Know Act must file a toxic chemical source reduction and recycling report.

The Resource Conservation and Recovery Act of 1976, as amended 1984 (PL 94-580, PL 98-616 [1984], and 42 USC 6901, *et seq.*) authorizes the EPA to regulate the generation, storage, and disposal of hazardous wastes. The Resource Conservation and Recovery Act also manages underground storage tanks. See also Utilities Regulations.

The Toxic Substances Control Act of 1976 (PL 94-469, 15 USC 2601, *et seq.*) establishes that the EPA has the authority to require the testing of new and existing chemical substances entering the environment, and, subsequently, has the authority to regulate these substances. The Toxic Substances Control Act also regulates polychlorinated biphenyls.

HEALTH AND SAFETY

29 CFR 1910 and 1926—Regulatory requirements related to the Occupational Safety and Health Act of 1970 have been codified in 29 CFR 1910, *General Industry Standards,* and 29 CFR 1926, *Construction Industry Standards.* The regulations contained in these sections specify equipment, performance, and administrative requirements necessary for compliance with federal occupational safety and health standards, and apply to all occupational (workplace) situations in the United States. Requirements specified in these regulations are monitored and enforced by the Occupational Safety and Health Administration (OSHA), which is a part of the U.S. Department of Labor.

With respect to ongoing work activities at the Proposed Action locations, the primary driver is the requirements found in 29 CFR 1910, *Occupational Safety and Health Standards.* These regulations address such items as electrical and mechanical safety and work procedures, sanitation requirements, life safety requirements (fire and evacuation safety, emergency preparedness, etc.), design requirements for certain types of facility equipment (such as ladders and stairs lifting devices), mandated training programs (employee Hazard Communication training, use of powered industrial equipment, etc.), and recordkeeping and program documentation requirements. For any construction or construction-related activities, additional requirements specified in 29 CFR 1926, *Safety and Health Regulations for Construction,* also apply.

EM 385-1-1, *U.S. Army Corps of Engineers Safety and Health Requirements Manual*—All work activities undertaken or managed by the U.S. Army Corps of Engineers, which can include many types of federal construction projects, must comply with the requirements of EM 385-1-1.

In many respects the requirements in this manual reflect those in 29 CFR 1910 and 1926, but also include U.S. Army Corps of Engineers-specific reporting and documentation requirements.

Range Commanders Council (RCC) Standard 321-02, *Common Risk Criteria for National Test Ranges*. RCC 321-02 sets requirements for minimally-acceptable risk criteria to occupational and non-occupational personnel, test facilities, and non-military assets during range operations. Methodologies for determining risk are also set forth.

RCC 319-92, *Flight Termination System Commonality Standards*, specifies performance requirements for flight termination systems used on various flying weapons systems.

49 CFR—Requirements pertaining to the safe shipping and transport handling of hazardous materials (which can include hazardous chemical materials, radioactive materials, and explosives) are found in the U.S. Department of Transportation Hazardous Materials Regulations and Motor Carrier Safety Regulations codified in 49 CFR 107, 171-180 and 390-397). These regulations specify all requirements that must be observed for shipment of hazardous materials over highways (truck shipment) or by air. Requirements include specific packaging requirements, material compatibility issues, requirements for permissible vehicle/shipment types, vehicle marking requirements, driver training and certification requirements, and notification requirements (as applicable).

The Federal Water Pollution Control Act, as amended by the Clean Water Act of 1977 (33 USC 1251, *et seq.*) has special enforcement provisions for oil and hazardous substances. For example, the Spill Prevention Control and Countermeasure Plan covers the release of hazardous substances, as identified by EPA, which could reasonably be expected to discharge into the waters of the United States.

Marine Terminals, 29 CFR 1917, applies to employment within a marine terminal (as defined in 29 CFR 1917.2) including the loading, unloading, movement or other handling of cargo, ship's stores, or gear within the terminal or into or out of any land carrier, holding or consolidation area, and any other activity within and associated with the overall operation and functions of the terminal, such as the use and routine maintenance of facilities and equipment. Cargo transfers accomplished with the use of shore-based material handling devices are also regulated.

Safety and Health Regulations for Longshoring, 29 CFR 1918, applies to longshoring operations and related employments aboard marine vessels.

LAND USE

Land use is described as the human use of land resources for various purposes, including economic production, natural resources protection, or institutional uses. Land uses are frequently regulated by management plans, policies, ordinances, and regulations that determine the types of uses that are allowable or protect specially designated or environmentally sensitive uses. Potential issues typically stem from encroachment of one land use or activity on another or an incompatibility between adjacent land uses that leads to encroachment.

The Coastal Barrier Resources Act of 1983 (16 USC 3501) is designed to curtail federal subsidization of development on fragile coastal barriers. The act prohibits designated federal

expenditures and financial assistance, including flood insurance, for development within the coastal barrier system.

The Coastal Zone Management Act of 1972 (16 USC 1451 *et seq.*) is designed to preserve and develop the resources of the coastal zone. The act seeks to do so by providing funds to states that develop and implement programs for management of land and water uses consistent with the act's standards.

Executive Order 11988, *Floodplain Management* (amended by Executive Order 12148, *Federal Emergency Management*), was designed to improve federal policy on floodplain management. The order requires federal agencies to avoid direct or indirect support of floodplain development when there is a "practicable" alternative. The order applies to acquisition, disposal, or management of federal land; undertaking, financing, or assisting construction projects; and conducting activities affecting land use, including planning, regulating, and licensing.

Executive Order 11990, *Protection of Wetlands,* was designed to prevent federal agencies from causing or encouraging unnecessary destruction of wetland areas.

The Farmland Protection Act of 1981 (7 USC 4201 *et seq.*) is designed to require federal agencies to consider alternatives to projects that would convert farmlands to nonagricultural use. The reach of the act is limited to procedures to assure that the actions of federal agencies do not cause U.S. farmland to be irreversibly converted to nonagricultural uses in cases in which other national interests do not override the importance of the protection of farmland nor otherwise outweigh the benefits of maintaining farmland resources.

The Federal Land Policy and Management Act of 1976 (43 USC 1701 *et seq.*) repeated a number of public land statutes and instituted a number of new programs including review of all lands managed by the Bureau of Land Management for possible designation by Congress as "wilderness," including a stipulation that the federal agency must manage the public lands so as not to impair their wilderness potential.

The Wilderness Act of 1964 (16 USC 1131-1136) provided Congressional protection of several named wilderness areas and also established a National Wilderness Preservation System for inclusion of lands within national forests, national parks, and national wilderness refuges.

NOISE

Noise is most often defined as unwanted sound. Sound levels can be easily measured, but the variability in subjective and physical response to sound complicates the analysis of its impact on people. People judge the relative magnitude of sound sensation in subjective terms such as "loudness" or "noisiness." Physically, sound pressure magnitude is measured and quantified in terms of a level scale in units of decibels (dB).

The human hearing system is not equally sensitive to sound at all frequencies. Because of this variability, a frequency-dependent adjustment called A-weighting has been devised so that sound may be measured in a manner similar to the way the human hearing system responds. The abbreviation for A-weighted sound level, dBA, is often used for expressing the units of the sound level quantities. Typical A-weighted noise levels measured for various sources are

provided in table B-2. When sound levels are read and recorded at distinct intervals over a period of time, they indicate the statistical distribution of the overall sound level in a community during the measurement period. The most common parameter derived from such measurements is the energy equivalent sound level (L_{eq}). L_{eq} is a single-number noise descriptor that represents the average sound level in a real environment where the actual noise level varies with time.

B-2: Noise Levels of Common Sources

Source	Noise Level (in A-weighted decibels)	Comment
Air raid siren	120	At 15.2 meters (50 feet) (threshold of pain)
Rock concert	110	
Airplane, 747	102.5	At 304.8 meters (1,000 feet)
Jackhammer	96	At 3.0 meters (10 feet)
Power lawn mower	96	At 0.9 meters (3 feet)
Football game	88	Crowd size: 65,000
Freight train at full speed	88 to 85	At 9 meters (30 feet)
Portable hair dryer	86 to 77	At 0.3 meters (1 foot)
Vacuum cleaner	85 to 78	At 1.5 meters (5 feet)
Long range airplane	80 to 70	Inside
Conversation	60	
Typical suburban background	50	
Bird calls	44	
Quiet urban nighttime	42	
Quiet suburban nighttime	36	
Library	34	
Bedroom at night	30	
Audiometric (hearing testing booth)	10	Threshold of hearing without hearing loss

Source: Cowan, 1994

While the A-weighted scale is often used to quantify the sound level of an individual event and is related to subjective response, psychoacousticians (scientists specializing in the effects of noise on people) have determined that the degree of annoyance response and other effects depend on a number of factors. Some of the factors identified by researchers that affect our perception and cause us to categorize a sound as an annoyance or “noise” are magnitude of the event sound level in relation to the background (i.e., ambient) sound level, duration of the sound event, frequency of occurrence of events, and time of day at which events occur.

Several methods have been devised to relate noise exposure over time to community response. The EPA has developed the Day-Night Average Sound Level (L_{dn}) as the rating method to describe long-term annoyance from environmental noise. L_{dn} is similar to a 24-hour L_{eq} A-weighted, but with a 10 dB penalty for nighttime (10:00 p.m. to 7:00 a.m.) sound levels to account for the increased annoyance that is generally felt during normal sleep hours. The U.S. Air Force also uses L_{dn} for evaluating community noise impact.

The Community Noise Equivalent Level (CNEL) has been adopted by the State of California for environmental noise monitoring purposes. CNEL is also similar to the A-weighted L_{eq}, but includes a penalty of 5 dB during evening hours (7:00 p.m. to 10:00 p.m.), while nighttime hours (10:00 p.m. to 7:00 a.m.) are penalized by 10 dB. For outdoor noise, the L_{dn} noise descriptor is usually 0.5 to 1 dB less than CNEL in a given environment.

CNEL and L_{dn} values can be useful in comparing noise environments and indicating the potential degree of adverse noise impact. However, averaging the noise event levels over a 24-hour period tends to obscure the periodically high noise levels of individual events and their possible adverse effects. These metrics have limitations in their usefulness, and the use of other noise metrics may be necessary to assess noise impact. In recognition of this limitation of the L_{dn} and CNEL metrics, the EPA uses single-event noise impact analyses for sources with a high noise level and short duration.

The maximum sound level (L_{max}) is a noise descriptor that can be used for high-noise sources of short duration, such as space vehicle launches. The L_{max} is the greatest sound level that occurs during a noise event. The term “peak” defines peak sound over an instantaneous time frame for a particular frequency.

Regulatory Framework

Federal and state governments have established noise regulations and guidelines for the purpose of protecting citizens from potential hearing damage and various other adverse physiological, psychological, and social effects associated with noise. The federal government preempts the state on control of noise emissions from aircraft, helicopters, railroads, and interstate highways.

The following are federal regulations and guidelines. The state regulations and guidelines are discussed under each facility according to its jurisdiction.

The Noise Control Act (PL 92-574, 42 USC 4901, *et seq.*) directs all federal agencies, to the fullest extent within their authority, to carry out programs within their control in a manner that promotes an environment free from noise that jeopardizes the health or welfare of any American. The act requires a federal department or agency engaged in any activity resulting in the emission of noise to comply with federal, state, interstate, and local requirements respecting control and abatement of environmental noise. OSHA has established noise limits for workers. For an 8-hour work day, people should not be exposed to a continuous noise level greater than 90 dBA. In addition, personnel should not be exposed to noise levels higher than 115 dBA for periods longer than 15 minutes. For the general public, the EPA recommends a 24-hour average noise level not to exceed 70 dBA. Typical noise exposure levels are shown in table B-3.

The Department of Defense Noise–Land Use Compatibility Guidelines state that sensitive land use, such as residential areas, are incompatible with annual L_{dn} greater than 65 dBA. Table B-4 shows typical land use zones for noise and their accompanying day-night noise levels.

The California Division of Aeronautics has set noise standards governing airports that operate under a valid permit issued by the Division. These regulations control the noise in communities

in the vicinity of airports. For persons residing in the vicinity of an airport, state noise standards establish a CNEL of 65 dB as an acceptable level of noise to a reasonable person.

Table B-3: Permissible Noise Exposures*

Duration (hours per day)	Sound level (dBA) Slow Response
8	90
6	92
4	95
3	97
2	100
1 to 1.5	102
1	105
0.5	110
0.25 or less	115

Source: 29 CFR 1910.95, table G-16

*Exposure to impulsive or impact noise should not exceed 140 dB peak sound pressure level

Table B-4: Definition of Land Use Zones for Noise

Noise Zone	Compatibility with Noise Sensitive Land Uses	Percent of Population Highly Annoyed	C-Weighted Annual Average Day-Night Sound Level (L_{dn})
I	Acceptable	Less than 15%	Less than 62 dB
II	Normally Unacceptable	15–39%	62–70 dB
III	Unacceptable	More than 39%	More than 70 dB

Source: U.S. Army Regulation 200-1

Noise Sources

The major operational noise source is missile launch noise. Three distinct noise events are associated with launch and ascent of a launch vehicle: on-pad missile noise, in-flight missile noise, and sonic boom.

On-pad missile noise occurs when engines are firing but the vehicle is still on the pad. Deflectors or an exhaust tunnel usually turns the missile exhaust horizontally. Noise is highly directional, with maximum levels in lobes that are at about 45 degrees from the main direction of the deflected exhaust. Noise levels at the vehicle and within the launch complex are high. Because the sound source is at or near ground level, propagation from the missile to off-site locations grazes along the ground and tends to experience significant attenuation over distance. On-pad noise levels are typically much lower than in-flight noise levels because sound propagates in close proximity to the ground and undergoes significant attenuation when the vehicle is on or near the pad.

In-flight missile noise occurs when the vehicle is in the air, clear of the launch pad, and the engine exhaust plume is in line with the vehicle. In the early part of the flight, when the vehicle's motion is primarily vertical, noise contours are circular. The sound source is also well above the ground and therefore experiences less attenuation as it propagates to large distances. The shapes of the contours for launch vehicle ascent are approximately circular, particularly for the higher levels near the center. The outer contours tend to be somewhat distorted. They can be stretched out in the launch direction or broadened across the launch direction, depending on specific details of the launch. Because the contours are approximately circular, it is often adequate to summarize noise by giving the sound levels at a few distances from the launch site. On-pad noise contours are much smaller than in-flight contours. Because in-flight noise is greater than on-pad noise, analysis in this study has concentrated on in-flight noise.

The major source of missile noise is from mixing of the exhaust flow with the atmosphere, combustion noise in the combustion chamber, shock waves and turbulence in the exhaust flow, and occasional combustion noise from the post-burning of fuel-rich combustion products in the atmosphere. The emitted acoustic power from a missile engine and the frequency spectrum of the noise can be calculated from the number of engines, their size and thrust, and their flow characteristics. Normally, the largest portion of the total acoustic energy is contained in the low-frequency end of the spectrum (1 to 100 hertz). Noise measurements conducted during a Titan IIID launch indicated that the maximum sound pressure levels occurred at around 20 to 50 hertz (U.S. Air Force, 1991).

To evaluate the potential noise impact associated with launch and ascent, it is necessary to consider not only the overall sound level but also the frequency spectrum and the duration of exposure. High noise levels can cause annoyance and hearing damage. As previously discussed, OSHA has established noise limits to protect workers at their work places. According to these standards, no worker shall be exposed to noise levels higher than 115 dBA. The exposure level of 115 dBA is limited to 15 minutes or less during an 8-hour work shift (U.S. Department of the Air Force, 1998a). The OSHA standards are the maximum allowable noise levels for the personnel in the vicinity of the launch pad. Off site, concerns for noise are community annoyance, damage to fragile structures, and adverse effects on animals.

Another noise characteristic of launch vehicles is that they reach supersonic (faster than the speed of sound) speeds and will generate sonic booms. A sonic boom, the shock wave resulting from the displacement of air in supersonic flight, differs from other sounds in that it is impulsive and very brief (less than 1 second for aircraft; up to several seconds for launch vehicles). Sonic booms are generally described by their peak overpressure in pounds per square foot.

Sonic booms can vary from inconsequential to severe, depending on the physical aspects of the launch vehicle, the trajectory of the launch, and weather conditions at the time of launch. Physical features of the launch vehicle that influence the occurrence and intensity of sonic booms include the vehicle's overall length and width, the length of each stage, and the shape of the nose cone. Trajectory criteria that affect sonic booms include the time from launch, the angle of the flight path from the horizontal, velocity of the launch vehicle, altitude of launch vehicle, range from the launch site, and the position at which stage separation occurs (U.S. Department of the Air Force, 1998b).

The initial shock wave propagates along a path that grazes the Earth's surface due to the angle of the vehicle and refraction of the lower atmosphere. As the vehicle pitches over, the direction

of propagation of the shock wave becomes more perpendicular to the earth's surface. These direct and grazing shock waves can intersect to create a focused sonic boom. The focused sonic boom is typically narrow, about 1.6 kilometers (1 mile) of intense focus, followed by a larger region of multiple sonic booms (U.S. Department of the Air Force, 1998a).

SOCIOECONOMICS

Socioeconomics is defined as the basic attributes and resources associated with the human environment, in particular population and economic activity. Socioeconomic resources consist of several primary elements including population, employment, and income. Other aspects often described may include housing and employment characteristics, and an overview of the local economy.

TRANSPORTATION

The purpose of the transportation section is to address the ground, aviation, and ocean transport systems within an organized framework and their use within a region of influence defined for each location.

Ground Transportation

Ground transportation refers to the movement of vehicles through a road and highway network. Roadway operating or pavement conditions and the adequacy of the existing and future roadway system to accommodate vehicular movements are typically described in terms of the volume-to-capacity ratio. This ratio is a comparison of the average daily traffic volume to the capacity of the roadway. The volume-to-capacity ratio corresponds to a Level of Service rating, ranging from free-flowing traffic conditions (Level of Service A) for a volume-to-capacity of usually less than 30 percent, to forced flow, congested conditions (Level of Service F) for a volume-to-capacity of usually 100 percent or greater (i.e., roadways operating at or beyond design capacity).

Aviation Transportation

Aviation transportation refers to the movement of aircraft through airspace. The control of airspace used by air traffic varies from very highly controlled to uncontrolled areas. Examples of highly controlled air traffic situations are flight in the vicinity of airports, where aircraft are in critical phases of flight (take-off and landing), flight under IFR, and flight on the high or low altitude route structure (airways). Less controlled situations include flight under VFR or flight outside of U.S. controlled airspace (e.g., flight over international waters off the coast of California, Hawaii, or Alaska).

Ocean Transportation

Ocean traffic is the transportation of commercial, private, or military vessels at sea, including submarines. Ocean traffic flow in congested waters, especially near coastlines, is controlled by the use of directional shipping lanes for large vessels (cargo, container ships, and tankers). Traffic flow controls are also implemented to ensure that harbors and ports-of-entry remain as uncongested as possible. There is less control on ocean traffic involving recreational boating, sport fishing, commercial fishing, and activity by naval vessels. In most cases, the factors that govern shipping or boating traffic include the following: adequate depth of water; weather conditions (primarily affecting recreational vessels); the availability of fish of recreational or

commercial value; and water temperature (higher water temperatures will increase recreational boat traffic and diving activities).

UTILITIES

The purpose of the utilities section is to address the existing rate of consumption, generation, and distribution of utilities (i.e., energy, water, wastewater, and solid waste/construction debris). The analysis of these issues is conducted within a region of influence defined for each location.

Energy

Energy refers to the power that is produced by a central electrical power plant or, in some cases, by individual power generators. The power would be utilized for both construction and operational activities on different sites (i.e., Ronald Reagan Ballistic Missile Defense Test Site at Kwajalein Atoll, Pacific Missile Range Facility in Hawaii, and Vandenberg AFB in California). The current capabilities and capacities of each system are evaluated.

Water

Water refers to the system that produces water and the network that distributes that water. This water system is usually controlled, managed, and distributed by an entity (i.e., utility purveyor). In the absence of a water system, individualized water wells or a series of wells meet the demand for water. The water system is identified by potable, or drinkable, freshwater and nonpotable water used for other activities such as construction, operations, irrigation, and more. In some cases the non-potable system is saltwater. The water system is composed of a source that produces the water and the treatment systems that cleanse and purify it, making it available for use. The water available to public must meet certain standards (i.e., EPA standards). For instance, new facility upgrades that include adding potable water sources (e.g., wells, surface water intakes, or other drinkable water sources) must comply with the “new source” provisions recently amended to the Safe Drinking Water Act of 1974 (42 USC 300f *et seq.*).

More specifically, all new systems, or systems utilizing a new source of supply, that begin operation after 22 January 2004 are required to demonstrate compliance with the Maximum Contaminant Levels (MCLs) within a State-specified (or primacy agency-specified) time frame. These regulations require that States or primacy agencies establish initial sampling frequencies to ensure on-going compliance for inorganic (40 CFR 141.23(c)(9)), volatile organic (40 CFR 141.24(f)(22)), and synthetic organic (40 CFR 141.24(h)(20)) MCLs.

Potable water systems must also properly document any new drinking water sources for use by the appropriate Safe Drinking Water Act primacy agency (e.g., EPA Regional office or State Department of Environmental Quality office), as these new drinking water sources may require operating and/or withdrawal permits or other licensing requirements.

The current capabilities and capacities of these systems are analyzed.

Wastewater

There are different methods of treating wastewater that is produced by a development. Wastewater can be collected in a central system and then directed to a treatment plant where it can be treated and then discharged. In many instances, the wastewater is further treated and

reclaimed for use as nonpotable water. In the absence of a central system, septic systems collect and treat water either individually (individual households) or collectively (within a community). The current capabilities and capacities of these systems are analyzed.

Solid Waste Disposal

Solid waste disposal includes the collection, handling, and disposal of waste. Designated landfills within an area or region are the final destinations where solid waste is transported for processing. Solid waste is usually first processed to separate out recyclable products. Solid waste disposal also includes practices such as open burning, incineration, septage disposal, and burial in open or excavated trenches. Current systems of solid waste collection and disposal and their capabilities and capacities are evaluated.

VISUAL AND AESTHETIC RESOURCES

The significance of visual effects is very subjective and depends upon the degree of alteration, the scenic quality of the area disturbed, the sensitivity of the viewers, and the existing goals and policies of jurisdictions in which the project is located. The degree of alteration refers to the height and depth of maximum cut and fill areas and the introduction of urban elements into an existing natural environment or a substantial increase of structural elements into an already urban environment, while acknowledging any unique topographical formation or natural landmark. Sensitive viewers are those who utilize the outdoor environment or value a scenic viewpoint to enhance their daily activity and are typically residents or recreation users. Changes in the existing landscape where there are no identified scenic values or sensitive viewers are considered less than significant. It is also possible to acknowledge a visual change, as possibly adverse, but not significant, because either viewers are not sensitive or the surrounding scenic quality is not high.

In an effort to determine the existing visual quality of each of the SBX locations, the following method was derived from Agricultural Handbook Number 701, *Landscape Aesthetics: A Handbook for Scenery Management* (U.S. Department of Agriculture, Forest Service, 1995). The handbook outlines ways to measure individual aspects of visual resources and then rate the scenic value class of each of the locations. The following criteria were used to determine the scenic value class for the potential SBX locations: Scenic Attractiveness, Viewer Concern, and Distance Zones.

Scenic Attractiveness

Scenic attractiveness is the measure of scenic quality based on human perceptions of inherent beauty of the forms, colors, textures, and visual composition of an individual landscape. It assists in determining landscapes that are important for scenic beauty, based on commonly held perceptions of the beauty of landform, vegetation pattern, composition, surface water attributes, land use patterns, and cultural features.

Class A: Distinctive—Areas where land forms, vegetation patterns, water characteristics, and cultural features combine to provide outstanding or unique visual quality. These areas have strong, positive attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.

Class B: Typical—Areas where the land forms, vegetation patterns, water characteristics, and cultural features combine to provide ordinary or common scenic quality. These areas have generally positive but typical attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance.

Class C: Indistinctive—Areas where the landform, vegetation patterns, water characteristics, and cultural land use have low visual quality. These landscapes have weak or missing attributes of variety, unity, vividness, mystery, intactness, order, harmony, uniqueness, pattern, and balance. (U.S. Department of Agriculture, Forest Service, 1995)

Distance Zones

A principal indicator of scenic importance based on the distance an area can be seen by observers, and the degree of visible detail within that zone.

Foreground: 0 to 0.8 kilometers (0 to 0.5 miles)
The foreground distance zone is where the individual details of specific objects are important and easily distinguished. Details are most significant within the immediate foreground, (0 to 300 feet).

Mid-ground: 0.8 to 6.4 kilometers (0.5 to 4 miles)
The mid-ground zone where most object characteristics are distinguishable, but their details are weak and they tend to merge into larger patterns. When landscapes are viewed in this zone they are seen in broader context. Human alteration may contrast strongly with the larger patterns and make some mid-ground landscapes more sensitive than the foreground.

Background: 6.4 kilometers (4 miles) to the horizon
The background is the distant landscape where objects are not normally discernible unless they are especially large and standing alone. Details are generally not visible and colors are lighter. (U.S. Department of Agriculture, Forest Service, 1995)

Viewer Concern

Viewer concern can be defined as the level of scenic importance based on expressed human concern for the scenic quality of land areas viewed. Concern levels for this document were determined due to attitudes of the viewers at each of the locations. Generally the public was classified as having a “High” (Level 1) level of concern while military personnel and contractors were determined to have a “Low” (Level 3) level of concern.

Level 1: Areas seen from primary and secondary use areas where the number of viewers and concern for scenic quality is normally high.

Level 2: Areas also seen from primary and secondary use areas; however, the level of concern among the viewers is moderate or low.

Level 3: Areas seen from low-use primary areas or moderate- to low-use secondary areas and the level of concern among the viewers is low. (U.S. Department of Agriculture, Forest Service, 1995)

Scenic Value Class

The scenic value class of a landscape is determined by combining the levels of scenic attractiveness with the distance zones and concern levels of landscape visibility. They are a product of the inventory process is used for analysis and planning purposes. Table B-5 is used to determine the scenic value class for an individual landscape.

Table B-5: Scenic Classes

		Distance Zones and Concern Levels								
		FG1	**MG1**	**BG1**	**FG2**	**MG2**	**BG2**	**FG3**	**MG3**	**BG3**
Scenic Attractiveness	**A**	1	1	1	2	2	2	2	3	3
	B	1	2	2	2	3	4	3	5	5
	C	1	2	3	2	4	5	5	6	7

Source: U.S. Department of Agriculture, Forest Service, 1995

Scenic Attractiveness
A – Distinctive, B – Typical, C – Indistinctive
Distance zone and Concern Level
FG1 – Foreground with a high level of concern
MG1 – Mid-ground with a high level of concern
BG1 – Background with a high level of sensitivity
FG2 – Foreground with a moderate level of sensitivity
MG2 – Mid-ground with a moderate level of sensitivity
BG2 – Background with a moderate level of sensitivity
FG3 – Foreground with a low level of sensitivity
MG3 – Mid-ground with a low level of sensitivity
BG3 - Background with a low level of sensitivity
Scenic Class
1-2: High public value.
3-5: Moderate public value.
6-7: Low public value.

Scenic Integrity

The scenic integrity of an area can be used to determine the level of modification to an area. Scenic Integrity is a measure of the degree to which a landscape is visually perceived to be "complete." Although scenic integrity may or may not be used to determine the scenic value of a viewshed, it should be noted that the scenic integrity greatly affects the current scenic value.

Very High: Landscapes where the valued landscape is intact with only insignificant if any deviation or disturbance.

High: Landscapes where the valued landscape appears intact. Deviations may occur but must repeat the form, line, color, texture, and pattern found in the landscape character so completely that they are not evident.

Moderate: Landscapes where the valued landscape appears slightly altered. Noticeable deviations must be visually subordinate to the landscape character being viewed.

Low: Landscapes where the valued landscape character appears moderately altered. Deviations begin to dominate the valued landscape character but still borrow valued attributes such as size, shape, and pattern of natural openings, vegetative changes, or architecture.

Very Low: Landscapes where the valued landscape character appears heavily altered. Deviations may strongly dominate the valued landscape character. They may not borrow from attributes such as size, shape, and pattern of natural openings, vegetative changes, or architecture.

Unacceptably Low: Landscapes where the valued landscape appears extremely altered. Deviations are extremely dominant and borrow little from the landscape character. Landscapes at this level require rehabilitation. (U.S. Department of Agriculture, Forest Service, 1995)

WATER RESOURCES

Potentially affected water resources include freshwater surface and groundwater resources and marine waters in the region of influence described in the next section. Potential changes in the availability of water supplies as a result of project water use requirements also are addressed. As required by Executive Order 11988, *Floodplain Management*, potential effects to floodplains were considered; however, none of the proposed facilities in any of the action alternatives would be constructed in a floodplain and further analysis of such issues is not warranted. Potentially affected wetland resources are described under Biological Resources.

Water quality and the consumption and diversion of water are regulated by a number of federal and state agencies. The EPA has the primary authority for implementing and enforcing the Clean Water Act (33 USC 1251 *et seq.*) (after 1977, the Clean Water Act became the common name of the 1972 Federal Water Pollution Control Act). The EPA, along with state agencies to which the EPA has delegated some of its authority, issues permits under the Clean Water Act to maintain and restore the quality of our nation's water resources. The Clean Water Act requires permits for activities that result in the discharge of pollutants to water resources or the placement of fill material in waters of the United States.

Stormwater Pollution Prevention Plans are typically prepared and permitted under the National Pollutant Discharge Elimination System to ensure construction activities do not lead to unacceptable levels of erosion and water pollution. The Safe Drinking Water Act of 1974 (42 USC 300f *et seq.*), and its 1986 and 1996 amendments, provides the EPA with the authority to regulate the quality of the nation's drinking water supplies, including surface water and groundwater sources. The EPA has delegated some of its authority for enforcement to all of the states, with the exception of Wyoming and the District of Columbia. The appropriation of water, including diversions, consumption of potable water, and other uses are usually regulated by the same state agencies that regulate water quality.

The state agency with water quality and water rights permitting authority related to this project in Alaska is the Alaska Department of Environmental Conservation. This state agency issues water quality standards that must be at least as stringent as the national standards developed by the EPA. The water quality standards of Alaska are extensive, and cover a wide variety of water

contaminants or other physical characteristics of water, such as turbidity, temperature, dissolved oxygen, pH, total dissolved solids, and heavy metals.

The California State Water Resources Control Board and its local Central Coast Regional Water Quality Control Board also have the authority to help regulate water quality at Vandenberg AFB.

ENVIRONMENTAL JUSTICE

Examination of Minority and Low Income populations is warranted through the adoption of a 1994 directive designed specifically to examine impacts to such things as human health of minority populations, low-income populations, and Indian tribes and is commonly known as Environmental Justice. Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (59 CFR 7629 [1994]) requires each federal agency to achieve environmental justice by addressing "disproportionately high and adverse human health and environmental effects on minority and low-income populations." The demographics of the affected area should be examined to determine whether minority populations, low-income populations, or Indian tribes are present in the area impacted by the Proposed Action. If so, a determination must be made whether the implementation/ development of the proposed project may cause disproportionately high and adverse human health or environmental effects on the minority populations or low-income populations present.

The Council on Environmental Quality defined "minority" to consist of the following groups: Black/African American, Asian, Native Hawaiian or Other Pacific Islander, American Indian or Alaska Native, and Hispanic populations (regardless of race). Additionally, for the purposes of this analysis, “minority” also includes all other non-white racial categories within the census such as "Some other race" and "Two or more races." The Interagency Federal Working Group on Environmental Justice guidance states that a "minority population" may be present in an area if the minority population percentage in the area of interest is "meaningfully greater" than the minority population in the general population.

Council on Environmental Quality defined "low-income populations" as those identified with the annual statistical poverty thresholds from the Bureau of the Census. The accepted rationale in determining what constitutes a low-income population is similar to minority populations, in that when the low-income population percentage within the area of interest is "meaningfully greater" than the low-income population in the general population, the community in question is considered to be low-income.

EXECUTIVE ORDER 12114

Executive Order 12114, *Environmental Effects Abroad of Major Federal Actions,* represents the U.S. Government's exclusive and complete determination of the procedural and other actions to be taken by federal agencies to further the purpose of the National Environmental Policy Act, with respect to the environment outside the United States, its territories, and possessions. This Executive Order enables responsible officials of federal agencies to be informed of pertinent environmental considerations and to take such considerations into account, with other pertinent considerations of national policy in making decisions regarding proposed actions. Although based on independent authority, this Order furthers the purpose of the National Environmental Policy Act and the Marine Protection Research and Sanctuaries Act of 1972 (33 USC 1401 *et seq.*; 16 USC 1431 *et seq.*) and the Deepwater Port Act of 1974, as amended (33 USC 1501-1524), consistent with the foreign policy and national security policy of the United States.

APPENDIX C
MISSILE LAUNCH SAFETY AND EMERGENCY RESPONSE

APPENDIX C
MISSILE LAUNCH SAFETY AND EMERGENCY RESPONSE

This appendix discusses in general terms the potential health and safety hazards associated with missile launch operations. The information herein focuses on the nature and control of the potential hazards and public risks associated with pre-launch, launch, and emergency response.

The information in this appendix is derived from numerous sources, including *Final Launch Site Safety Assessment* (Federal Aviation Administration, 2002) for the 30th Space Wing/Vandenberg Air Force Base; Standard 321-02, *Common Risk Criteria for National Test Ranges, Subtitle: Inert Debris (*Range Commanders Council, Range Safety Group, 2002); *The Hazard Analysis of Commercial Space Transportation* (Federal Aviation Administration, 1997); *Casualty Areas from Impacting Inert Debris for People in the Open, Final Report* (Department of the Air Force, 30th and 45th Space Wing, 1995); AFR 127-1, *Eastern and Western Range Safety Policies and Procedures* (Department of the Air Force, 1997); and *Theater Missile Defense Extended Test Range, Supplement to the Draft Environmental Impact Statement* (U.S. Army Space and Strategic Defense Command, 1994).

While range safety is location, facility and mission-dependent, the Department of Defense has established standards and protocols to eliminate or acceptably minimize potential health and safety risks/hazards.

Safety regulations are directed at preventing the occurrence of potentially hazardous accidents and minimizing or mitigating the consequences of hazardous events. This is accomplished by employing system safety concepts and risk assessment methodology to identify and resolve prospective safety hazards.

Ground Safety

Procedures have been established to handle and store all materials (propellants, etc.) which may be a hazard, control and monitor electromagnetic emissions, and govern transportation of materials to and from a facility. Storage of propellants and explosives is controlled by quantity–distance criteria. Failure modes and effects analyses are prepared when necessary for all potentially hazardous activities and devices.

Accidents occurring before launch can result in on-pad explosions, potential destruction of the vehicle, damage to facilities within range of the blast wave, and dispersion of debris in the vicinity of the pad. The types of accidents depend upon the nature of the propellants. An accident in handling storable hypergolic propellants could produce a toxic cloud, likely to move as a plume and disperse beyond the boundaries of the facility. The risk to the public would then depend upon the concentration of population in the path of this toxic plume and on the ability to evacuate or protect the population at risk until the cloud is dispersed. It is obviously advantageous if the winds generally blow away from populated areas. There are also specific

safety requirements and risks associated with ground support equipment. The design and use of this equipment must incorporate safety considerations.

The Range Safety Control process is predicated on risk avoidance, minimization of accident impacts, and protection of population centers. Risk values related to missile launch activities are categorized in two ways: probability of vehicle failure, including all possible failure modes that could lead to debris impact events, and their probabilities and consequence estimation. The casualty estimation used is generally one of two types: the probability of casualty, defined as the probability of one or more persons sustaining an injury, or the expected number of casualties, defined as the number of persons expected to sustain an injury as a result of at least one object impact in a specific area.

Protection of life and property, on- and off-range, is the prime concern of Range/Mission Safety personnel.

Range safety is accomplished by establishing:

- Requirements and procedures for storage and handling of propellants, explosives, radioactive materials and toxics
- Performance and reliability requirements for flight termination systems on the vehicle
- A real-time tracking and control system at the range
- Mission abort, vehicle destruct, or flight termination criteria that are sufficient to provide the necessary protection to people both on and outside the boundaries of the launch facility

Health and safety risks/hazards associated with pre-launch and launch activities are generally broken down into:

- Ground safety—handling of propellants, ordnance, noise, hazardous operations, toxics, etc.
- Flight analysis—vehicle trajectory, mission, etc.
- Flight termination systems
- Ground operations and flight operations

Launch Planning

Minimization of the probability of terminating a “good” flight and simultaneous minimization of the potential of risk due to malfunctioning missile is accomplished through careful mission planning, preparation, and approval before launch. Planning is in two parts:

- Mission definition such that land overflights or other higher risk aspects of launch are avoided and/or minimized
- Development of data that support the real-time decision and implementation of active control and destruct activities

Hazard potential exists because of the large quantities of liquid and/or solid propellants and they could be unintentionally released in case of a launch accident. This potential hazard decreases with time into the flight because the quantities of on-board propellants decrease as they are consumed and the vehicle/missile moves away from both the launch site and nearby populated areas.

Federal Aviation Administration Clearance Procedures

Aeronautical information is distributed through the Airmen's Information System and the Notice to Airmen (NOTAM) System.

The Airmen's Information System consists of civil aeronautical charts and publications, such as airport/facility directories, published and distributed by the Federal Aviation Administration, National Aeronautical Charting Office. The aeronautical charts and the airport/facility directories contain more permanent data and are the main sources to notify airmen of changes in or to the National Airspace System.

The NOTAM System is a telecommunication system designed to distribute unanticipated or temporary changes in the National Airspace System, or until aeronautical charts and other publications can be amended. This information is distributed in the Notice to Airmen Publication. The Notice to Airmen Publication is divided into four parts: (1) NOTAMs expected to be in effect on the date of publication, (2) revisions to Minimum En Route Instrument Flight Rules Altitudes and Changeover Points, (3) international—flight prohibitions, potential hostile situations, foreign notices, and oceanic airspace notices, (4) special notices and graphics such as military training areas, large scale sporting events, air shows, and airport specific information – Special Traffic Management Programs. Notices in Sections 1 and 2 are submitted through the National Flight Data Center, ATA-110. Notices in sections 3 and 4 are submitted and processed through Air Traffic Publications, ATA-10. Air Traffic Publications, ATA-10 issues the Notice to Airmen Publication every 28 days.

The Coast Guard District is responsible for developing and issuing Local Notices to Mariners. Local Notices to Mariners are developed from information received from Coast Guard field units, the General Public, U.S. Army Corps of Engineers, U.S. Merchant Fleet, National Oceanic and Atmospheric Administration, National Ocean Service, and other sources, concerning the establishment of, changes to, and deficiencies in aids to navigation and any other information pertaining to the safety of the waterways within each Coast Guard District. This information includes: reports of channel conditions, obstructions, hazards to navigation, dangers, anchorages, restricted areas, regattas, information on bridges such as proposed construction or modification, the establishment or removal of drill rigs and vessels, and similar items.

The actual implementation of operational plans under launch conditions ultimately determines the actual risk exposure levels on and off site. Integral to the analysis are the constraints posed by the following:

- Launch area/range geometry and siting
- Nominal flight trajectories/profiles
- Launch/release points

- Impact limit lines, whether based on risk to population/facilities or balanced risk criteria
- Flight termination system and destruct criteria
- Wind/weather restrictions
- Instrumentation for ground tracking and sensing onboard the vehicle
- Essential support personnel requirements

The range safety group (or its equivalent) typically reviews and approves launch plans, imposes and implements destruct lines and other safeguards, such as NOTAMS, Air Space Danger Area Notifications, and radio-frequency monitoring.

The launch (normal and failure) scenarios are modeled, and possible system failure modes are superimposed against the proposed nominal flight plan. The hazard to third parties is dependent on the vehicle configuration, flight path, launch location, weather, and many other factors.

A blast danger area around the missile on the launch pad and a launch danger area (a circle centered on the pad with tangents extended along the launch trajectory) are prescribed for each missile depending on its type, configuration, amount of propellant and their toxicity, trinitrotoluene (TNT) equivalents, explosive fragment velocities anticipated in case of an accident, typical weather conditions, and plume models of the launch area.

Typical mission approval documentation submitted to the range: Flight Plan approval and Flight Termination reports.

Each launch is evaluated based on:

- Range user data submission requirements from the hazard analysis viewpoint
- Launch vehicle analyses to determine all significant failure modes and their corresponding probability of occurrence
- The vehicle trajectory, under significant failure mode conditions, which is analyzed to derive the impact of probability density functions for intact, structurally failed and destructed options
- The vehicle casualty area based on anticipated (modeled) conditions at the time of impact
- Computed casualty expectations given the specific launch and mission profile, population data near the range and along the ground track. Shelters may be provided or evacuation procedures adopted, in addition to restricting the airspace along the launch corridor and notifying the air and shipping communities (NOTAM) to avoid and/or minimize risks
- An Accident Risk Assessment Report prepared to identify hazards of concern, causes, controls, and verification procedures for implementing such controls

Risk Models and Safety Criteria Used at National Ranges

The Range Safety Group, Range Commanders Council has reviewed a number of the computer models used at national ranges.

The evaluation of launch associated hazards is based on range destruct criteria designed to minimize risk exposure to on- and off-range population and facilities. Computer models are used to simulate missions for optimization and approval or run in real time for range safety control officers to minimize flight performance.

Launch risk exposure to the public is primarily controlled in real time by the range safety personnel rather than the range users.

Range safety reports, safety analysis reports, and other such probabilistic hazard analyses must be prepared by range users for mission approval at most national ranges whenever a new launch vehicle configuration, an unusually hazardous payload, or a trajectory with land overflight is involved.

Range safety guidelines minimize post-launch risks to the public by imposing a number of restrictions: e.g., no land overflight corridors are selected if it is possible to have launches and flight paths over water. However, for land-locked launches, strict overflight criteria restrict both land and airspace corridors to on-range and extended range areas. There are no intentional off-range land impacts permitted for any normally jettisoned booster and sustainer castings, and sufficient safety margins are provided within the destruct corridor to avoid impacts on population centers by accidentally or intentionally generated debris.

Models run sequentially or in parallel are designed to compute risks based on estimating both the probabilities and consequences of launch failures as a function of time into the mission. Databases include data on mission profile, launch vehicle specifics, local weather conditions, and the surrounding population distribution. Given a mission profile, the risks would vary in time and space. Therefore, a launch trajectory optimization is performed by the range for each proposed launch, subject to risk minimization and mission objectives constraints. The debris impact probabilities and lethality are then estimated for each launch considering the geographic setting, normal jettisons, failure debris, and demographic data to define destruct lines to confine and/or minimize potential public risk of casualty or property damage.

A circular or an elliptical footprint dispersion model is used to analyze vacuum and wind-modified instantaneous impact points from both normal stages jettisoned during launch and launch debris (failure or destruct). The debris dispersal estimates generally assume bivariate Gaussian dispersion distributions. Risk contours are estimated as impact probabilities or casualties expected per unit area centered on the instantaneous impact points (nominal impact points) or on a specific site (land, community or range) of interest. All these models are similar in approach, but quite site-specific in the use of databases, which depend on range location and on the geographic area and associated population distribution at risk. The models may be run either as simulation to assist in analyzing and selecting launch options, or can be run in real time, to monitor launch operations.

The Launch Risk Analysis program calculates relative risks to population centers on the flight corridor ground-track. Real-time debris footprint display is based on computed and wind-corrected trajectory and Launch Risk Analysis impact patterns moving with the tracked vehicle and their position relative to the fixed, prescribed destruct and impact limit lines. If the failed vehicle encroaches upon these lines, a destruct decision must be made or withheld according to clearly formulated destruct criteria.

Launch Hazards

Generally, the on-board destruct system is not activated early in flight (during the first 10 seconds or so) until the failed vehicle clears the range. This protects range personnel and facilities from a command explosion. Failures during the very early portion of launch and ascent can be divided into two categories: propulsion and guidance/control. Lighting, wind, and other meteorological hazards (e.g., temperature inversions) must be considered before launch countdown. Propulsion failures produce a loss of thrust and the inability of the vehicle to ascend. Depending on its altitude and speed when thrust ceases, the vehicle can fall back intact or break up under aerodynamic stresses. If the vehicle falls back, the consequences are similar to those of an explosion on the ground.

The exception is when intact solid rocket motors impact the ground at a velocity exceeding approximately 91 meters (300 feet) per second. In that case, the explosive yield may be significantly increased. If there are liquid fuels (hydrogen-oxygen), there is also potential for a large explosion, much higher overpressures, and more damage to structures at the launch facility. It could also create higher overpressures off the facility that could break windows and possibly do minor structural damage to residential and commercial buildings.

Solid rocket motor failures can be due to a burn-through of the motor casing or damage or burn-through of the motor nozzle. In a motor burn-through there is a loss of chamber pressure and an opening is created in the side of the case, frequently resulting in structural breakup. The nozzle burn-through may affect both the magnitude and the direction of thrust. There is no way to halt the burning of a solid rocket once initiated. Hence, a solid rocket motor failure almost inevitably puts the entire launch vehicle and mission at risk.

The purpose of the Range Safety Control system is to destroy, halt, or neutralize the thrust of an errant vehicle before its debris can be dispersed off-range and become capable of causing damage or loss of life. Without a flight termination system, the debris could land on a population center and, depending upon the type of debris (inert or burning propellant), cause considerable damage. The destruct system generally is activated either on command or spontaneously at or soon after the time of failure. In-flight destruction limits vehicle debris dispersion and enables dispersion of propellants, thus reducing the possibility of secondary explosions upon ground impact. The destruct systems on vehicles having cryogenics are designed to minimize the mixing of the propellants, i.e., holes are opened on the opposite ends of the fuel tanks. Solid rocket destruct systems usually consist of linear shaped charges running along the length of the rocket, which open up the side of the casing like a clam shell, causing an abrupt loss of pressure and thrust. They may, however, produce many pieces of debris in the form of burning chunks of propellant and fragments of the motor casing and engines.

In addition to complete loss of control, three other early flight guidance and control failures have been observed with launch vehicles over the life span of the space program: failure to pitch

over, pitching over but flying in the wrong direction (i.e., failure to roll before the pitchover maneuver), and having the wrong trajectory programmed into the guidance computer. The likelihood of these circumstances depends upon the type of guidance and control used during the early portion of flight. The types are open or closed loop (i.e., no feedback corrections) and programmer or guidance controlled. In the case of vehicles that use programming and open-loop guidance during the first portion of flight, failure to roll and pitch is possible, although relatively unlikely, based on historical flight data. If the vehicle fails to pitch over, it rises vertically until it is destroyed. As it gains altitude, the destruct debris can spread over an increasingly larger area. Consequently, most ranges watch for the pitchover, and if it does not occur before a specified time, they destroy the vehicle before its debris pattern can pose significant risk to structures and people outside the launch facility or the region anticipated to be a hazard zone, where restrictions on airspace and ship traffic apply. Failure to halt the vehicle within this time can produce a significant risk to those not associated with launch operations.

Of greatest concern to Range Safety Control during the steep ascent phase is the capability of the vehicle to wander off course immediately following a malfunction. The Range Safety Control system must be able to respond before debris becomes a hazard. Consequently, the design of the destruct lines must take into consideration: (1) the delay between decision and destruct; (2) the highest rate that the vehicle can move its instantaneous impact point toward a protected area; (3) the effect of the winds; and (4) the contribution of any explosion to the scatter of debris.

The potential for damage to ground sites from a launch vehicle generally decreases with time into flight since fuel is consumed as the vehicle gains altitude. If it breaks up or is destroyed at a higher altitude, the liquid fuels are more likely to be dispersed and lead to lower concentrations on the ground. In addition, if there are solid propellants, they would have been partially consumed during the flight period before the failure and would continue to burn in free fall after the breakup.

Very early in flight, when the vehicle is still close to the ground, there is less opportunity for debris to be scattered. The debris fall within a footprint is affected by the range of ballistic coefficients of the pieces, the wind speed and direction, velocity contributions due to explosion and random lift.

Debris that is very dense and has a high ballistic coefficient (b) is not as affected by drag and will tend to land closer to the vacuum instantaneous impact point. High ballistic coefficients can be associated with pumps, other compact metal equipment, etc. Panels or pieces of motor and rocket skin offer a high drag relative to their mass (a low ballistic coefficient) and consequently slow down much more rapidly in the atmosphere. After slowing down they tend to fall and drift with the wind. A piece of debris with a very low ballistic coefficient (b=1) is shown to stop its forward flight almost immediately and drift to impact in the direction of the wind. Pieces having intermediate value ballistic coefficients show a combination of effects and fall along a centerline. From a lethality standpoint, the pieces having a higher ballistic coefficient impact at a higher velocity and can cause more damage (depending upon their size).

The boundaries of the debris dispersion footprint are not precise but rather represent a contour which contains, for example, 95 percent of the debris. Thus, when considering the hazard to structures or people on the ground, one must consider the hazard area for debris impacts in the terms of a dynamic pattern.

For all launches, the boosters, sustainers, and other expendable equipment are always jettisoned and fall back to the Earth. Therefore, in planning a mission, care must be taken to keep these objects from impacting on land, offshore oil platforms, aircraft, and shipping lanes. The impact locations are normally quite predictable, so risks can be avoided or minimized.

Failure modes and associated probability of failure are required if other than a normal launch is addressed. Estimates for failure mode probabilities are typically based upon knowledge of a vehicle's critical systems and expert assessment of their reliability combined with historical data, when available. Launch vehicle data used may include propellants, explosive/fuel chemical properties, fragmentation characteristics, mass, shape, ballistic coefficients, flight dynamics, flight termination system, guidance and control, stage burn times and separation characteristics, and lethality of debris, as represented by lethal area.

The regions or areas exposed to launch operations or accident hazards must be identified. These may be subdivided into smaller sections, critical locations of people or buildings that are specified for subsequent risk calculations. All risk analyses require estimates of the probabilities of debris/fragments from failed vehicle impacting within hazardous distances of personnel or structures in the region. The probability of an impact for a public area requires consideration of all failure chains which could endanger it and always implies a flight termination system failure.

It is important to determine what occurs after vehicle failure fragmentation leading to ground impact. The number of fragments, their sizes and shapes would ultimately define the hazard and casualty area for a given vehicle or fragment impact. Debris pieces are characterized by their size, mass, area, and ballistic coefficient to determine if they survive re-entry and their terminal velocity at ground impact.

Flight Corridors

Vehicle performance is determined at all ranges by visual observation (early in the flight) and by real-time telemetry measurements of vehicle status as a backup to the computed (wind-corrected) behavior of the instantaneous impact point. The actual location of the missile is less important than the where it and/or its debris will land in case of normal launch operation, accidental failure, abort or destruct. Therefore, when tracking a missile, velocity data must be obtained either directly or by differentiating successive measures of position. Radar trackers measure vehicle position in terms of azimuths, elevation and range relative to the tracker, expressed in a launch-pad centered reference coordinate system.

Early in the flight, visual observation and telemetry may be the only means of determining whether there is a malfunction or whether the vehicle maintains correct altitude. Vehicle position and velocity data and the predicted instantaneous impact point(s) are displayed in real time in the Launch Control Center.

Early in the flight the (predicted) instantaneous impact point advances slowly. As the vehicle altitude, velocity, and acceleration increase, the instantaneous impact point change rate also increases from zero to several miles per second. It is the advancing instantaneous impact point that the Range Safety Officer usually observes during a launch. Prior to launch a map with lines indicates the limits of excursion, which, when exceeded, would dictate a command signal to terminate flight.

Destruct Lines

Destruct lines are deliberately offset from land or populated areas to accommodate:

- Vehicle performance characteristics and wind effects
- The correction for using a vacuum instead of a drag-corrected impact point
- The scatter of vehicle debris
- The inaccuracies and safety-related tolerances of the vehicle tracking and monitoring system
- The time delays between the instantaneous impact point impingement on a destruct line and the time at which flight termination actually takes place (i.e., human decision time lag)

By proper selection of destruct lines, debris can be prevented from impacting on or near inhabited areas.

Debris Impact Areas

Debris consists of missile fragments that may land upon structures or populated areas. Fragments may include burning propellants which could explode or burn, thus posing additional hazards (explosion or fire).

Vehicle altitude increases rapidly with time into flight, roughly reaching 37 kilometers (20 nautical miles) in the first 2 minutes of flight. Furthermore, the location of the launch site and the direction of the launch are usually selected so the vehicle moves away from population centers. Thus, the "separation" distance between the vehicle and the potentially vulnerable communities/populations, in case of vehicle accident, increases with time. As time elapses from liftoff, the quantity of propellants remaining on board decreases very rapidly. Note that the total remaining propellant weight decreases by about 50 percent within 2 minutes from liftoff. Also the explosive potential (or TNT yield) of a given quantity of propellant may change as time elapses from liftoff.

Generally, the hazard from propellant explosion decreases rapidly with time into flight, except for the first 10 to 25 seconds. Activation of the flight termination system is likely to further reduce such explosion hazards by dispersing the propellant. Typically, the flight termination system is not activated during the first 8-12 seconds (depending on the missile, mission and site/facility) in order to avoid damage to the pad facilities.

When a vehicle is in flight at significant altitude, the debris will land over a much larger area. Distribution of debris impacts is dependent upon the forces acting on the fragments. Initially, the velocity vector of the vehicle is of primary importance, and this contribution is affected by the velocity vectors resulting from the turns, tumbling and/or explosions. Thereafter, the effects of the atmosphere on the fragments during free fall (which depend on wind and fragment size, shape, and mass) become important.

Furthermore, impacting launch vehicle fragments can be divided into four categories:

- Inert pieces of vehicle structure
- Pieces of solid propellant (some of which may burn up during free fall)
- Vehicle structures which contain propellant (solid or liquid) that may continue to burn after landing (but are non-explosive). They may pose the risk of starting secondary fires at the impact points.
- Fragments which contain propellant and which can explode upon impact (if their velocity is greater than roughly 91 meters [300 feet] per second)

The casualty area of an impacting fragment is the area about the fragment impact point within which a person would become a casualty. Casualties may result from a direct hit, from a bouncing fragment, from a collapsing structure resulting from an impact on a building or other shelter, from the overpressure pulse created by an explosive fragment, from a fire or toxic cloud produced by the fragment or some combination thereof. The hazard area is increased if a fragment has any significant horizontal velocity component at impact which could result in bouncing or other horizontal motion near ground level.

Casualty area is also affected by the sheltering of people by structures. Structures may be divided into classes (for occupational purposes) depending on the degree of protection they afford.

Emergency Response

Each launch facility has an Emergency Response Plan that defines the initial response requirements and procedures to be implemented in the event that flight system malfunction and/or flight termination occurs during flight activities associated with Ground-Based Midcourse Defense Extended Test Range activities. The following paragraphs present a general description of the emergency response process.

It is the policy of each launch facility to immediately respond in the event of an emergency during any missile flight operation. Initial response to any areas impacted by flight hardware shall be to secure and render safe the area for follow-on recovery and restoration activities. All areas affected by ground impact of flight hardware shall be cleared of all recoverable debris and environmentally restored. The recovery of launch hardware shall be accomplished in a manner consistent with each launch location's requirements as set forth in applicable environmental documentation and conditions specified by the appropriate land owner.

In the event of a flight termination or malfunction, Flight Safety would immediately determine the projected impact area(s) for all debris and flight hardware. The Emergency Response Coordinator would be notified, and the Emergency Response Plan would be initiated.

An initial assessment team would be immediately dispatched to the predicted impact area(s) to assess the situation.

Key elements of information to be obtained by the initial assessment team include:

- Exact impact location(s)
- Extent and condition of impact location(s)
- Personnel injuries
- Indications of fires and/or hazardous materials releases
- Extent of property damage

Results would be reported back to the Emergency Response Coordinator as expeditiously as possible. Based on this assessment, the Emergency Response Coordinator would call up and dispatch to the impact site(s) the appropriate elements of a contingency team.

The Contingency Team would be designated by the Emergency Response Coordinator and would consist of those elements determined to be required, based on the initial assessment. Elements that may be included on the Contingency Team may include, depending on the situation, communications, logistics, public affairs, staff judge advocate, security, health and safety, Explosive Ordnance Disposal, recovery, fire safety, and civilian agency personnel.

The initial priorities for the Contingency Team are the following:

- Emergency rescue and/or emergency medical treatment
- Establish site security
- Contain, control, and extinguish fires
- Confine hazardous materials

All elements of the Contingency Team would be under the control of an On Scene Incident Coordinator, designated by the Emergency Response Coordinator. The On Scene Incident Coordinator would retain on-scene control of all initial response elements until initial response operations are complete and recovery and site restoration activities commence.

The highest priorities during any emergency response operation are the rescue of injured or trapped personnel and the control of any fires produced by a launch or impact event. Rescue of injured and trapped personnel is of the highest priority. Responsibility for emergency rescue is shared among all initial response personnel but most especially by the first-on-scene security personnel and the fire response units (military or civilian). Rescues should be attempted using appropriate safety equipment and protective clothing (i.e., respirators, protective clothing, etc., as necessary). Since rescue may require entry into the impact area, care should be taken to avoid hazards associated with hazardous debris or fires. Under no circumstances shall rescue personnel unnecessarily endanger themselves during rescue activities. Rescue personnel should *never* require rescue by other response personnel.

Emergency response operations are complete once all impact sites have been secured, rescue operations are completed, any fires have been extinguished, and initial site reconnaissance has been performed. Recovery and site restoration activities can then be initiated. Using the results

of the initial site reconnaissance, plans would be developed for the recovery of all debris and the restoration of the site(s) to natural conditions.

Additional post-launch recovery and restoration areas may be determined by the launch operator before and throughout mission-specific operations. The recovery of launch hardware would be accomplished in a manner consistent with the launch site procedures, and requirements set forth in applicable environmental documentation and conditions specified in agreements with appropriate land owners.

The launch site operator is responsible for planning, performance, and control of launch activities. This includes:

- Using results of analysis provided by Flight Safety to determine flight hardware impact zones which fully encompass the areas designated in the analysis
- Ensuring that appropriate agreements with all affected landowners are in place and adequately address recovery requirements
- Coordinating with local civilian authorities concerning recovery requirements
- Providing recovery plans to applicable agencies/personnel in accordance with current launch site policies
- Establishing appropriate travel routes (ground/air) prior to launch activities to outline access into recovery areas
- Perform visual inspections and obtain radar data to insure expeditious recovery of the missile
- Ensure complete recovery of missile hardware

The recovery team is responsible for the recovery of all missile debris and restoration of impact areas to their natural condition. Recovery personnel would have overall responsibility for controlling recovery and restoration operations. Air units composed of helicopters and support equipment would transport recovery personnel to road-inaccessible impact sites. Air support equipment would also transport the missile components out of all land and near-shore impact sites and perform quality assurance inspections or sweeps to ensure proper recovery procedures.

Each launch location is subject to all federal and state regulations involving waste/material handling and disposal, endangered species, and historical resource preservation. Implementation of these regulations may require the assistance of civilian agencies and law enforcement authorities during recovery and restoration operations. Civilian assistance would be requested by each launch location in accordance with existing agreements.

The following is a list of personnel, equipment, transportation, and operational requirements that typically would be necessary to perform recovery activities.

Personnel

- Helicopter pilots
- Helicopter co-pilots
- Helicopter crew chief
- Explosive Ordnance Disposal personnel (2)
- Recovery personnel
- Project representative
- Owner representative (if required by controlling agent)
- Environmental representative (if required by controlling agent)

Roadblocks

Roadblocks shall be utilized to limit unauthorized access into recovery areas that include locations in the vicinity of public roadways or thoroughfares. The Recovery Team Coordinator would designate appropriate roadblock locations on roads leading into recovery areas. Roadblocks would be coordinated by the launch site security personnel, augmented as needed by local law enforcement personnel. At each roadblock positive communication would be established and maintained with the Recovery Team Coordinator and other security personnel/roadblocks. This communication would occur using either landlines (telephones), cellular telephone, or military radio systems.

Certain critical response personnel, such as ambulance/medical or fire response units, shall be permitted to pass through "active" roadblocks in the performance of their duties.

Debris Recovery

Personnel would arrive at impact site by appropriate mode. Recovery transportation vehicles would remain at nearest accessible road. Explosive Ordnance Disposal members of the recovery team would be the first on scene and would be responsible for the identification, handling, control, and rendering safe of minor detonating charges and other minor hazardous debris. Other responsibilities include:

- Providing initial impact site control to prevent exposure for recovery personnel (Security personnel would assume this role as impact zone access controls are eased.)
- Maintaining area safety and rendering safe potential explosive materials
- Conducting initial impact site assessments for the identification of debris and the determination of recovery equipment requirements
- Assisting in dismantling of launch hardware prior to recovery and transport operations

Recovery personnel would then handle the next phase of the recovery including:

- Collect small missile parts
- Dismantle larger pieces into manageable sections

- Transport recovered parts by helicopter to recovery vehicles waiting at accessible roads

Environmental Restoration

Recovery operations would be coordinated with the Environmental Office at each launch site. If deemed necessary, an archaeologist and biologist would accompany Explosive Ordnance Disposal personnel during the initial site assessment to determine if cultural or sensitive biological resources are present at the impact site. These resource specialists would assist in the determination of recovery equipment requirements and recovery transport routes.

All recovery and restoration activities would be carried out in accordance with Memorandum of Agreements signed by appropriate state and federal agencies and other potentially affected organizations. Impacted areas would be restored to a natural condition in accordance with land-owners' agreements and agency requirements.

APPENDIX D
ENGINEERING FIELD ANALYSIS OF SEISMIC DESIGN BUILDING STANDARDS FOR EXISTING FACILITIES AT KODIAK LAUNCH COMPLEX

APPENDIX D
ENGINEERING FIELD ANALYSIS OF SEISMIC DESIGN BUILDING STANDARDS FOR EXISTING FACILITIES AT KODIAK LAUNCH COMPLEX

Kodiak Island is located in one of the world's most seismically active regions, producing three of the largest magnitude earthquakes of the last 100 years, including the great Mw 9.2, 1964 Prince William Sound Earthquake. The potential for severe ground shaking at Kodiak Launch Complex (KLC) over the design life of KLC is high and has been discussed in section 3.1.5. Existing KLC facilities were designed in 1997 under seismic design guidelines as specified in the 1994 Uniform Building Code for high seismic areas. New facilities and infrastructure envisioned under the Ground-Based Midcourse Defense (GMD) Extended Test Range would conventionally be designed and constructed under the newer International Building Code. Modifications in the newer code have brought about questions of whether the standards are sufficient given the severe seismic setting. In addition, recent and on-going seismic hazard evaluation studies at the U.S. Coast Guard Loran Station, Narrow Cape, Alaska (U.S. Coast Guard Civil Engineering Unit, 2001, 2002, 2003) indicate that "the shaking hazard at Kodiak is significantly greater than was previously recognized and exceeds standards such as the Uniform Building Code that have traditionally been used as a basis for design and construction in the Kodiak area." The Alaska Aerospace Development Corporation (AADC) would obtain and review necessary definitive information on surface faulting in the vicinity of the proposed GMD facilities. In making final siting and design determinations, AADC would incorporate all appropriate standards specified by its licensed and bonded A&E contractor. The purpose of this Appendix is to address the following questions:

1. How does the Code under which the original KLC structures were designed (LLC building, LS, IPF building and the SCAT building) compare with the current code? This issue takes into account that as time goes by the Code officials and experts in the field of seismic design gain knowledge and incorporate this knowledge into the future Building Code editions.

2. Are the existing structures constructed as originally designed? This question requires inspection of the existing structures to ensure that they were constructed as designed.

KLC is located at Narrow Cape on Kodiak Island, Alaska. The facility, per the Construction Drawings, was designed in 1997. At that time, the 1994 edition of the Uniform Building Code was in place. Per the drawings, this is the Code to which the facilities were designed. For the purpose of this study, we are assuming that this is true and that the structures are properly designed using this Code. The Frame Loading Conditions shown on the design drawings are compatible with the 1994 Uniform Building Code. To answer the first question, how does the

Code in which the structures were designed compare with the current Code, we performed calculations using the two Codes. The calculations are attached for reference.

Although the two Codes are different in the method for obtaining the design base shear, once calculated, the loads are applied in the same way to design the structure. Therefore, we can compare the design base shear values calculated with each Code and determine which code requires a stronger design. Based on the original calculations included in the Draft EIS, the Uniform Building Code, 1994 edition required approximately a 10% greater design base shear than the International Building Code, 2000 edition. However, based on comments received on the Draft EIS, a Site Class S_2 (Uniform Building Code 94) and Site Class B (International Building Code 2000) should be used due to the soft sandstone under Narrow Cape. The calculations for each building were rerun using these numbers. Based on these revised calculations, the International Building Code 2000 design base shear is approximately 15 % to 20 % greater than the Uniform Building Code 94 design base shear. For example, at the Launch Control building this equates to an International Building Code design base shear of 0.26W and a Uniform Building Code design base shear of 0.229W (W is the Dead Load of the structure) . However, when looking at the KLC design documents wind is the controlling factor, not the seismic design. Based on ASCE 7-95, which was used for the wind design at the KLC facilities, the design base shear for wind is 20^K per frame. The design base shear for seismic is calculated at 7^K per frame and thus the wind controls the design. The International Building Code 2000 design base shear for wind is calculated to be 13.4^K per frame. This is greater than the seismic base shear but less than the original wind base shear.

Another comment on the Draft EIS questioned why the buildings were not classified as structures having critical national defense functions. The proposed facilities at KLC are for test purposes. Facilities having critical national defense functions are those directly involved in national defense operations that must remain operational following a seismic event. KLC is not involved in operational aspects related to national defense and therefore it does not have critical national defense functions.

In answering the second question, are the structures constructed as designed, a professional engineer traveled to the site and inspected the structures. Original Construction Documents were compared to the actual structures in the field. Each building was inspected with special attention to the bracing system. Although some components could not be directly observed due to them being hidden by siding or wall coverings, most of the braces could be directly observed and compared to the Construction Documents. We did not find any discrepancies in the bracing construction. (ASCG Incorporated, 2002)

After reviewing all of the documents and comparing the loading requirements of each Code, we have determined that if the structures were designed and built with the latest techniques for resisting seismic forces, in accordance with the latest Building Codes, and the structures would not require any modifications. Since the design wind load is the controlling factor, and it is almost 50% greater than the design seismic load it is our opinion that the structures should be able to withstand a seismic event with a 2% probability of exceedence in 50 years without a catastrophic failure. (ASCG Incorporated, 2002)

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DATE: 8/8/02 SHT.: 1 OF
PREPARED BY: RTB
SUBJECT: KODIAK SEISMIC STUDY

PURPOSE: TO DETERMINE WHETHER THE UBC 97 CODE OR THE IBC 2000 CODE WILL REQUIRE MORE LOAD BE APPLIED TO THE STRUCTURES @ THE FACILITY

METHOD: WILL CALCULATE THE TOTAL DEAD LOAD FACTOR (DESIGN BASE SHEAR) THAT EACH CODE WILL REQUIRE AND COMPARE THEM.

CRITERIA: WILL USE THE INFORMATION ON THE DRAWINGS ALONG WITH THE MAPS IN THE CODES. WILL USE SIMILAR ASSUMPTIONS AS ORIGINAL DESIGN.

RESULTS:

LAUNCH CONTROL CENTER
IBC = .207 W
UBC = .229 W
UBC CONTROLS

LAUNCH STRUCTURE
IBC = .156 W
UBC = .172 W
UBC CONTROLS

IPF
IBC = .207 W
UBC = .229 W
UBC CONTROLS

SCAT
IBC = .207 W
UBC = .229 W
UBC CONTROLS

UBC 94 CODE CONTROLS THE AMOUNT OF FORCE APPLIED TO THE STRUCTURE IN EVERY CASE

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STRUCTURE SUMMARY:

- LAUNCH CONTROL CENTER
  - 175' x 80' x 14' E.H.
  - METAL BUILDING w/ MOMENT FRAMES & X-BRACING
  - 4:12 ROOF SLOPE
  - Rw = 6
  - CATEGORY II

- LAUNCH STRUCTURE
  - 85' x 40' x 210' HIGH
  - METAL STRUCTURE w/ X-BRACING
  - Rw = 3
  - CATEGORY II

- INTEGRATED PROCESSING FACILITY (IPF)
  - 100' x 71' x 50' E.H.
  - METAL BUILDING w/ MOMENT FRAMES & X-BRACING
  - 4:12 ROOF SLOPE
  - Rw = 6
  - CATEGORY II

- SCAT
  - 70' x 50' x 50' E.H.
  - METAL BUILDING w/ MOMENT FRAMES & X-BRACING
  - 4:12 ROOF SLOPE
  - Rw = 6
  - CATEGORY II

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DATE: _____ SHT.: 3 OF _____
PREPARED BY: KTS
SUBJECT: LAUNCH CONTROL CENTER

LAUNCH CONTROL CENTER:

UBC 94

GIVEN: ZONE 4
$S_1 = 1.0$
OCCUPANCY CATEGORY II
$R_W = 6$

DESIGN PER 1627.8.2 USE STATIC PROCEDURE (1628)

$$V = \frac{ZIC}{R_W} W$$

$Z = .40$ (TABLE 16-I)
$I = 1.25$ (TABLE 16-K)
$R_W = 6$ (TABLE 16-N)

$$C = \frac{1.25\,S}{T^{2/3}} = 11.42 > 2.75 \therefore \text{USE } 2.75$$

$$T = C_t (h_n)^{3/4} = .035$$

$C_t = .035$
$h_n = 0$
$S = 1.0$

$$V = \frac{(.4)(1.25)(2.75)}{6} W = .229\,W$$

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LAUNCH CONTROL CENTER

IBC 2000

GIVEN: $S_S = 1.75$ (MAPS)
$S_1 = 0.60$ (MAPS)
SITE CLASS A (TABLE 1615.1.1)
SEISMIC USE GROUP II

DESIGN:

$F_a = .8$ (TABLE 1615.1.2(1))
$F_v = .8$ (TABLE 1615.1.2(2))

$S_{MS} = .8(1.75) = 1.4$ (16-16)

$S_{M1} = .8(.60) = .48$ (16-17)

$S_{DS} = 2/3(1.4) = .93$ (16-18)

$S_{D1} = 2/3(.48) = .32$ (16-19)

SEISMIC DESIGN CATEGORY = D (PER TABLE 1616.3)
USE EQUIVALENT LATERAL-FORCE PROCEDURE 1617.4
(PER TABLE 1616.6.3)

$V_{ASD} = \frac{C_S W}{1.4}$ (16-34 MODIFIED FOR ASD)

C_S (16-35) $= \frac{S_{DS}}{\frac{R}{I_E}}$ => .194 (< 1.90, $> .051$) : OK USE .194

$S_{DS} = .93$ (16-18)
$R = 6$ (TABLE 1617.6)
$I_E = 1.25$ (1616.2)

$C_{S\,MAX}$ (16-36) $= \frac{S_D}{\left(\frac{R}{I_E}\right)T}$ => 1.90

$S_{D1} = .32$
$R = 6$
$I_E = 1.25$
$T = .035$ (1617.4.2.1)

$C_{S\,MIN}$ (16-37) $= .044\, S_{DS}\, I_E$ => .051

$V = \frac{.194}{1.4} W = .138 W$

PER 1617.2 MUST APPLY REDUNDANCY FACTOR DUE TO SDC = D
MAX $\rho = 1.5$ ∴ $V = .138 W \rho = .207 W$

D-6

LAUNCH STRUCTURE ;

UBC 94

GIVEN: ZONE 4 $R_W = 8$
$S_1 = 1.0$
OCCUPANCY CATEGORY II

DESIGN : PER 1627.8.2 USE STATIC PROCEDURE (1628)

$$V = \frac{ZIC}{R_W} W$$

$Z = .40$ (TABLE 16-I)
$I = 1.25$ (TABLE 16-K)
$R_W = 8$ (TABLE 16-N)

$$C = \frac{1.25\,S}{T^{2/3}} = 16.5 \geq 2.75 \therefore \text{USE } 2.75 \text{ max}$$

$$T = C_t (h_n)^{3/4} = .020$$

$C_t = .020$
$h_n = 0'$
$S = 1.0$

$$V = \frac{(.40)(1.25)(2.75)}{8} W = \boxed{.172\,W}$$

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LAUNCH STRUCTURE:

IBC 2000

GIVEN: $S_S = 1.75$
$S_1 = .60$
SITE CLASS A (TABLE 1615.1.1)
SEISMIC USE GROUP II

DESIGN: $F_a = .8$ (TABLE 1615.1.2(1))
$F_v = .8$ (TABLE 1615.1.2(2))
$S_{MS} = .8(1.75) = 1.4$ (16-16)
$S_{M1} = .8(0.60) = .48$ (16-17)
$S_{DS} = 2/3(1.4) = .93$ (16-18)
$S_{D1} = 2/3(.48) = .32$ (16-19)
SEISMIC DESIGN CATEGORY "D" (TABLE 1616.3)
USE EQUIVALENT LATERAL FORCE PROCEDURE 1617.4
(TABLE 1616.6.3)

$V_{ASD} = \frac{C_S}{1.4} W$ (16-34 MODIFIED FOR ASD)

$C_S = \frac{S_{DS}}{R/I_E} \Rightarrow .145 \begin{matrix} < 2.5 \\ > .051 \end{matrix}$ ∴ USE .145

$S_{DS} = .93$
$R = 8$
$I_E = 1.25$

$C_{S\,MAX} = \frac{S_{D1}}{\left(\frac{R}{I_E}\right)T} \Rightarrow 2.5$

$S_{D1} = .32$
$R = 8$
$I_E = 1.25$
$T = .020$ (1617.4.2.1)

$C_{S\,MIN} = .044 S_{DS} I_E = .051$

$V = \frac{.145}{1.4} W = .104 W$

PER 1617.2 MUST APPLY REDUNDANCY FACTOR DUE TO SDC = D
MAX $\rho = 1.5$ ∴

$V = .104 W \rho = \underline{.156 W}$

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DATE: _____ SHT.: 7 OF _____
PREPARED BY: RJB
SUBJECT: IPF BLDG.

IPF BUILDING :

UBC 94

GIVEN : ZONE 4
$S_1 = 1.0$
OCCUPANCY CATEGORY I
$R_W = 6$

DESIGN PER 1627.8.2 USE STATIC PROCEDURE (1628)

$$V = \frac{ZIC}{R_W} W$$

$Z = .40$ (TABLE 16-I)
$I = 1.25$ (TABLE 16-K)
$R_W = 6$ (TABLE 16-N)

$$C = \frac{1.25 S}{T^{2/3}} = 11.42 > 2.75 \therefore \text{USE } 2.75$$

$$T = C_t (h_n)^{3/4} = .035$$

$C_t = .035$
$h_n = 0$
$S = 1.0$

$$V = \frac{(.4)(1.25)(2.75)}{6} W = .229 W$$

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IPF BUILDING!

IBC 2000

GIVEN: $S_S = 1.75$ (maps)
$S_1 = 0.60$ (maps)
SITE CLASS A (TABLE 1615.1.1)
SEISMIC USE GROUP II

DESIGN: $F_a = .8$ (TABLE 1615.1.2(1))
$F_v = .8$ (TABLE 1615.1.2(2))
$S_{MS} = .8(1.75) = 1.4$ (16-16)
$S_{M1} = .8(0.60) = .48$ (16-17)
$S_{DS} = 2/3(1.4) = .93$ (16-18)
$S_{D1} = 2/3(.48) = .32$ (16-19)
SEISMIC DESIGN CATEGORY = D (TABLE 1616.3)
USE EQUIVALENT LATERAL-FORCE PROCEDURE 1617.4
(TABLE 1616.6.3)

$V_{ASD} = \frac{C_S}{1.4} W$ (16-34 MODIFIED FOR ASD)

$C_S = \frac{S_{DS}}{\frac{R}{I_E}} \Rightarrow .194 \begin{matrix} \leq 1.9 \\ > .051 \end{matrix}$. OK USE .194
(16-35)

$S_{DS} = .93$ (16-18)
$R = 6$ (TABLE 1617.6)
$I_E = 1.25$ (1616.2)

$C_{SMAX} = \frac{S_{D1}}{\left(\frac{R}{I_E}\right)T} \Rightarrow 1.90$
(16-36)

$S_{D1} = .32$ $I_E = 1.25$
$R = 6$ $T = .035$ (1617.4.2.1)

$C_{SMIN} = .044 S_{DS} I_E \Rightarrow .051$
(16-37)

$V = \frac{.194}{1.4} W = .138W$

PER 1617.2 MUST APPLY REDUNDANCY FACTOR DUE TO SDC = D
MAX $\rho = 1.5$ ∴

$V = .138 W\rho = \underline{\underline{.207W}}$

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SCAT BUILDING.

UBC 94

GIVEN: ZONE 4
$S_1 = 1.0$
OCCUPANCY CATEGORY II
$R_W = 6$

DESIGN PER 1627.8.2 USE STATIC PROCEDURE (1628)

$$V = \frac{ZIC}{R_W} W$$

$Z = .40$ (TABLE 16-I)
$I = 1.25$ (TABLE 16-K)
$R_W = 6$ (TABLE 16-N)

$$C = \frac{1.25\ S}{T^{2/3}} = 11.42 > 2.75 \therefore \text{USE } 2.75$$

$$T = C_t (h_n)^{3/4} = .035$$

$C_t = .035$
$h_n = 0$
$S = 1.0$

$$V = \frac{(.4)(1.25)(2.75)}{6} W = .229 W$$

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SCAT :

IBC 2000

GIVEN: $S_S = 1.75$ (MAPS)
$S_1 = 0.60$ (MAPS)
SITE CLASS A (TABLE 1615.1.1)
SEISMIC USE GROUP II

DESIGN: $F_a = .8$ (TABLE 1615.1.2.(1))
$F_v = .8$ (TABLE 1615.1.2(2))
$S_{MS} = .8(1.75) = 1.4$ (16-16)
$S_{M1} = .8(.60) = .48$ (16-17)
$S_{DS} = 2/3(1.4) = .93$ (16-18)
$S_{D1} = 2/3(.48) = .32$ (16-19)

SEISMIC DESIGN CATEGORY = D (PER TABLE 1616.3)
USE EQUIVALENT LATERAL-FORCE PROCEDURE 1617.4
(PER TABLE 1616.6.3)

$V_{ASD} = \frac{C_S}{1.4} W$ (16-34 MODIFIED FOR ASD)

$C_S = \frac{S_{DS}}{R/I_E}$ (16-34) $\Rightarrow .194 \begin{matrix} < 1.90 \\ > .051 \end{matrix}$ OK USE .194

$S_{DS} = .93$
$R = 6$
$I_E = 1.25$ (T1616.2)

$C_{S\,MAX} = \frac{S_{D1}}{\left(\frac{R}{I_E}\right)T}$ (16-36) $\Rightarrow 1.90$

$S_{D1} = .32$
$R = 6$
$I_E = 1.25$
$T = .035$ (1617.4.2.1)

$C_{S\,MIN} = .044 S_{DS} I_E = .051$ (16-37)

$V = \frac{.194}{1.4} W \Rightarrow .138W$

PER 1617.2 MUST APPLY REDUNDANCY FACTOR DUE TO SDC = D
MAX $\rho = 1.5$ ∴

$V = .138 W\rho = \underline{.207\ W}$

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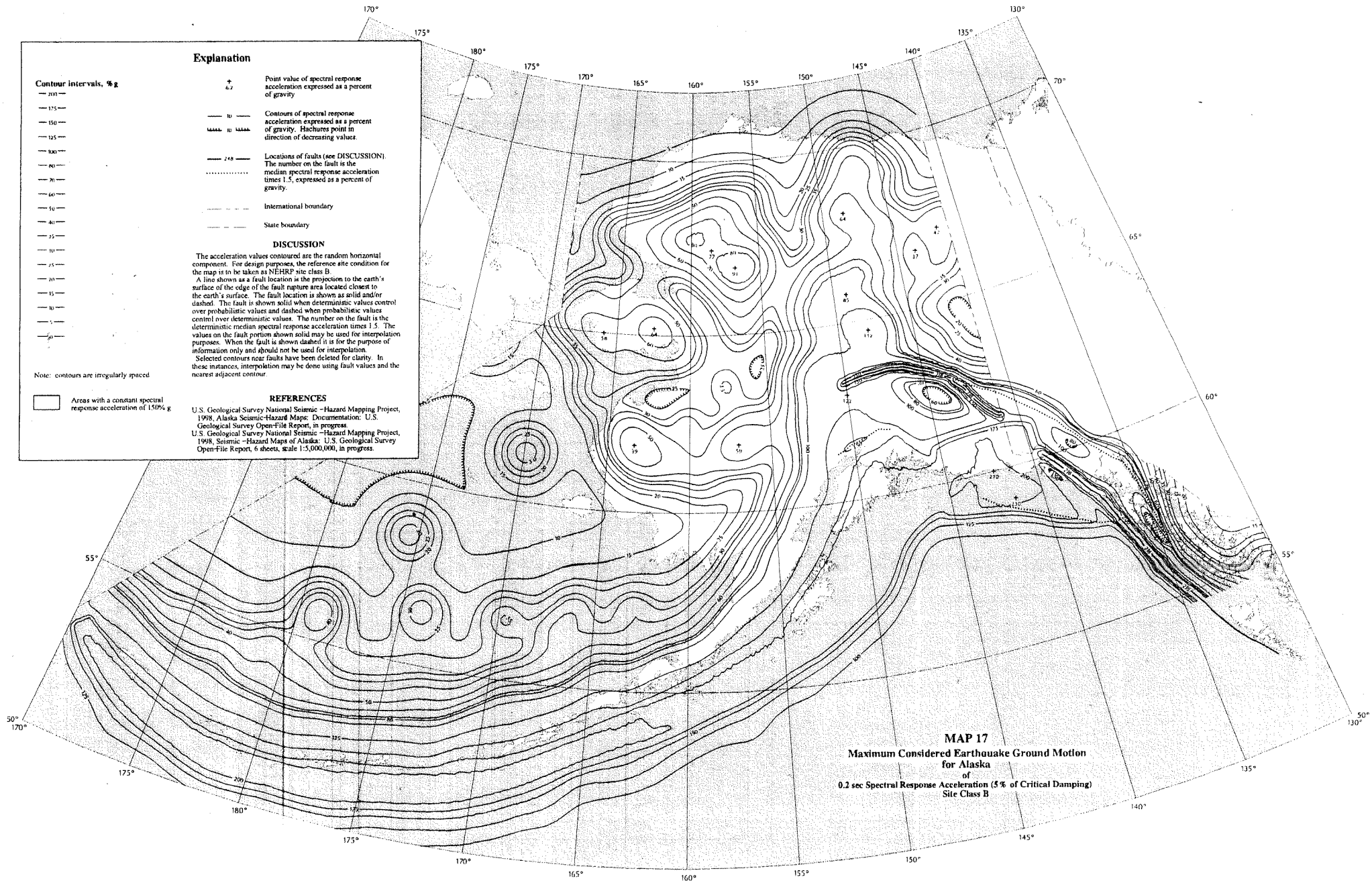
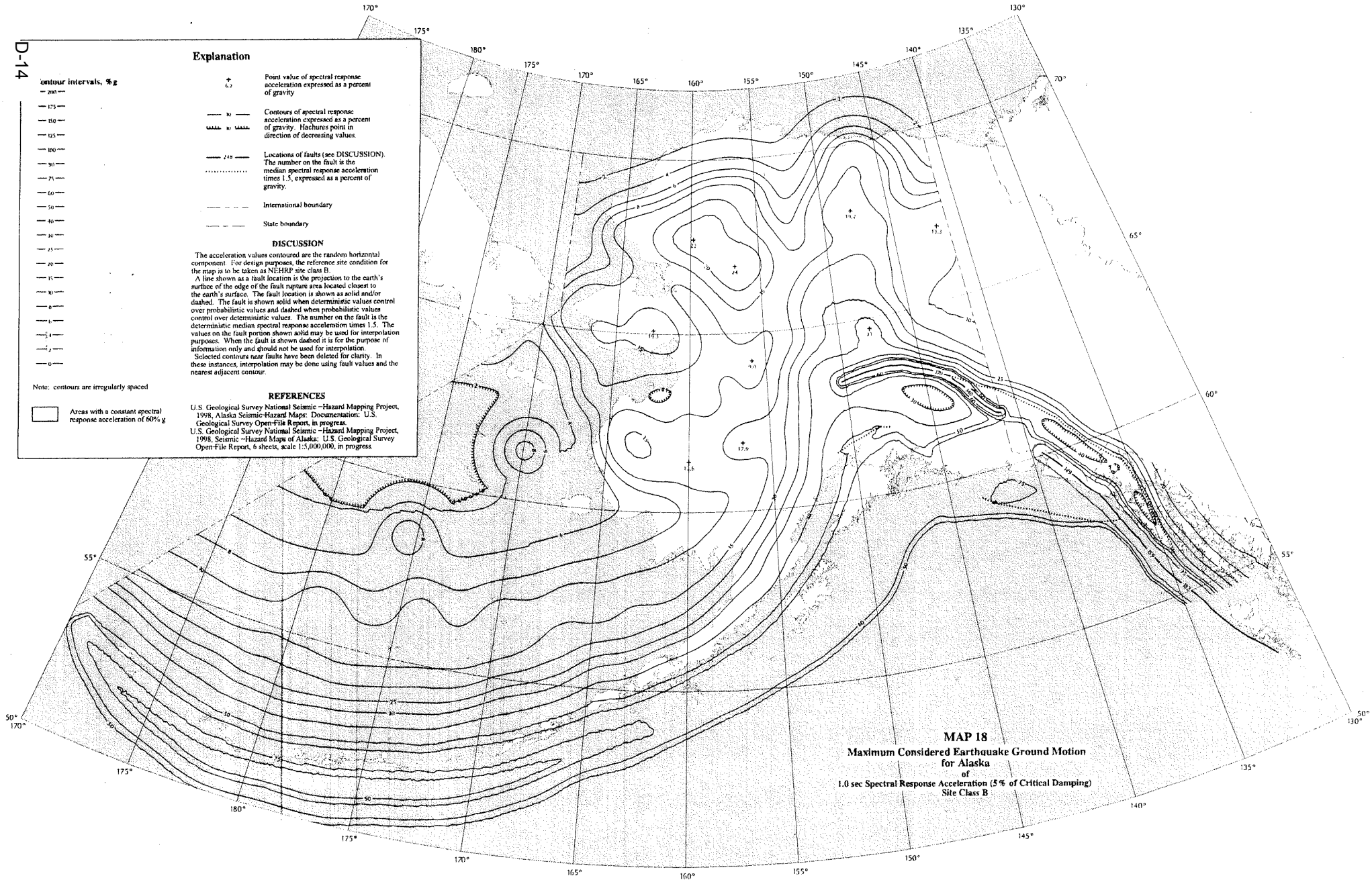


Digital data prepared with ARC / INFO 7.1.1 running under Solaris 2.5 on a UNIX workstation

Albers Equal-Area Conic Projection
Standard Parallels 55°N and 65°N
Central Meridian 160°W

Prepared for USGS / BSSC Project 97
by
U.S. Geological Survey (USGS)
Building Seismic Safety Council (BSSC)
Federal Emergency Management Agency (FEMA)



Explanation

contour intervals, %g

200
175
150
125
100
80
75
60
50
40
30
25
20
15
10
8
6
4
2
0

Note: contours are irregularly spaced

Areas with a constant spectral response acceleration of 60% g

+ 6.2 — Point value of spectral response acceleration expressed as a percent of gravity

—— 80 —— Contours of spectral response acceleration expressed as a percent of gravity. Hachures point in direction of decreasing values.

—— 248 —— Locations of faults (see DISCUSSION). The number on the fault is the median spectral response acceleration times 1.5, expressed as a percent of gravity.

International boundary

State boundary

DISCUSSION

The acceleration values contoured are the random horizontal component. For design purposes, the reference site condition for the map is to be taken as NEHRP site class B.

A line shown as a fault location is the projection to the earth's surface of the edge of the fault rupture area located closest to the earth's surface. The fault location is shown as solid and/or dashed. The fault is shown solid when deterministic values control over probabilistic values and dashed when probabilistic values control over deterministic values. The number on the fault is the deterministic median spectral response acceleration times 1.5. The values on the fault portion shown solid may be used for interpolation purposes. When the fault is shown dashed it is for the purpose of information only and should not be used for interpolation.

Selected contours near faults have been deleted for clarity. In these instances, interpolation may be done using fault values and the nearest adjacent contour.

REFERENCES

U.S. Geological Survey National Seismic –Hazard Mapping Project, 1998, Alaska Seismic-Hazard Maps: Documentation: U.S. Geological Survey Open-File Report, in progress.

U.S. Geological Survey National Seismic –Hazard Mapping Project, 1998, Seismic –Hazard Maps of Alaska: U.S. Geological Survey Open-File Report, 6 sheets, scale 1:5,000,000, in progress.

MAP 18

Maximum Considered Earthquake Ground Motion for Alaska of 1.0 sec Spectral Response Acceleration (5% of Critical Damping) Site Class B

Scale 1:7,000,000

100 0 100 200 300 400 500 600 700 800 900 1000 1100 MILES

800 0 100 200 300 400 500 600 700 800 900 1000 1100 KILOMETERS

Digital data prepared with ARC / INFO 7.1.1 running under Solaris 2.5 on a UNIX workstation

Albers Equal-Area Conic Projection
Standard Parallels 55°N and 65°N
Central Meridian 160°W

Prepared for USGS / BSSC Project 97
by
U.S. Geological Survey (USGS)
Building Seismic Safety Council (BSSC)
Federal Emergency Management Agency (FEMA)

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DATE: June 19, 2003 SHT.: 4A OF
PREPARED BY: AAC
SUBJECT: LAUNCH CONTROL CENTER
IBC 2000 - SEISMIC FORCES
SITE CLASS B, SEISMIC USE GROUP I

LAUNCH CONTROL CENTER

IBC 2000

$S_S = 1.75$

$S_1 = 0.60$

SITE CLASS B (TABLE 1615.1.1)

SEISMIC USE GROUP I

TESTING FACILITY WITH LIMITED AMOUNTS HAZARDOUS MATERIAL WITH LIMITED TIMES OF USE.

DESIGN

$F_a = 1.0$ TABLE 1615.1.2(1)

$F_v = 1.0$ TABLE 1615.1.2(2)

$S_{MS} = 1.0(1.75) = 1.75$ (16-16)

$S_{M1} = 1.0(0.60) = 0.60$ (16-17)

$S_{DS} = \frac{2}{3}(1.75) = 1.167$ (16-18)

$S_{D1} = \frac{2}{3}(0.60) = 0.40$ (16-19)

SEISMIC DESIGN CATEGORY = D (TABLE 1616.3(1)&(2))

$S_{DS} > 0.5g$ & $S_1 < 0.75g$
$S_{D1} > 0.2g$

TABLE 1616.6.3 2. Regular Structures,

USE EQUIVALENT LATERAL FORCE PROCEDURE, (SECT. 1617.4)

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IBC 2000 SEISMIC FORCES
SITE CLASS B, SEISMIC USE GRP I

LAUNCH CONTROL CENTER

SEISMIC BASE SHEAR

$V = C_S W$

C_S - SEISMIC RESPONSE COEFFICIENT

$I_E = 1.25$

$C_S = \frac{1.17}{\frac{4}{1.25}}$

$C_S = 0.36$ OK

ORDINARY MOMENT FRAME

$R = 4$ TABLE 1617.6.3

$S_{DS} = 1.17$

$S_{D1} = 0.40$

$V = 0.36\,W$

$0.044 S_{DS} I_E = 0.064 < C_S$

ASD $V = \frac{V}{1.4} = 0.26W$

$T = 0.035(14)^{3/4}$

$T = 0.253$

IBC 2000 ASD $V = 0.26W > 0.229W$ 94 UBC

$\frac{S_{D1}}{\left(\frac{R}{I}\right)T} = \frac{0.40}{\left(\frac{4}{1.25}\right)0.253} = 0.49 > C_S$

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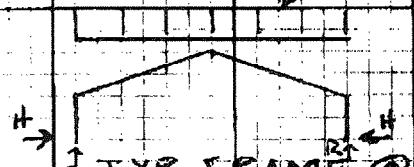
DATE: June 27, 2003 SHT.: W1 OF
PREPARED BY: JAC
SUBJECT: Kodiak Launch Control Center
UBC 94 & IBC 2000
DESIGN LOADS -

DESIGN LOADS

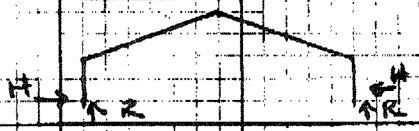
DESIGN WIND ASCE 7-95
BASIC WIND - 110 MPH
EXPOSURE C
CLASSIFICATION OF BUILDING I=1.00

SEISMIC LOAD - 1994 UBC
ZONE 4
FACTOR Z=0.40
SITE COEFFICIENT S_1 = 1.0
CLASSIFICATION OF BUILDING II

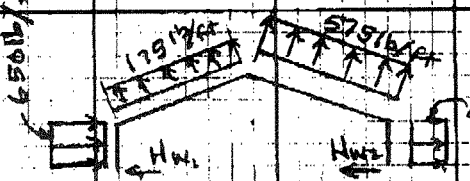
DEAD LOAD - 375 lb/ft
USE 250 lb/ft for D+W Combination
TOTAL DEAD - 32K 120K w/ WIND



LIVE LOAD - 300 lb/ft



SNOW LOAD - 450 lb/ft
TOTAL - 38K



WIND LOAD
INTERNAL PRESSURE DIFFERENTIAL - 150 lb/ft

	POS. INT. PRESS	NEG. INT. PRESS.
R_{W1}	19K	8K
H_{W1}	20K	16K
R_{W2}	22K	10K
H_{W2}	0K	4K

TOTAL BASE SHEAR FOR WIND - 20K

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DATE: JUNE 27, 2003 SHT.: W2 OF
PREPARED BY: RAC
SUBJECT: KODIAK LAUNCH CONTROL CENTER
UBC 94 & IBC 2000
DESIGN LOADS -

DESIGN LOADS

SEISMIC LOADS -

$V = 0.18\,W$
BASE SHEAR

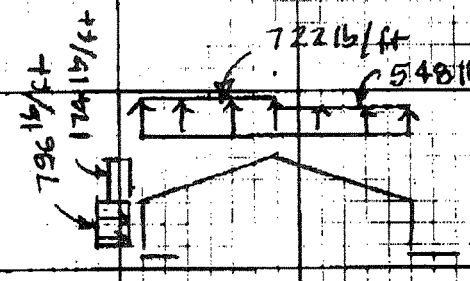
TOTAL BASE SHEAR FOR SEISMIC = 7K < 20K for WIND CONTROLS

W - SEISMIC DEAD LOAD INCLUDED 25% SNOWLOAD

IBC 2000

V = 130 MPH WIND SPEED
EXPOSURE C I = 1.0 h_n = 14'
TABLE 1609.6.2.1(4)

INTERIOR WALL q_h = 24.7 psf
WINDWD ROOF q_h = -22.4 psf
LEEWD. ROOF q_h = -17.0 psf



25 FT TRIB. WIDTH

WALL $P = 25(24.7) = 617.5$ plf
W ROOF $P_{WR} = 25(-22.4) = 560$ plf
L ROOF $P_{LR} = 25(-17) = -425$ plf

mean $h = 14 + \frac{13.33}{2} = 20.67$ SAY 20'

TABLE 1609.6.2.1(4) HEIGHT & EXPOSURE ADJUSTMT COEFFICIENTS 1.29

WALL $P = 1.29(617.5) = 796$ plf
W ROOF $P = 1.29(-560) = -722$ plf
L ROOF $P = 1.29(-425) = 548$ plf

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TABLE 1609.6.2.1(1)
MAIN WINDFORCE-RESISTING SYSTEM LOADS FOR A BUILDING WITH MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B[a] (psf)

BASIC WIND SPEED V (mph—3-second gust)	LOAD DIRECTION	ROOF ANGLE	HORIZONTAL LOADS[b]				VERTICAL LOADS				MAXIMUM HORIZONTAL WALL LOADS[d]				
			End zone		Interior zone		End zone		Interior zone		Windward overhang		Zone		
			Wall	Roof[c]	Wall	Roof[c]	Windward roof	Leeward roof	Windward roof	Leeward roof	End zone	Interior zone	1E	4E	1	4
85	Transverse	0 to 5°	11.5	-5.9	7.6	-3.5	-13.8	-7.8	-9.6	-6.1	-19.3	-15.1	8.7	-6.2	6.4	-5.2
		20°	15.9	-4.2	10.6	-2.3	-13.8	-9.6	-9.6	-7.3	-19.3	-15.1	10.8	-9.0	7.8	-6.2
		30° < angle ≤ 45°	12.9	8.8	10.2	7.0	5.0	-7.8	4.3	-6.7	-4.5	-5.2	9.6	-7.3	8.2	-6.1
	Longitudinal	All angles	11.5	-5.9	7.6	-3.5	-13.8	-7.8	-9.6	-6.1	-19.3	-15.1	8.7	-6.2	6.4	-5.2
90	Transverse	0 to 5°	12.8	-6.7	8.5	-4.0	-15.4	-8.8	-10.7	-6.8	-21.6	-16.9	9.8	-7.5	7.2	-5.8
		20°	17.8	-4.7	11.9	-2.6	-15.4	-10.7	-10.7	-8.1	-21.6	-16.9	12.1	-10.1	8.8	-7.5
		30° < angle ≤ 45°	14.4	9.9	11.5	7.9	5.6	-8.8	4.8	-7.5	-5.1	-5.8	10.7	-8.1	9.1	-6.8
	Longitudinal	All angles	12.8	-6.7	8.5	-4.0	-15.4	-8.8	-10.7	-6.8	-21.6	-16.9	9.8	-7.5	7.2	-5.8
100	Transverse	0 to 5°	15.9	-8.2	10.5	-4.9	-19.1	-10.8	-13.3	-8.4	-26.7	-20.9	12.0	-9.3	8.8	-7.2
		20°	22.0	-5.8	14.6	-3.2	-19.1	-13.3	-13.3	-10.1	-26.7	-20.9	14.9	-12.5	10.8	-9.3
		30° < angle ≤ 45°	17.8	12.2	14.2	9.8	6.9	-10.8	5.9	-9.3	-6.3	-7.2	13.3	-10.1	11.3	-8.4
	Longitudinal	All angles	15.9	-8.2	10.5	-4.9	-19.1	-10.8	-13.3	-8.4	-26.7	-20.9	12.0	-9.3	8.8	-7.2
105	Transverse	0 to 5°	17.5	-9.1	11.6	-5.4	-21.0	-11.9	-14.6	-9.2	-29.4	-23.0	13.3	-10.3	9.7	-7.9
		20°	24.2	-6.4	16.1	-3.5	-21.0	-14.6	-14.6	-11.1	-29.4	-23.0	16.5	-13.8	11.9	-10.3
		30° < angle ≤ 45°	19.7	-13.4	15.6	10.8	7.6	-11.9	6.6	-10.3	-6.9	-7.9	14.6	-11.1	12.4	-9.2
	Longitudinal	All angles	17.5	-9.1	11.6	-5.4	-21.0	-11.9	-14.6	-9.2	-29.4	-23.0	13.3	-10.3	9.7	-7.9
110	Transverse	0 to 5°	19.2	-10.0	12.7	-5.9	-23.1	-13.1	-16.0	-10.1	-32.3	-25.3	14.6	-11.3	10.7	-8.7
		20°	26.6	-7.0	17.7	-3.9	-23.1	16.0	-16.0	-12.2	-32.3	-25.3	18.1	-15.1	13.1	-11.3
		30° < angle ≤ 45°	21.6	14.8	17.2	11.8	8.3	-13.1	7.2	-11.3	-7.6	-8.7	16.0	-12.2	13.7	-10.1
	Longitudinal	All angles	19.2	-10.0	12.7	-5.9	-23.1	-13.1	-16.0	-10.1	-32.3	-25.3	14.6	-11.3	10.7	-8.7
120	Transverse	0 to 5°	22.8	-11.9	15.1	-7.0	-27.4	-15.6	-19.1	-12.1	-38.4	-30.1	17.3	-13.4	12.7	-10.3
		20°	31.6	-8.3	21.1	-4.6	-27.4	-19.1	-19.1	-14.5	-38.4	-30.1	21.5	-18.0	15.6	-13.4
		30° < angle ≤ 45°	25.7	17.6	20.4	14.0	9.9	-15.6	8.6	-13.4	-9.0	-10.3	19.1	-14.5	16.2	-12.1
	Longitudinal	All angles	22.8	-11.9	15.1	-7.0	-27.4	-15.6	-19.1	-12.1	-38.4	-30.1	17.3	-13.4	12.7	-10.3
125	Transverse	0 to 5°	24.8	-12.9	16.4	-7.6	-29.8	-16.9	-20.7	-13.1	-41.7	-32.6	18.8	-14.5	13.8	-11.2
		20°	34.3	-9.1	22.9	-5.0	-29.8	-20.7	-20.7	-15.7	-41.7	-32.6	23.3	-19.5	16.9	-14.5
		30° < angle ≤ 45°	27.9	19.1	22.2	15.2	10.7	-16.9	9.3	-14.5	-9.8	-11.2	20.7	-15.7	17.6	-13.1
	Longitudinal	All angles	24.8	-12.9	16.4	-7.6	-29.8	-16.9	-20.7	-13.1	-41.7	-32.6	18.8	-14.5	13.8	-11.2

(continued)

SUPPLEMENTAL CALCULATIONS

TABLE 1609.6.2.1(1)—continued
MAIN WINDFORCE-RESISTING SYSTEM LOADS FOR A BUILDING WITH MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B[a] (psf)

BASIC WIND SPEED V (mph—3-second gust)	LOAD DIRECTION	ROOF ANGLE	HORIZONTAL LOADS[b]				VERTICAL LOADS				MAX HORIZONTAL WALL LOADS[d]				
			End zone		Interior zone		End zone		Interior zone		Windward overhang		Zone		
			Wall	Roof[c]	Wall	Roof[c]	Windward roof	Leeward roof	Windward roof	Leeward roof	End zone	Interior zone	1E	4E	1	4
130	Transverse	0 to 5°	26.8	-13.9	17.8	-8.2	-32.3	-18.3	-22.4	-14.2	-45.1	-35.3	20.4	-15.7	14.9	-12.1
		20°	37.1	-20.8	24.7	-5.4	-32.2	-22.4	-23.4	-17.0	-45.1	-35.3	25.2	-21.1	18.3	-15.7
		30°<angle<45°	30.1	20.6	24.0	16.5	11.6	-18.3	10.0	-15.2	-10.6	-12.1	22.4	-17.0	19.1	-14.2
	Longitudinal	All angles	26.8	-13.9	17.8	-8.2	-32.2	-18.3	-22.4	-14.2	-45.1	-35.3	20.4	-15.7	14.9	-12.1
140	Transverse	0 to 5°	31.1	-16.1	20.6	-9.6	-37.3	-21.2	-26.0	-16.4	-52.3	-40.9	23.6	-18.2	17.3	-14.0
		20°	43.0	-11.4	28.7	-6.3	-37.3	-26.0	-26.0	-19.7	-52.3	-40.9	29.3	-24.5	21.2	-18.2
		30°<angle<45°	35.0	23.9	27.8	19.1	13.4	-21.2	11.7	-18.2	-12.3	-14.0	26.0	-19.7	22.1	-16.4
	Longitudinal	All angles	31.1	-16.1	20.6	-9.6	-37.3	-21.2	-26.0	-16.4	-52.3	-40.9	23.6	-18.2	17.3	-14.0
145	Transverse	0 to 5°	33.3	-17.3	22.1	-10.3	-40.1	-22.8	-27.9	-17.6	-56.1	-43.9	25.3	-19.6	18.6	-15.1
		20°	46.2	-12.2	30.8	-6.7	-40.1	-27.9	-27.9	-21.2	-56.1	-43.9	31.4	-26.3	22.8	-19.6
		30°<angle<45°	37.5	25.6	29.8	20.5	14.4	-22.8	12.5	-19.6	-13.1	-15.1	27.9	-21.2	23.7	-17.6
	Longitudinal	All angles	33.3	-17.3	22.1	-10.3	-40.1	-22.8	-27.9	-17.6	-56.1	-43.9	25.3	-19.6	18.6	-15.1
150	Transverse	0 to 5°	35.7	-18.5	23.7	-11.0	-42.9	-24.4	-29.8	-18.9	-60.0	-47.0	27.1	-20.9	19.9	-16.1
		20°	49.4	-13.0	32.9	-7.2	-42.9	-29.8	-29.8	-22.6	-60.0	-47.0	33.6	-28.1	24.4	-20.9
		30°<angle<45°	40.1	27.4	31.9	22.0	15.4	-24.4	13.4	-20.9	-14.1	-16.1	29.8	-22.6	25.4	-18.9
	Longitudinal	All angles	35.7	-18.5	23.7	-11.0	-42.9	-24.4	-29.8	-18.9	-60.0	-47.0	27.1	-20.9	19.9	-16.1
170	Transverse	0 to 5°	45.8	-23.8	30.4	-14.1	-55.1	-31.3	-38.3	-24.2	-77.1	-60.4	34.8	-26.9	25.6	-20.7
		20°	63.4	-16.7	42.3	-9.3	-55.1	-38.3	-38.3	-29.1	-77.1	-60.4	43.2	-36.1	31.3	-26.9
		30°<angle<45°	51.5	35.2	41.0	28.2	19.8	-31.3	17.2	-26.9	-18.1	-20.7	38.3	-29.1	32.6	-24.2
	Longitudinal	All angles	45.8	-23.8	30.4	-14.1	-55.1	-31.3	-38.3	-24.2	-77.1	-60.4	34.8	-26.9	25.6	-20.7

For SI: 1 foot = 304.8 mm, 1 degree = 0.0174S rad.

a. Pressures for roof angles between 5° and 20° and between 20° and 30° shall be interpolated from the table.
b. Pressures are the sum of the windward and leeward pressures and shall be applied to the windward elevation of the building in accordance with Figure 1609.6(3).
c. If pressure is less than 0, use 0.
d. Pressures shall be applied in accordance with Figure 1609.6(1).

TABLE 1609.6.2.1(3)
ROOF OVERHANG COMPONENT AND CLADDING DESIGN WIND PRESSURES
FOR A BUILDING WITH A MEAN ROOF HEIGHT OF 30 FEET LOCATED IN EXPOSURE B[a] (psf)

	ZONE per Figure 1609.6(2)	Effective Wind Area[a] (ft^2)	BASIC WIND SPEED V (mph—3-second gust)										
			90	100	105	110	120	125	130	140	145	150	170
Roof > 0 to 10 Degrees	2	10	-21.0	-25.9	-28.6	-31.4	-37.3	-40.5	-43.8	-50.8	-54.5	-58.3	-74.9
	2	20	-20.6	-25.5	-28.1	-30.8	-36.7	-39.8	-43.0	-49.9	-53.5	-57.3	-73.6
	2	50	-20.1	-24.9	-27.4	-30.1	-35.8	-38.8	-42.0	-48.7	-52.2	-55.9	-71.8
	2	100	-19.8	-24.4	-26.9	-29.5	-35.1	-38.1	-41.2	-47.8	-51.3	-54.9	-70.5
	3	10	-34.6	-42.7	-47.1	-51.6	-61.5	-66.7	-72.1	-83.7	-89.7	-96.0	-123.4
	3	20	-27.1	-33.5	-36.9	-40.5	-48.3	-52.4	-56.6	-65.7	-70.4	-75.4	-96.8
	3	50	-17.3	-21.4	-23.6	-25.9	-30.8	-33.4	-36.1	-41.9	-44.9	-48.1	-61.8
	3	100	-10.0	-12.2	-13.4	-14.8	-17.6	-19.1	-20.6	-23.9	-25.6	-27.4	-35.2
Roof > 10 to 30 Degrees	2	10	-27.2	-33.5	-37.0	-40.6	-48.3	-52.4	-56.7	-65.7	-70.5	-75.5	-96.9
	2	20	-27.2	-33.5	-37.0	-40.6	-48.3	-52.4	-56.7	-65.7	-70.5	-75.5	-96.9
	2	50	-27.2	-33.5	-37.0	-40.6	-48.3	-52.4	-56.7	-65.7	-70.5	-75.5	-96.9
	2	100	-27.2	-33.5	-37.0	-40.6	-48.3	-52.4	-56.7	-65.7	-70.5	-75.5	-96.9
	3	10	-45.7	-56.4	-62.2	-68.3	-81.2	-88.1	-95.3	-110.6	-118.6	-126.9	-163.0
	3	20	-40.5	-50.0	-55.1	-60.5	-72.0	-78.1	-84.5	-98.0	-105.1	-112.5	-144.4
	3	50	-33.6	-41.5	-45.7	-50.2	-59.7	-64.8	-70.1	-81.3	-87.2	-93.3	-119.9
	3	100	-28.4	-35.1	-38.7	-42.4	-50.5	-54.8	-59.3	-68.7	-73.7	-78.9	-101.3
Roof > 30 to 45 Degrees	2	10	-24.7	-30.5	-33.6	-36.9	-43.9	-47.6	-51.5	-59.8	-64.1	-68.6	-88.1
	2	20	-24.0	-29.6	-32.6	-35.8	-42.6	-46.2	-50.0	-58.0	-62.2	-66.5	-85.5
	2	50	-23.0	-28.4	-31.3	-34.3	-40.8	-44.3	-47.9	-55.6	-59.6	-63.8	-82.0
	2	100	-22.2	-27.4	-30.3	-33.2	-39.5	-42.9	-46.4	-53.8	57.7	-61.7	-79.3
	3	10	-24.7	-30.5	-33.6	-36.9	-43.9	-47.6	-51.5	-59.8	-64.1	-68.6	-88.1
	3	20	-24.0	-29.6	-32.6	-35.8	-42.6	-46.2	-50.0	-58.0	-62.2	-66.5	-85.5
	3	50	-23.0	-28.4	-31.3	-34.3	-40.8	-44.3	-47.9	-55.6	-59.6	-63.8	-82.0
	3	100	-22.2	-27.4	-30.3	-33.2	-39.5	-42.9	-46.4	-53.8	-57.7	-61.7	-79.3

For SI: 1 foot = 304.8 mm, 1 degree = 0.01745 rad, 1 mile per hour = 0.44 m/s.

a. For effective areas between those given above, the load is permitted to be interpolated; otherwise, use the load associated with the lower effective area.

TABLE 1609.6.2.1(4)
HEIGHT AND EXPOSURE
ADJUSTMENT COEFFICIENTS[a]

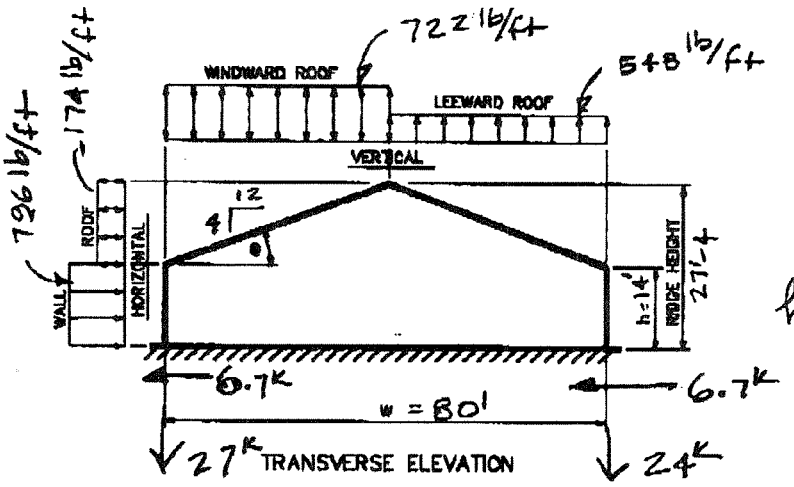
MEAN ROOF (feet)	EXPOSURE		
	B	C	D
15	1.00	1.21	1.47
20	1.00	1.29	1.55
25	1.00	1.35	1.61
30	1.00	1.40	1.66
35	1.05	1.45	1.70
40	1.09	1.49	1.74
45	1.12	1.53	1.78
50	1.16	1.56	1.81
55	1.19	1.59	1.84
60	1.22	1.62	1.87

For SI: 1 foot = 304.8 mm.

a. All table values shall be adjusted for other exposures and heights by multiplying by the above coefficients.

6

FIGURE 1609.6(3)



IBC 2000

MAX BASE SHEAR DUE TO WIND

13.4K < 20K ORIGINAL DESIGN WIND LOAD

h = 20'-8 mean roof height

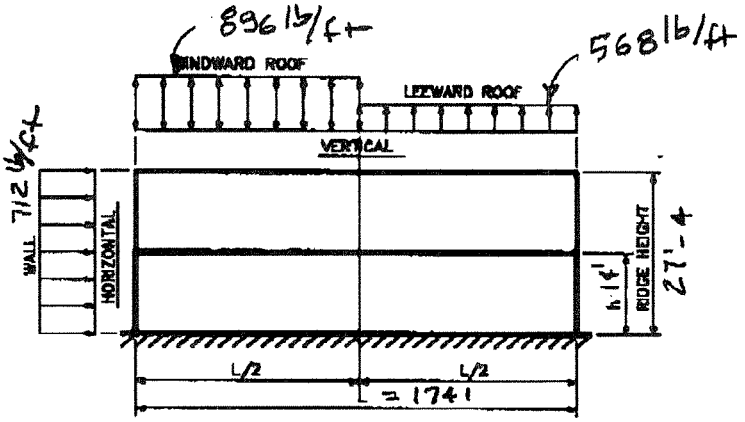


FIGURE 1609.6(3)
APPLICATION OF MAIN WINDFORCE-RESISTING SYSTEM (MWFRS) LOADS FOR SIMPLE DIAPHRAGM BUILDINGS

APPENDIX E
POTENTIAL PERMITS, LICENSES, AND ENTITLEMENTS REQUIRED

APPENDIX E
POTENTIAL PERMITS, LICENSES, AND ENTITLEMENTS REQUIRED

KODIAK LAUNCH COMPLEX

Air—The existing Alaska Department of Environmental Conservation Air Permit under the Clean Air Act will be upgraded to include Ground-Based Midcourse Defense activities

Cultural Resources—As project details are further delineated, additional archaeological surveys may be required to verify the absence of sites within the area of potential effect

Land Use—Coastal Consistency Determination under the Alaska Coastal Management Act of 1977

Water Resources—Existing Alaska Department of Environmental Conservation (ADEC) National Pollutant Discharge Elimination System permit (under Section 402 of the Clean Water Act for non-point sources from construction activities) will be updated to include Ground-Based Midcourse Defense activities

Wetlands—Section 404 Permit under the Clean Water Act

MIDWAY

No permits, licenses, or entitlements identified

RONALD REAGAN BALLISTIC MISSILE DEFENSE TEST SITE

No permits, licenses, or entitlements identified

PACIFIC MISSILE RANGE FACILITY

No permits, licenses, or entitlements identified

VANDENBERG AIR FORCE BASE

Biological Resources—Section 7 (Endangered Species Act) consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service; Section 10(a) incidental take permit under the Endangered Species and Marine Mammal Protection Acts

Cultural Resources—As project details are further delineated, coordination would occur with the Environmental Planning Section and the Cultural Resources Section at Vandenberg AFB to further ensure that cultural resources would be protected

Water Resources—Construction of the IDT would require a Construction Activities Storm Water General Permit from the California State Water Resources Control Board, or its local Central Coast Regional Water Quality Control Board. A related Stormwater Pollution Prevention Plan would also need to be prepared before the commencement of any soil-disturbing activities.

SEA-BASED TEST X-BAND RADAR

Airspace—Federal Aviation Administration initiated Notices to Airmen and Notices to Mariners when the Sea-Based Test X-Band Radar is testing

Biological Resources—Section 7 (Endangered Species Act) consultation with the U.S. Fish and Wildlife Service and the National Marine Fisheries Service

Land Use—Coastal Consistency Determination depending on location of the Primary Support Base

BROAD OCEAN AREA

Airspace—Federal Aviation Administration initiated Notices to Airmen and Notices to Mariners when the Sea-Based Test X-Band Radar is testing

APPENDIX F
COOPERATING AGENCIES ACCEPTANCE LETTERS

U.S. Department
of Transportation
Federal Aviation
Administration

800 Independence Ave., S.W.
Washington, D.C. 20591

NOV 13 2001

Ronald T. Kadish
Lieutenant General, USAF
Director
Ballistic Missile Defense Organization
7100 Defense Pentagon
Washington D.C. 203091-7100

Dear General Kadish:

It has come to my attention that the Department of Defense Ballistic Missile Defense Organization (BMDO) will be proposing construction and operations in support of the National Missile Defense System at the Kodiak Launch Complex (KLC). I also understand that in conjunction with the proposed activities at KLC, the BMDO will be initiating an environmental review process pursuant to the National Environmental Policy Act (NEPA). The Federal Aviation Administration (FAA) Office of the Associate Administrator for Commercial Space Transportation, the Federal agency responsible for licensing the operation of U.S. commercial launch facilities, is reviewing the license renewal process for the KLC. The license renewal process will also require NEPA review. Given the similar timing and the fact that the BMDO and FAA actions are connected, I propose that the FAA and BMDO work together to fulfill their NEPA obligations.

By way of background, the FAA issued a launch site operator license to the Alaska Aerospace Development Corporation (AADC) in September 1998 that specifies the terms and conditions under which the KLC can be operated. The AADC license is valid for a period of five years. The current license expires in September 2003 and will need to be renewed prior to that time. As part of the license renewal process and pursuant to NEPA, the FAA must make an environmental determination regarding any proposed modification to the terms of the launch site operator license. This would include any proposed addition or change to on-site facilities and operations at KLC. The FAA is advising that AADC begin the environmental portion of the license renewal process as soon as possible. We note that if the AADC license is not renewed prior to September 2003, the KLC launch site operator license will expire and no launches could occur at the facility.

NEPA emphasizes agency cooperation early in the environmental review process. Recognizing that the FAA has jurisdiction by law over the operation of the launch facility and any commercial launches proposed to take place at KLC, the FAA proposes that a cooperative environmental process is appropriate. Currently both BMDC and FAA are beginning a NEPA environmental review process for the KLC facility. The proposed actions to be evaluated under NEPA by BMDO must also be considered by the FAA during the license renewal process. It seems clear that environmental documentation to meet the needs of both agencies could be addressed in one Environmental Impact Statement (EIS) thereby reducing paperwork and delay. Therefore, the FAA requests that the BMDO designate the FAA a cooperating agency, as provided in 40 CFR § 1501.6, for an EIS to cover both proposed construction and operations in support of the National Missile Defense System test activities at the KLC as well as proposed renewal of the ADDC launch site operator license.

Specific arrangements and details pertaining to the responsibilities and regulatory requirements of each agency can be discussed and outlined in a future Memorandum of Agreement between the BMDO and the FAA. Initiating this arrangement early in the NEPA review process will help to ensure that the concerns and requirements of both agencies are thoroughly addressed.

Please feel free to contact me at (202) 267-7793 or Michon Washington from my staff at (202) 267-9305. I look forward to hearing back from you regarding the FAA request for designation as cooperating agency on the BMDO EIS and to working with you on this project.

Sincerely,

Patricia G. Smith
Associate Administrator for
Commercial Space Transportation

APPENDIX G
ELECTROMAGNETIC RADIATION SUMMARY

APPENDIX G
ELECTROMAGNETIC RADIATION SUMMARY

The information in this appendix focuses on the nature and control of potential health and safety and interference effects associated with non-ionizing electromagnetic radiation (EMR) from the proposed Sea-Based Test X-Band (SBX) radar.

IONIZING AND NON-IONIZING RADIATION

EMR is generated during the operation of medical/diagnostic equipment, microwave ovens, cellular phones, computers, radios, televisions, radars, and similar devices. EMR is usually classified as one of two types: ionizing radiation or non-ionizing radiation. Ionizing radiation is produced by x-rays, cosmic rays, and gamma rays. Non-ionizing radiation is produced by a wide variety of equipment such as cellular phones, ham radios, and radars.

HEALTH EFFECTS AND STANDARDS

Human exposure to high levels of ionizing radiation can cause cell tissue damage. The EMR (non-ionizing radiation) that is generated by radars, microwave ovens, cellular phones, etc., is absorbed into the human body in the form of heat. This causes the temperature of the body to rise. At low intensities, the heat that is induced by EMR can be accommodated by the body's ability to regulate its temperature through blood flow and perspiration. Thus, any effects produced would be regulated by the body in a manner similar to when the body heats up due to exercise or exposure to the sun. At high intensities, the thermoregulatory capabilities may be exceeded, which could lead to thermal distress or irreversible thermal damage similar to heat exhaustion or severe sunburn.

The Institute of Electrical and Electronics Engineers (IEEE) is considered a leading authority in computer engineering, biomedical technology, telecommunications, electric power, aerospace, and consumer electronics, with individual members in approximately 150 countries. For non-ionizing radiation, the Occupational Safety and Health Administration established a radiation protection guide (29 Code of Federal Regulations 1910.97) for normal environmental conditions and for incident electromagnetic energy of frequencies from 10 megahertz (MHz) to 100 MHz. This radiation protection guide is 10 milliwatts per square centimeter (mW/cm^2), as averaged over any possible 1-hour period. Department of Defense (DoD) Instruction 6055.11, *Protection of DoD Personnel from Exposure to Radiofrequency (RF) Radiation*, established Permissible Exposure Levels (PELs) for controlled and uncontrolled environments and for high power microwave narrow-band and electromagnetic pulse broad-band simulator systems.

The IEEE guidelines are more stringent than the U.S. Environmental Protection Agency (EPA) guidelines, based on the shorter averaging time, and therefore are used in the SBX analysis. The IEEE standards have dual designations as American National Standards Institute standards. The Federal Communications Commission regulations are primarily based on the 1986 National Council for Radiation Protection and Measurement Report No. 86, *Biological*

Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields, but also incorporate portions the 1991 IEEE standard.

To protect people from exposure to levels of EMR that may be considered harmful, the IEEE has defined an extremely conservative set of standards based on the relationship between the body mass and skin area (the whole body exposure of a human baby or small child) that converts the exposure limit to a power density related to area. Hundreds of studies (321 that are referenced in the latest version of IEEE C95.1-1999) have determined that laboratory animals may be affected by specific absorption rates (the rate at which the EMR is absorbed by the body as heat) if maintained for extended periods of time. The periods of time are frequency dependent because the higher frequencies have less penetration depth than lower frequencies. The IEEE also applied a safety factor of 10 in arriving at standards for human exposure which are expressed in terms of milliwatts per square centimeters (mW/cm^2). General public exposure is typically limited to one-fifth of the occupational limits. Table G-1 provides a comparison of EMR exposure from a variety of sources.

Table G-1: Comparison of EMR Exposure

System	Distance	Power Density
Microwave Oven	5 centimeters (2 inches)	5 mW/cm^2
SBX	85 meters (278 feet) (worst-case)	5 mW/cm^2
Walkie-Talkie	10 centimeters (4 inches)	2.5 mW/cm^2
Cellular Phone	1 centimeter (0.4 inches)	0.6 mW/cm^2

At X-band frequencies (8,000 MHz to 12,000 MHz), the IEEE standards for human exposure is 5.33 mW/cm^2 to 8 mW/cm^2, respectively. In order for the SBX to have an effect on human health, the beam operating at full power would have to come in contact with a person and remain on them for 7.5 minutes (8,000 MHz) and 11.25 minutes (12,000 MHz). Under proposed SBX operating conditions, full power operation would involve tracking objects in space with the beam pointed up and constantly moving. The beam would not remain stationary for any period of time. Safe distance separations and redundant RF Radiation Hazard Safety software controls would not allow a full power beam to come in contact with any personnel, on the deck of the SBX or on land. Similar software controls have been effectively used on the Ground-Based Radar Prototype (GBR-P) at Kwajalein Island in the Republic of the Marshall Islands for over 5 years.

People with pacemakers may be affected by the EMR generated by some radars. According to the Air Force Occupational Safety and Health Standard 161-9, a significant disruption of normal pacemaker function requires RF radiation signals having a primary frequency between 100 and 5,000 MHz, pulse widths greater than 10 microseconds, and electric field strengths greater than 10 mW/cm^2. The disruption of pacemakers via RF radiation has also been studied extensively at the Georgia Technical Research Institute and similar results have been found. The SBX is not in the same frequency band, nor would it exceed the 10 mW/cm^2 that are required to affect pacemakers.

INTERFERENCE EFFECTS

Communications-Electronics Equipment

The proposed SBX operates within the 8,000–12,000 MHz frequency band, commonly referred to as the X-band. RF interference is most likely to occur when two pieces of communications-electronics equipment are operated within the same frequency band (in-band-interference). Therefore, equipment whose frequencies fall within the X-band is most likely to be affected by the SBX. Some examples of X-band communications-electronics equipment include airborne weather radars, fire control radars, and bomb/navigation radars. Garage door openers are well below this frequency and would not be affected. Adjacent-band RF interference is similar to in-band RF interference. The adjacent bands for the X-band include all frequencies that are within approximately 5 percent of the operating frequency. Interference is also possible to systems that operate in harmonically-related frequency bands. Harmonic band interference refers to interference produced in harmonically related receivers or interference caused by sub-harmonically related transmitters. Harmonic frequencies include those frequencies which are integer multiples of the operating frequencies. Systems that operate in harmonically-related frequency bands include airport surface detection equipment and broadcasting satellite service. Software controls and coordination with military and commercial aircraft controllers would minimize this potential interference. Personal home satellite systems would not be affected.

Systems that operate outside of X-band and the harmonically-related frequency bands could be subject to interference (non-frequency-related) due to high power effects from the SBX. High power effects typically occur in receivers that are located close to high power transmitters and may be the result of either antenna-coupled signals or equipment case penetration. The accepted levels for high power effects are 1 mW/cm^2 for military equipment and 0.1 mW/cm^2 for civilian equipment. At power levels below these thresholds, it can be reasonably assumed that high power effects are not likely to occur. At power levels above these thresholds, it cannot be stated with certainty that high power effects will occur, only that it is possible. Under proposed SBX operating conditions, full power operation would involve tracking objects in space with the beam pointed up and constantly moving. The beam would not remain stationary for any appreciable period of time; thus the odds of interference from high power effects with any electronic equipment on the ground would be slight, 1/1000000 or 0.0001 percent of the time (roughly 1/10 of a second per day). The effects would not damage any electronic equipment and would last for less than 1 second, should this occur.

Ground-based, airborne, and ship-based systems will be evaluated for in-band, adjacent-band, and harmonic band interference during the detailed EMR/electromagnetic interference (EMI) survey that is underway. Level 2 surveys are planned to be completed in the summer of 2003.

Electro-Explosive Devices

An electro-explosive device (EED) is defined as a device in which electrical energy is used to initiate an enclosed explosive, propellant, or pyrotechnic material. Some applications of EEDs are detonators, squibs, blasting caps, and igniters. A current sufficient to initiate the EED can be induced by exposure of the device to an electromagnetic field. The potential impacts to EEDs from emissions from the X-Band Radar (XBR) are twofold: (1) the EED could be made not to work (a phenomenon known as dudding), or (2) the EED could be inadvertently initiated. The majority of the time, an EED is either installed in its intended application with its leads attached (the presence phase) or is in the shipping/storage phase. Typical EED applications in the presence phase would include fire extinguishers, automotive airbags, a missile attached to

the wing of an aircraft, and military aircraft ejection seats. However, infrequently, EEDs are sometimes handled without the protection of a storage container (handling/loading phase). Therefore, different susceptibility criteria have been developed for each of these two distinct conditions described above. As can be seen from table G-2, EEDs in the handling/loading phase are substantially more susceptible to EMR hazards; however, main beam illumination on the ground will not occur. Based upon a grating lobe illumination on the ground from the fully populated SBX, a separation distance of 2.3 kilometers (1.4 miles) is recommended for EEDs in the handling/loading phase (table G-2). The distances for the 65 percent populated SBX are also shown in table G-2.

Table G-2: Electromagnetic Radiation Potential Interference Distances for SBX

	65 Percent Populated	**Fully Populated**
	kilometers (miles)	kilometers (miles)
Main beam (average field intensity) on an aircraft (air)	12.1 (7.5)	19 (11.8)
Main beam on an EED presence/shipping (ground and air) such as a missile mounted on an aircraft wing or an EED in a shipping container	4.8 (3.0)	7.5 (4.6)
Grating lobe on an EED handling (ground) where an EED is in an exposed position	1.6 (1.0)	2.3 (1.4)
Grating lobe on an EED presence/shipping (ground and air) such as a vehicle airbag or an EED in a shipping container	<10 meters (<33 feet)	<10 meters (<33 feet)
Military communications/electronics	3.5 (2.2)	7.1 (4.4)
Commercial communications/electronics	15.4 (9.6)	22.4 (13.9)
Grating or side lobe personnel hazard (exceeds Permissible Exposure Limit within)	85 meters[1] (279 feet[1]) 0 meters[2] (0 feet[2])	150 meters[1] (493 feet[1]) 0 meters[2] (0 feet[2])

[1] Personnel Hazard distance worst case—without software controls

[2] Personnel Hazard distance with software controls

It is assumed that the handling/loading of EEDs will not occur when aircraft are airborne. However, main beam illumination of in flight aircraft with EEDs (mainly military aircraft ejection seats) in the presence and shipping phases is possible. There is a potential for EED radiation interference for distances up to 7.5 kilometers (4.6 miles) in the air. Software controls on the SBX and coordination with military and commercial aircraft controllers would be used to ensure that aircraft bearing EEDs are not threatened by main beam interference. Based on the EMR/EMI survey results and coordination with the Federal Aviation Administration (FAA), the U.S. Department of Transportation, and others, the SBX operating area would be crafted in time and space so as to avoid existing airports, air routes, and airspace users. The general SBX operating area would be published on appropriate aeronautical charts to inform pilots of the potential EMI hazard to certain aircraft.

The main beam and side lobes of the SBX could also illuminate EEDs on the ground in the presence/shipping phase. However, the potential radiation hazard would exist only 10 meters (33 feet), in front of the radar, which would be limited to the deck of the SBX. Therefore, EEDs on the ground, including those associated with airbags in vehicles, would not be affected.

Two separate, redundant computer systems (similar to controls effectively used on the large XBR currently operating at Kwajalein Island in the Republic of the Marshall Islands) would monitor all emission energy levels at locations around the radar to assure safe exposure levels would be maintained. These software controls and coordination with military and commercial aircraft controllers would also minimize potential interference to systems such as airport surface detection equipment and broadcasting satellite services that operate in harmonically-related frequency bands.

Aircraft/Avionics

Another form of non-frequency related interference affects aircraft and avionics. Both the DoD and the FAA have standards for EMR interference to aircraft, which should not be exceeded. DoD uses MIL-STD-464 standards; therefore, military aircraft must be hardened or protected from EMR with a peak power threshold up to 3500 volts per meter (V/m) and 1270 V/m (average power). The SBX would not exceed these levels. Commercial aircraft must be hardened or protected from EMR levels up to 3,000 V/m (peak power) and 300 V/m (average power) as mandated by the FAA by Notice 8110.71, Guidelines for the Certification of Aircraft Flying through High Intensity Radiated Field Environments. The SBX would not exceed the 3000 V/m peak power threshold. The SBX could exceed the 300 V/m average power threshold. As shown in table G-2, the fully populated radar has a potential for interference out to a distance of 19 kilometers (11.8 miles) from the SBX. The average power threshold is based upon reducing the time of exposure of aircraft avionics (electronic equipment) to High Intensity Radiated Fields in order to preclude shortening the life of the aircraft avionics. Therefore, the concern is not interference but is a reduction in life of the aircraft avionics/electronic equipment.

Fuels

Based upon the threshold of 5,000 mW/cm^2 from Technical Order 31Z-10-4, the SBX does not present a radiation hazard to fuels because the SBX does not emit radiation levels that exceed 5,000 mW/cm^2.

SUMMARY

The proposed SBX operating conditions at a Primary Support Base would include full power operation to track objects in space. The beam would be pointed up and constantly moving along with the object. Software controls would not allow a full power beam to come in contact with any personnel on the platform or on land. Similar software controls have been proven and effectively used on the large XBR operating at Kwajalein Island in the Republic of the Marshal Islands. The disruption of pacemakers via RF radiation has been studied extensively by the Air Force and Georgia Technical Research Institute, and the SBX would not exceed the 10 mW/cm^2 that those agencies determined would be required to affect pacemakers.

The potential radiation hazard for EEDs on the ground would exist only 10 meters (33 feet) in front of the radar or only on the main deck of the SBX. Therefore, EEDs on the ground, including those associated with airbags in vehicles, would not be affected. Garage door openers as well would not be affected because they are well below the operating frequency of the SBX. The beam from the SBX would not remain stationary during operation for any period of time, thus the odds of interference from high power effects with any electronic equipment on the ground would be slight, 1/1000000 or 0.0001 percent of the time (roughly 1/10 of a second per day). The effects would not damage any electronic equipment and would last for less than 1 second, should this occur.

The SBX will not exceed the 3,000 V/m peak power threshold for commercial aircraft as established by the FAA. The SBX could exceed the 300 V/m average power threshold; however, the concern is not interference but a reduction in life of the aircraft avionics.

Based on the current standards and analysis described above, proposed operation of the SBX in port, with appropriate controls and coordination, would not pose a hazard to personnel or equipment.

APPENDIX H
THREATENED AND ENDANGERED SPECIES DESCRIPTIONS

APPENDIX H
THREATENED AND ENDANGERED SPECIES DESCRIPTIONS

PLANTS

Lau'ehu *(Panicum niihauense)*

Lau'ehu is a federally and state endangered grass species that was historically known to occur on Niihau and one location on Kauai. It is currently known to occur as 23 individuals scattered in the sand dunes on state-owned land near Queen's Pond in Polihale State Park, north of the Pacific Missile Range Facility (PMRF). It has not been identified on PMRF. The primary threats to this grass are off-road vehicles, competition with alien/exotic species, and the risk of extinction due to natural events because of the small size of the population.

Critical habitat is the term used in the Endangered Species Act to define those areas of habitat that are known to be essential for an endangered or threatened species to recover and that require special management protection. A proposed rule to designate critical habitat for 76 listed plant species on the islands of Kauai and Niihau was published in the *Federal Register* in November 2000 (Federal Register, 2000b). This proposed rule included land in the northwestern end of PMRF near Polihale State Park as critical habitat for the endangered ohai and lau'ehu. In January 2002, the U.S. Fish and Wildlife Service (USFWS) proposed critical habitat for additional plant species on Kauai and Niihau, revising the total number of plants to 83, which includes additional land in the southern portion of PMRF for protection of lau'ehu. (U.S. Fish and Wildlife Service, Pacific Region, 2002a; Federal Register, 2002) The USFWS reevaluated the dune habitat on PMRF and the habitat on Navy land at Makaha Ridge and determined that these lands were not essential for the conservation of ohai or dwarf iliau. However, the USFWS has determined that land on PMRF adjacent to Polihale State Park and dune areas along the southern portion of the range contain primary constituents necessary for the recovery of lau'ehu because not enough areas exist outside of PMRF. If the Navy revises its Integrated Natural Resources Management Plan to address the maintenance and improvement and long-term conservation of the lau'ehu, the USFWS will reassess critical habitat boundaries. (Federal Register, 2003)

Ohai (*Sesbania tomentosa*)

Ohai is a federally and state endangered member of the pea family that is endemic to Hawaii. Historically this species occurred on all of the main Hawaiian Islands but currently has been identified on Necker, Nihoa, Kauai, Oahu, Molokai, Maui, and Hawaii. Foraging by deer, cattle, sheep, and pigs may have extirpated the species from other islands. Ohai has been observed in Polihale State Park, adjacent to a state-owned pond south of the park, and in the sand dunes north of PMRF.

As stated above, the USFWS reevaluated the dune habitat in the northwestern end of PMRF near Polihale State Park as critical habitat for ohai and determined that these lands were not essential for its conservation (Federal Register, 2003).

Dwarf Iliau *(Wilkesia hobdyi)*

The dwarf iliau, a federally and state endangered member of the daisy or sunflower family, has been observed on rocky outcrops of the cliff overlooking Makaha Valley, to the north of the tracking station on Makaha Ridge. It occurs only on Kauai at elevations ranging from about 275 to 400 meters (902 to 1,312 feet). Threats to the dwarf iliau include habitat disturbance and browsing by feral goats. Threats to its survival could also include fire and naturally occurring events, such as landslides or hurricanes.

The USFWS recently reevaluated the habitat on Navy land at Makaha Ridge and determined that these lands were not essential for the conservation of dwarf iliau (Federal Register, 2003).

Lompoc Yerba Santa *(Eriodictyon capitatum)*

The federally endangered Lompoc yerba santa is a shrub in the waterleaf family that produces lavender flowers on sticky stems that can reach heights of 3 meters (10 feet). It grows in maritime chaparral and southern bishop pine forests in western Santa Barbara County, California. (U.S. Fish and Wildlife Service, 2002c)

The USFWS excluded approximately 2,126 hectares (5,253 acres) of critical habitat for the Lompoc yerba santa and Gaviota tarplant at Vandenberg AFB because the benefits of excluding the base from being designated as critical habitat for the two plant species were more significant. This decision was based on Vandenberg's commitment to the development and implementation of the protective measures agreed to in their revised Integrated Natural Resource Management Plan, including the establishment of Sensitive Resource Protection Areas for the plants in the areas proposed for critical habitat designation. The monitoring, survey, enhancement, and restoration activities Vandenberg AFB will undertake that will provide additional benefits to the species and, in addition, will provide encouragement to Vandenberg for ongoing positive environmental protection programs and partnerships on base that may lead to future conservation. (U.S. Fish and Wildlife Service, 2002)

Gaviota Tarplant (*Hemizonia increscens* ssp. *villosa*)

The federally and state endangered Gaviota tarplant is a gray-green annual in the sunflower family that has yellow flowers and can grow to a height of 89 centimeters (35 inches). It occurs in rare needlegrass grasslands between Point Arguello and Gaviota, California on coastal terraces and along ridgeline saddles in the Santa Ynez Mountains. (U.S. Fish and Wildlife Service, 2002)

As stated above, land on Vandenberg AFB was excluded as critical habitat for the Gaviota tarplant.

BIRDS

Short-tailed Albatross *(Phoebastria albatrus)*

The short-tailed albatross is a very large seabird that is listed as endangered both federally and by the State of Alaska. There are no breeding populations in the United States, but several individuals have been regularly observed on Midway Atoll during migration and the breeding season. Midway Atoll is the only terrestrial area within U.S. jurisdiction that is currently used by the short-tailed albatross for attempted nesting. Single nests occasionally occur on the island.

Most summer sightings in Alaska are in the Aleutian Islands, Bering Sea, and Gulf of Alaska (State of Alaska Online, 2002b). The world population is estimated to be 1,200 (U.S. Fish and Wildlife Service, 2001).

Threats to the species include destruction of breeding habitat by volcanic eruption, mud or land slides caused by monsoons, and genetic vulnerability due to low population numbers and limited breeding distribution.

Steller's Eider *(Polysticta stelleri)*

The Steller's eider is a diving duck that has three distinct breeding populations: two in Russia and one (a small portion, less than 5 percent) in Alaska. The Alaskan population is listed as federally threatened due to a substantial decrease in size. Most of the world's Steller's eiders winter along the Alaskan Peninsula, an area that includes Kodiak Island and the Aleutian Islands. The Steller's eiders spend most of the year in shallow, nearshore marine waters (Bureau of Land Management, 2002). Rafts of the eiders were primarily observed offshore of North and South Lagoons on Kodiak and offshore of Pasagshak Bay during surveys conducted in 1997 and 1998 (Alaska Aerospace Development Corporation, 1998).

Threats to the species include predation by ravens, gulls, and foxes in breeding areas; increased shipping traffic and disturbance of feeding flocks; and contaminants in the Bering Sea that affect food availability. (Bureau of Land Management, 2002)

Hawaiian Duck (*Anas wyvilliana)*

The federally and state endangered Hawaiian duck's range formerly included all the main islands except Lanai and Kahoolawe. The only remaining natural population occurs on the island of Kauai, but the species has been successfully reintroduced to the islands of Oahu and Hawaii. Kauai supports the main population of the Hawaiian duck. The current population is estimated to be about 2,000 on Kauai. About 90 percent of the Kauai duck population uses montane stream habitat between elevations of 305 and 1,219 meters (1,000 and 4,000 feet). Habitat near PMRF includes the Mana pond, Mana ditches and drains, and pasture land near Kekaha. Individuals have also been observed in wetland areas (drains) on PMRF. (U.S. Fish and Wildlife Service, 2001; Pacific Missile Range Facility, Barking Sands, 1998)

The Hawaiian duck uses a variety of wetland habitats, from sea level to elevations of 1,067 meters (3,500 feet). Marshes, reservoirs, taro patches, streams and river valleys, flooded grassland, coastal ponds, mountain pools, bogs and forest swamplands, drainage ditches, and wet agricultural lands are used as habitat for feeding and nesting. Nesting may occur year round, but most nesting occurs in December through May. Concealed nests are built on the ground near water. U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

The primary cause for the decline of the Hawaiian duck is the loss of wetland habitat and hunting. The Hawaiian duck is also limited by degradation of wetland habitat and introduced predators such as feral pigs, rats, and dogs that eat ducklings or disturb nests. Toxic chemicals may also adversely affect the species. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

Hawaiian (American) Coot *(Fulica americana alai)*

The federally and state endangered Hawaiian coot is a subspecies of the common American coot. It is nonmigratory and is endemic to the Hawaiian Islands. The Hawaiian coot occurs on all the main islands (Hawaii, Maui, Molokai, Oahu, Lanai, Kauai, and Niihau) except Kahoolawe. The largest concentrations occur on Maui, Oahu, and Kauai. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

The preferred habitat of the Hawaiian coot includes thickly vegetated fresh and brackish marshland and ponds. On PMRF, the Hawaiian coot is limited to wetland habitat along drainage ditches and settling ponds. Nesting occurs year round. Floating nests and platforms are built from aquatic vegetation. Feeding occurs at the water surface and by diving. The Hawaiian coot rarely flies. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

The primary cause of the decline of the Hawaiian coot is the loss of wetland habitat. Natural and agricultural wetlands have been converted to drier agricultural use and developed for housing, resorts, and other urbanized use. Exotic plant species that invade the wetlands compete with the more desirable species and eliminate open water areas. Introduced predators have also had a negative impact on the population. Toxic chemicals from agriculture and other human activity may also be a threat. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

Hawaiian Common Moorhen *(Gallinula chloropus sandvicensis)*

The federally and state endangered Hawaiian moorhen is a non-migratory endemic species of the Hawaiian Islands. Its range is limited to Kauai, Oahu, and possibly Maui and Molokai. The species also occurs on the playa lakes and other natural and man-made lakes and ponds on Niihau. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

Preferred habitat of the Hawaiian moorhen includes thickly vegetated freshwater ponds, marshes, reservoirs, irrigation ditches, taro patches, and wet pasture. Areas below elevations of 125 meters (400 feet) are preferred. Available habitat is used for nesting, feeding, and loafing sites. Protected habitat for the Hawaiian moorhen is present on Kauai within the Hanalei and Huleia National Wildlife Refuges and at State bird sanctuaries such as the newly developed Kawaiele Sanctuary and the Mana base pond. Both of the latter locations are near PMRF. On PMRF, the Hawaiian moorhen is limited to wetland habitat along agricultural drainage ditches and settling ponds. Individuals have been observed foraging on the Mana base pond (near the north end of PMRF). (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

The primary cause of the decline of the Hawaiian moorhen is the loss of wetland habitat. Other factors include introduced predators, disease, hybridization, and toxic contaminants. The introduced common myna is an egg predator, and the black crowned night heron may also be a predator of the Hawaiian moorhen. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

Hawaiian Black-necked Stilt (*Himantopus mexicanus knudseni*)

The federally and state endangered Hawaiian black-necked stilt is endemic to the Hawaiian Islands. It is known to occur on all of the main islands except Kahoolawe. Protected habitat for the Hawaiian black-necked stilt is present on Kauai within the Hanalei and Huleia National Wildlife Refuges and at State bird sanctuaries, such as the newly developed Kawaiele Sanctuary and the Mana base pond. Both of the latter locations are near PMRF. Additional habitat exists on Kauai at several reservoirs and agricultural areas. On PMRF, the Hawaiian black-necked stilt is limited to wetland habitat along agricultural drainage ditches and settling ponds. Individuals have been observed foraging on the Mana base pond (near the north end of PMRF).

Hawaiian black-necked stilts use a variety of wetland habitats and move between different locations daily. The different locations are used separately for feeding, loafing, and nesting. Feeding occurs in shallow, fresh, brackish, or salt water. Loafing occurs in open mudflats, pickleweed mats, open pasture, islands in offshore mudflats, and in fresh or brackish ponds. Nesting occurs on sparsely covered ground adjacent to or on islands surrounded by fresh or brackish water. Irrigation reservoirs, settling basins, ponds, marshes, taro patches, silted ancient fish ponds, and salt evaporation pans are used as nesting locations. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

The primary cause of the decline of the Hawaiian black-necked stilt is the loss of wetland habitat. The stilt is also limited by degradation of wetland habitat, introduced predators, and lack of suitable nesting habitat. The species may also be adversely affected by toxic chemicals. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

Hawaiian Goose (ne ne) *(Nesochen sandvincensis)*

The federally and state endangered Hawaiian goose is endemic to the Hawaiian Islands (Hawaii, Maui) and is the Hawaiian state bird. It almost became extinct in the wild by 1951 when the population was limited to 30 birds. A small introduced population is present at Makaha Ridge of the PMRF complex. This population had at least two breeding pairs with young in 1997, and appeared to be doing well in the open areas between buildings and other structures within the Makaha Ridge facility. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

The Hawaiian goose frequents scrubland, grassland, golf courses, sparsely vegetated slopes, and open lowland country. The breeding season is from November to June. It appears to prefer nesting in the same nest area. Family groups remain in the breeding grounds for approximately 1 month. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

Threats to the species include predation by introduced species such as rats, dogs, cats, mongooses, and pigs. Poor available nutrition in their habitat may contribute to low productivity. (U.S. Fish and Wildlife Service, 2003)

Hawaiian Dark-rumped Petrel (*Pterodroma phaeopygia sandwichensis*)

This federally and state endangered subspecies of the dark-rumped petrel nests only in the Hawaiian Islands and in the Galapagos Islands. The Hawaiian dark-rumped petrel breeds in

burrows in barren areas high along large rock outcrops on mountain slopes. In the Hawaiian Islands, the Hawaiian dark-rumped petrel breeds on Kauai, Maui, Lanai, Hawaii, and possibly on Molokai. Nearly the entire known population of Hawaiian dark-rumped petrels, about 900 pairs, nests in colonies on Maui in or near Haleakala National Park. The potential numbers of Hawaiian dark-rumped petrels on Kauai are low; they are not expected to occur on or near PMRF. The breeding season is from March to October. During the breeding season, they come and go between the nest site and the ocean at night. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

Threats to the species include predation by introduced mammals, development, ocean pollution, and disturbance to their breeding grounds (U.S. Fish and Wildlife Service, 2003).

Newell's Townsend's Shearwater *(Puffinus auricularis newelli)*

The federally threatened and state endangered Newell's Townsend's shearwater is endemic to the Hawaiian Islands. Breeding occurs on steep, forested slopes of Kauai, which is the primary location of breeding habitat for the Newell's shearwater. Breeding grounds are typically at elevations of 152 to 701 meters (500 to 2,300 feet). The wetter side of the island is preferred. It nests in burrows, which are used year after year, usually by the same pair. Fledging occurs in October and November. Adults and fledging chicks fly between nesting areas and the ocean at night only. These flight corridors are considered critical habitat for the Newell's shearwater. The Newell's shearwater is not known to nest on or near PMRF or its associated facilities such as Makaha Ridge. However, it may cross the PMRF facilities during flights from the breeding grounds in the mountains to the ocean. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

The greatest threat to the Newell's Townsend's shearwater population is predation by the mongoose and feral dogs and cats. Feral pigs also damage nesting grounds through rooting activity. Urbanization, especially near the coast, has had an adverse impact on breeding colonies of the Newell's shearwater because bright outdoor lights cause fledglings to become disoriented on their flights to the ocean and possibly cause temporary night blindness. Disoriented fledglings may collide with power lines and other obstacles and fall to the ground. The Barking Sands-Kekaha area, in which PMRF is located, has recorded relatively low numbers of fallen birds. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

Western Snowy Plover (*Charadrius alexandrinus nivosus*)

The federally threatened western snowy plover breeds along the Pacific coast from southern Washington State to southern Baja California, Mexico. The majority breed along the California coast. They currently occupy beaches in the Santa Barbara area from Point Conception to Point Sal, Santa Rosa Island, and San Nicolas Island (County of Santa Barbara, Department of Planning and Development, 2003). The plover nests and forages year round on the beaches and intertidal zone of San Nicolas Island. Several beaches on San Nicolas Island have been designated as critical habitat for the western snowy plover. Nesting beaches are closed during the breeding season (March through September) and are monitored weekly to determine plover usage. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002; Sacramento Fish and Wildlife Service, 2003)

The western snowy plover is commonly observed in the Vandenberg AFB area, which provides nesting and roosting habitat. The USFWS has designated critical habitat for nesting snowy plovers in 28 areas along the coasts of California, Oregon, and Washington, including the beaches of Vandenberg AFB. Vandenberg AFB is developing a management plan in coordination with USFWS for beach closures during the snowy plover nesting season (1 March through 30 September). The nesting season extends from early March through late September and may be 2 to 4 weeks earlier in southern California than in Oregon and Washington. Nests typically occur in flat, open areas. (Sacramento Fish and Wildlife Service, 2003)

Threats to the Western snowy plover include shoreline modification, recreational activities such as the use of off-road vehicles and beach combing, and loss of nesting habitat. (Sacramento Fish and Wildlife Service, 2003)

California Brown Pelican *(Pelecanus occidentalis californicus)*

The federally and state endangered California brown pelicans breed in nesting colonies on islands free of mammal predators. Nesting is restricted to Gulf of California islands, along the outer coast from Baja California to West Anacapa, and Santa Barbara islands in Southern California. The breeding season is from March to August (County of Santa Barbara, Department of Planning and Development, 2003). Non-breeding pelicans occur along the Pacific Coast from the Gulf of California northward to Washington State and southern British Columbia.

Breeding habitat occurs on San Nicolas Island and the pelicans roost along the coastline, mainly along the eastern end of the island (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002). The California brown pelican is commonly observed in the Vandenberg AFB area, which provides winter roosting. The beach at the mouth of Shuman Creek is also occasionally used by the California brown pelican (Vandenberg Air Force Base, 2003). The pelicans also roost at Point Sal. (Sacramento Fish and Wildlife Service, 2003)

Threats to the California brown pelican include the decline in their food supply due to overfishing, entanglement with hooks and fishing lines, disturbance at roosting sites, disease outbreaks, and climatic changes. (Sacramento Fish and Wildlife Service, 2003)

California Least Tern (*Sterna antillarum browni*)

The federally and state endangered California least tern is a migratory bird that is present in Southern California from April to September. It migrates further south for the winter. The least tern nests in colonies on sandy open areas, near lagoons or estuaries, where fish are available. Least terns nest from mid-April through August along the western coast from San Francisco to Baja California, Mexico. It also forages in nearshore waters. Least terns have been observed in Shuman Creek on Vandenberg AFB, which is the main water body closest to the proposed project launch sites and which offers foraging areas. (Vandenberg Air Force Base, 2003)

Threats to the California least tern include habitat loss, human disturbance, predation, and climatic events (County of Santa Barbara, Department of Planning and Development, 2003).

AMPHIBIANS

California Red-legged Frog *(Rana aurora draytoni)*

The federally threatened California red-legged frog occurs in nearly all permanent streams and ponds on Vandenberg AFB, including the San Antonio Creek and the man-made Mod III Lake located south of Building 1819 on the southern edge of San Antonio Terrace. The California red-legged frog is found in surrounding riparian areas, as well as in freshwater ponds neighboring the area and Barka Slough. The California red-legged frog is also found in riparian wetland areas in the northwestern Vandenberg AFB portion near Minuteman Beach, and shows a preference for freshwater pools and ponds associated with arroyo willow, cattails, and other thickets of emergent aquatic vegetation. (U.S. Department of the Air Force, 1997b) In March 2001, the USFWS designated 1.6 million hectares (4.1 million acres) in 28 California counties as critical habitat for the threatened California red-legged frog, but excluded Vandenberg AFB since its integrated natural resource management plan provided adequate management for the on-base population (Jumping Frog Research Institute, 2001).

Threats to the California red-legged frog include the presence of exotic species such as the bullfrog and nonnative fish, human disturbance such as alteration of critical stream habitat features and commercial exploitation, and natural events (Vandenberg Air Force Base, 1997).

REPTILES

Loggerhead Sea Turtle (*Caretta caretta)*

The federally threatened loggerhead sea turtle is a large turtle similar to the green sea turtle. It occurs in oceans throughout the world. However, it is considered a visitor to the Hawaiian Islands and does not nest in the archipelago. Since it does not nest in the State of Hawaii, the state does not list the species as threatened or endangered. (Pacific Missile Range Facility, Barking Sands, 1998) The loggerhead may possibly occur in and around the U.S. Army Kwajalein Atoll (USAKA). Loggerheads are reported as far north as Alaska, in the eastern Pacific, and as far south as Chile. Occasional sightings are reported from the coast of Washington, but most records are of juveniles off the coast of California. Southern Japan is the only known breeding area in the North Pacific. (National Oceanic and Atmospheric Administration, Office of Protected Resources, no date)

Loggerhead sea turtles have been observed in the Point Mugu Sea Range at depths up to 1,000 meters (3,280 feet). Juvenile loggerhead sea turtles are common in the Sea Range, with the frequency of sighting increasing from July through September. Adult loggerheads are rare. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002) Most sightings of loggerhead sea turtles in northern United States waters are of juveniles. There have been several sightings from the Washington coast.

Threats to the loggerhead sea turtles include exploitation, loss of habitat, fishing practices, and pollution.

Green Sea Turtle *(Chelonia mydas)*

The federally threatened and state (Hawaii) endangered green sea turtle is found world-wide in warm seas. In the eastern North Pacific, green turtles have been sighted from Baja California to southern Alaska. Green sea turtles are found along the coasts of Hawaii and basks and nests on PMRF adjacent to the Nohili Ditch (Pacific Missile Range Facility, Barking Sands, 1999;

Department of the Navy, Pacific Missile Range Facility, Hawaii, 2001). Ninety percent of the Hawaiian population of the green sea turtle returns to French Frigate Shoals to breed and nest (National Oceanic and Atmospheric Administration, Channel Islands National Marine Sanctuary, 2002). A number of green sea turtles live and forage within Midway's lagoon, but nesting has not been recorded.

Sea turtles frequently enter the lagoon and are commonly seen in the harbors at Kwajalein and Roi-Namur. Green and hawksbill sea turtles have been observed on Kwajalein, but very little sea turtle nesting activity has been documented in recent years. At least two instances of nesting have been reported on Roi-Namur in recent years. Although some sandy beaches on the lagoon side of Meck provide potential sea turtle nesting habitat, no evidence of nesting has been observed. (U.S. Army Space and Strategic Defense Command, 1995)

Green sea turtles may forage in the kelp beds off western San Nicolas Island, but there are no known sea turtle nesting beaches on the island. Green sea turtles are sighted year round in the Point Mugu Sea Range in waters less than 50 meters (164 feet) deep, with more numbers being encountered from July through September. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002)

The green sea turtle forages and rests where food is abundant. Benthic algae and sea grasses, their main diet, grow in shallow water where there is sufficient sunlight and substrate. Resting habitat is near foraging habitat, in submarine caves or outcroppings where there is a sandy bottom. The Hawaiian population of green sea turtles is among the few known to haul out to bask on sandy beaches. Breeding and nesting occurs mainly in the summer. Nesting takes place at night on sandy beaches where the eggs are buried in the sand above the high water mark. Most females nest more than once in a season.

Threats to the green sea turtle include overharvesting by humans, habitat loss, fishing net entanglement, boat collisions, and disease (U.S. Fish and Wildlife Service, 2003).

Leatherback Sea Turtle *(Dermochelys coriacea)*

The federally and state (Hawaii) endangered leatherback sea turtle, a highly migratory species, is more pelagic than other species of sea turtles. This sea turtle is commonly seen by fishermen in Hawaiian offshore waters, generally beyond the 183-meter (100-fathom) curve but within sight of land. Sightings often take place off the north coast of Oahu and the Kona Coast of Hawaii. North of the Hawaiian Islands, a high seas aggregation of leatherbacks is known to occur at 35 to 45 degrees north, 175 to 180 degrees west. Because the leatherback sea turtle is not known to nest in the State of Hawaii, the state does not list the species as threatened or endangered. (Pacific Missile Range Facility, Barking Sands, 1998) The leatherback may possibly occur in and around USAKA.

Leatherback sea turtles may forage in the kelp beds off western San Nicolas Island, but there are no known sea turtle nesting beaches on the island. Leatherback sea turtles have been observed in the Point Mugu Sea Range in depths up to 1,000 meters (3,280 feet). Leatherback sea turtles are commonly seen in the Sea Range during July, August, and September. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002)

Threats to the leatherback sea turtles include exploitation, loss of habitat, fishing practices, and pollution.

Hawksbill Sea Turtle (Eretmochelys imbricate)

The hawksbill sea turtle occurs in tropical and subtropical seas of the Atlantic, Pacific, and Indian Oceans. Hawksbill sea turtles occur in Hawaiian coastal waters year round. The species is a solitary nester, which makes population estimates difficult. It is known to nest on the main islands, primarily on several small sand beaches on the islands of Hawaii, Maui, and Molokai. Two of the sites are at a remote location in the Hawaiian Volcanoes National Park. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998) The hawksbill sea turtle is a rare visitor to Midway Atoll (Pacific Division, Naval Facilities Engineering Command, 1994). Hawksbill sea turtles have been observed on Kwajalein, but very little sea turtle nesting activity has been documented in recent years. (U.S. Army Space and Strategic Defense Command, 1995) Occasional sightings are reported from the coast of Washington.

Threats to the hawksbill sea turtle include illegal international trade of items made from this species, beach erosion, and coastal construction (U.S. Fish and Wildlife Service, 2003).

Olive Ridley Sea Turtle *(Lepidochelys oliveacea)*

The range of the olive ridley is essentially tropical. In the eastern Pacific, nesting takes place from southern Sonora, Mexico, south at least to Colombia. Non-nesting individuals occasionally are found in waters of the southwestern United States. The olive ridley has been recorded occasionally from Galapagos waters, but is essentially very rare throughout the islands of the Pacific. The olive ridley forms great nesting aggregations generally known as “arribadas.” Not all adult olive ridley adults participate in the arribadas, but the vast majority of them do. The genus is unique in that both ridley species, Kemp’s and olive, commonly, and probably typically, nest each year without intervening non-breeding seasons as shown by other sea turtle species. (Pacific Missile Range Facility, Barking Sands, 1998)

Recent investigations show that ridleys reside in oceanic habitats of the eastern Pacific Ocean during the non-reproductive portion of their life cycle. The overall distribution of the olive ridley has parallels with that of the leatherback sea turtle. Both occupy oceanic habitat, and both nest primarily on Pacific shores of the American tropics and in the Guianas, in moderate numbers in tropical West Africa, and in relatively small numbers elsewhere, being extremely rare throughout Australia and the Pacific oceanic islands. (Pacific Missile Range Facility, Barking Sands, 1998) The olive ridley may possibly occur in and around USAKA.

Olive ridley sea turtles have been observed in the Point Mugu Sea Range in waters less than 50 meters (164 feet) deep, but they are rarely encountered. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002)

FISH

Tidewater Goby *(Eucyclogobius newberryi)*

The endangered tidewater goby is a small fish approximately 50 millimeters (2 inches) or less in length. It is restricted to waters less than 1 meter (3 feet) deep with low salinity in the coastal wetlands of California. (U.S. Fish and Wildlife Service, 2003) San Antonio Creek, located south of Building 1819, is one of the largest streams on base. Several freshwater marshes have been

recorded along the San Antonio that, along with the creek itself and the lagoon at its mouth, support both common and rare Vandenberg species; the tidewater goby can be found there (U.S. Department of the Air Force, 1997).

Threats to the existence of the tidewater goby include loss of saltmarsh habitat from coastal development, upstream water diversions resulting in salinity changes, groundwater drafting, and cattle grazing present. (U.S. Fish and Wildlife Service, 2003)

Unarmored Threespine Stickleback *(Gasterosteus aculeatus williamsoni)*

The federally endangered unarmored threespine stickleback is a small scaleless fish that has been eliminated from most of its natural range. Adults are approximately 2.5 centimeters (1 inch) long. San Antonio Creek, one of the largest streams on Vandenberg AFB supports the unarmored threespine stickleback. Several freshwater marshes have been recorded along the San Antonio that, along with the creek itself and the lagoon at its mouth, support both common and rare Vandenberg species; the unarmored threespine stickleback can be found there. (U.S. Department of the Air Force, 1997) This may represent the northern limit for the unarmored threespine stickleback, which uses adjoining feeder streams during the wet season (Pacific Pipeline System, Inc., 1996).

Threats to the unarmored threespine stickleback include loss of water quality, predation by larger non-native fish, and destruction of habitat.

Bull Trout *(Salvelinus confluentus)*

The federally threatened bull trout (*Salvelinus confluentus*) occurs in the Puget Sound. Bull trout have relatively specific habitat requirements and are found primarily in colder streams (below 15°C [59°F]). (U.S. Army Corps of Engineers, Seattle District, Regulatory Branch, 2002) Spawning begins in late August and ends in November in pristine headwater areas. Adults overwinter in mainstem rivers, lakes, or reservoirs before moving into saltwater in the spring. Newly hatched anadromous bull trout spend about 2 years in fresh water before they migrate to saltwater. (Port of Everett, 2001)

Bull trout are threatened by habitat degradation and fragmentation and interaction with introduced non-native fish such as brook trout.

Chinook salmon *(Oncorhynchus tshawytscha)*

The federally threatened Chinook salmon (*Oncorhynchus tshawytscha)* is found in the Puget Sound. Port Gardner, the lower Snohomish River, and the Everett Marina are located in the migration corridor of the Chinook salmon. Juvenile Chinook salmon migrate through the Snohomish River estuary during spring and summer outmigrations between May and late June. Adult Chinook move through the estuary from June through September. Chinook salmon spawn and rear young in fresh water, which then migrate to marine waters. (Port of Everett, 2001)

Threats to the chinook salmon include overfishing, increased sedimentation, and decrease in water quality.

MAMMALS

Northern Right Whale *(Balaena glacialis)*

The northern right whale is approximately (56 feet) long and are mainly black. It is found in both the Atlantic and Pacific oceans. Alaskan right whales feed in the northern Pacific waters during the summer and migrate to lower latitudes to calve. They eat zooplankton. (State of Alaska Online, 2001) It is unlikely that the northern right whale would be encountered in the Point Mugu Sea Range, which stretches from offshore San Luis Obispo County to offshore Los Angeles County. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002)

Right whales were hunted almost to extinction. It is not known if the current population of 100 to 500 whales is increasing, decreasing, or stable. (State of Alaska Online, 2001)

Steller Sea Lion *(Eumetopias jubatus)*

The federally endangered Steller sea lion is the largest member of the "eared seal" family. Steller sea lions have external ears and rear flippers that turn forward allowing them to "walk." The average weight of a male Steller sea lion is 566 kilograms (1,245 pounds) and length 3.2 meters (10.6 feet). Adult females are approximately half the weight of a male. Females give birth to a single pup in mid-May to July. Steller sea lions eat a wide variety of fish and invertebrates. (State of Alaska Online, 2002d)

Steller sea lions were a primary source of food for Aleutian Island inhabitants, and some are still taken for food. The primary threats to the species are from commercial fisheries, subsistence, and illegal shooting. (State of Alaska Online, 2002d)

Sei Whale *(Balaenoptera borealis)*

The federally endangered sei whale is approximately 14 to 16 meters (46 to 52 feet) long and weighs between 20 to 25 metric tons (22 to 28 tons). The sei whale is commonly found in the open ocean and not inshore or in coastal waters. It feeds on shoaling fish, squid, and plankton. The sei whale is found in every ocean and sea in the world, although most are found in temperate and sub-tropical water. (Cetacea, 2003a) Sei whales are rare in California waters. There are no estimates of stock numbers of sei whales along the western coast of the United States, or in the eastern north Pacific (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002; National Oceanic and Atmospheric Administration, National Marine Fisheries Service, 2003).

Threats to the sei whale include take by commercial whalers, offshore drift gillnet fisheries, and ship strikes. (National Oceanic and Atmospheric Administration, National Marine Fisheries, 2003)

Blue Whale (*Balaenoptera musculus*)

The federally endangered blue whale is the largest living animal. It can reach 30 meters (100 feet) in length and weigh 90,000 kilograms (200,000 pounds). The blue whale feeds on small shrimp-like krill. It is found in all of the world's oceans. It is rarely seen north as far as the Chukchi Sea. It winters off the eastern north Pacific from central California northward to the Gulf of Alaska. (State of Alaska Online, 2002e) The blue whale may possibly occur in and around USAKA. The blue whale is extremely rare in Hawaii. The blue whale occasionally

occurs within 5.6 kilometers (3 nautical miles) of San Nicolas Island and is common in summer beyond 5.6 kilometers (3 nautical miles) west of the island. There are about 1,600 blue whales in the Point Mugu Sea Range during summer (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002).

Historic whaling, offshore drift gillnet, and ship strikes are the main past and present threats to blue whales. (National Oceanic and Atmospheric Administration, National Marine Fisheries, 2003)

Fin Whale *(Balaenoptera physalus)*

The federally endangered fin whale is the second largest of the whales. It is approximately 24 meters (79 feet) long. The fin whale is mainly dark gray or brown. It feeds on plankton, fish, and squid. The fin whale is found in every ocean in the world but is rarely seen inshore. (Cetacea, 2003b) The fin whale was recently observed, but further than 5.6 kilometers (3 nautical miles) off the coast of San Nicolas Island. There are about 1,600 to 1,500 fin whales in the Point Mugu Sea Range during summer. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002)

Historic whaling, offshore drift gillnet fishing, and ship strikes are the main past and present threats to fin whales. (National Oceanic and Atmospheric Administration, National Marine Fisheries, 2003)

Hawaiian Hoary Bat *(Lasiurus cinereus semotus)*

The federally and state endangered, endemic Hawaiian hoary bat is a subspecies of the hoary bat common to temperate north and south America. It has been recorded on the islands of Kauai, Oahu, Maui, and Hawaii. It is the only native land mammal of Hawaii. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998)

The Hawaiian hoary bat roosts in trees during the day and are apparently not selective of the tree species used. It has also been reported to use rock structures for shelter. The bats are most common in regions between sea level and elevation of 1,219 meters (4,000 feet) that receive 51 to 229 centimeters (20 to 90 inches) of rain per year. The bats commonly feed on flying insects concentrated by offshore winds. (Pacific Missile Range Facility, Barking Sands, 1998)

The Hawaiian hoary bat may occur at PMRF, but it has not been documented there. It is known to occur in Polihale State Park, to the north of PMRF, where it has been observed feeding on flying insects offshore. The kiawe/koa-haole vegetation that is dominant in the area around PMRF and on Niihau may potentially provide roosting habitat for the Hawaiian hoary bat. However, the bat is not species specific in selecting roosting habitat. (Pacific Missile Range Facility, Barking Sands, 1998)

Threats to the Hawaiian hoary bat include habitat loss, pesticides, predation, and roost disturbance (U.S. Fish and Wildlife Service, 2003).

Humpback Whale (*Megaptera novaeangliae*)

The federal and state endangered migratory humpback whale has an average length of 14.5 meters (47.5 feet) long (female) and 13.5 meters (44 feet) (males). The humpback whale are dark on top and have white pigmentation on their flippers, flukes, and sides. It feeds on small schooling fish as well as on krill. (U.S. Department of Commerce, National Oceanic and Atmospheric Administration, and State of Hawaii, Office of Planning, 1997) Humpback whales occur throughout the world in coastal and open ocean areas. It is known to use the channel between Kauai and Niihau. Approximately two-thirds of the North Pacific population of humpback whales winter in Hawaii. Humpbacks are seen in the winter months in the shallow waters surrounding the Hawaiian Islands, where they congregate to mate and calve. (Pacific Missile Range Facility, Barking Sands, 1998)

The humpback whale may possibly occur in and around USAKA. Humpback whales have also been seen within 5.6 kilometers (3 nautical miles) of San Nicolas Island. Approximately 220 feeding humpback whales are located in the Point Mugu Sea Range during summer. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002)

Hawaiian Monk Seal *(Monachus schauinslandi)*

The major reproductive population of the federally and state endangered Hawaiian monk seal occurs in the northwest islands of the Hawaiian archipelago, including Kure Atoll, Midway Atoll, and French Frigate Shoals. However, they also are known to occur at Johnston Atoll to the southwest of the Hawaiian Island chain. The Hawaiian monk seal's primary breeding activity and pupping take place in the Northwest Hawaiian Islands, most of which are in the Hawaiian National Wildlife Refuge. (U.S. Fish and Wildlife Service, 2003; Pacific Missile Range Facility, Barking Sands, 1998) The first Hawaiian monk seal birth observed on a Kauai beach since 1993 occurred on PMRF in 1999 on the beach adjacent to the runway (Pacific Missile Range Facility, Barking Sands, 1999). Only four other Hawaiian monk seal births had been recorded on Kauai since 1961 (Navy Office of Information, 1999). The fact that humans frequent all beaches on PMRF may generally discourage use by monk seals. Approximately 45 to 55 Hawaiian monk seals live on Midway Atoll. Eastern and Spit islands are the main pupping areas. All of Midway Atoll, except for Sand Island and its harbor, has been designated as critical habitat for the Hawaiian monk seal.

The seals prefer undisturbed, sandy beaches where they can haul out to rest, give birth, and nurse young. Vegetation behind the beaches is also used as shelter. They are known to occasionally use hard substrate benches and exposed reefs for hauling out. Hawaiian monk seals may be more sensitive to human intrusion than other seal species. The degree of human disturbance may be one of the most important factors in selection of hauling-out habitat. Monk seals forage in shallow inner reef waters around coral structures, over offshore banks, and down bank slopes. They have been observed using habitat to 40 meters (22 fathoms). (Pacific Missile Range Facility, Barking Sands, 1998)

Threats to the Hawaiian monk seal include disturbance from human activities, interaction with fisheries (competition for prey or entanglement), mobbing attacks by males on adult and immature females, and predation by sharks (U.S. Fish and Wildlife Service, 2003).

Sperm Whale *(Physeter macrocephalus)*

The federally endangered sperm whale is the largest of the toothed whales. It is dark brown to gray in color. The sperm whale feeds on squid, octopus, and fish. It is located in all oceans of the world but rarely enters semi-enclosed or shallow seas. (Cetacea, 2003c) It may possibly occur in and around USAKA. Approximately 3,740 to 5,000 sperm whales may be present in the Point Mugu Sea Range in autumn and winter (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002). Sperm whales are found year round in California waters. The sperm whale is seen in every season except winter in Washington waters.

Historic whaling, offshore drift gillnet fishing, and ship strikes are the main past and present threats to sperm whales. (National Oceanic and Atmospheric Administration, National Marine Fisheries, 2003)

Southern Sea Otter *(Enhydra lutris nereis)*

The federally threatened southern sea otter is a member of the weasel family and is related to mink and river otters. Males weigh 32 to 41 kilograms (70 to 90 pounds). Female average weights range from 18 to 27 kilograms (40 to 60 pounds). The sea otter lives in shallow water along the shores of the North Pacific. Sea otters do not usually migrate. (State of Alaska Online, 2002) Sea otters inhabit intertidal and shallow, subtidal zones and are associated with kelp bed areas. A small resident breeding colony inhabits a kelp bed near Purisima Point on Vandenberg AFB. The southern sea otter can be found throughout the year in the kelp beds at the west end of San Nicolas Island and in smaller numbers off the north side of the island. Although the translocation project of 1987 to 1990 to waters off San Nicolas Island appears to have failed, the remaining population of approximately 17 individuals has been relatively stable. (Department of the Navy, Naval Air Warfare Center Weapons Division, 2002)

Sea otters are susceptible to drowning in gill nets in Washington's fisheries, but incidental takes are rare. Shooting, boat strikes, capture and relocation efforts, oil spills, and other toxic contaminants are the main threats to the species. (National Oceanic and Atmospheric Administration, National Marine Fisheries, 2003)

Guadalupe Fur Seals *(Arctocephalus townsendi)*

The federally threatened Guadalupe fur seal breeds along the eastern coast of Guadalupe Island west of Baja California. Births occur from mid-June through July. Individuals have been observed in the southern Channel Islands, including San Nicolas Island. (National Oceanic and Atmospheric Administration, National Marine Fisheries, 2002)

The major decline in the species was from commercial hunting.

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APPENDIX I
TYPICAL STANDARD OPERATING PROCEDURES AND BEST MANAGEMENT PRACTICES

APPENDIX I
TYPICAL STANDARD OPERATING PROCEDURES AND BEST MANAGEMENT PRACTICES

Numerous Standard Operating Procedures and Best Management Practices would be implemented as part of the Proposed Action. These types of actions are typically implemented as contract requirements. The following list is not intended to be all inclusive but rather provides a summary of the Standard Operating Procedures and Best Management Practices identified in the Ground-Based Midcourse Defense (GMD) Extended Test Range (ETR) Environmental Impact Statement (EIS) for one location, the Kodiak Launch Complex (KLC). Each installation identified in the EIS has similar Standard Operating Procedures and Best Management Practices that would be implemented as part of the Proposed Action.

Air Quality

Dust suppression measures could include the following:

- Periodically watering the areas being graded
- Minimizing unnecessary traffic
- Reducing vehicle speeds near the work areas
- Wet sweeping or otherwise removing soil and mud deposits from paved roadways and parking areas
- Proper tuning and preventative maintenance of construction vehicles would also serve to minimize exhaust emissions and maximize vehicle performance

Alaska Aerospace Development Corporation's (AADC's) approved Standard Operating Procedures include the following:

- Personal protection equipment procedures

Department of Defense (DoD) requirements include the following:

- KLC Range Safety Officer would obtain approval from the Administrator, Federal Aviation Administration
- Provision would be made for surveillance of the affected airspace

Biological Resources

Standard Operating Procedures could include the following:

- Spill prevention, containment, and control measures while transporting equipment and materials

Best Management Practices for soil erosion control could include the following:

- Site preparation—vegetation preservation and protection, topsoil preservation, dust control, and temporary gravel construction entrance and exit
- Surface stabilization—temporary and permanent seeding and use of mulches and fabric and gravel blankets
- Runoff control and conveyance measures—installation of diversions, dikes, grassed waterways, and temporary slope drains
- Sediment barriers—straw bale and rock barriers, sediment fences
- Sediment traps and basins
- Stream protection—temporary stream crossings and streambank stabilization
- Protection of soil and fill storage piles

U.S. Fish and Wildlife Service monitoring recommendations for KLC's launches will be reviewed and coordinated with AADC and if agreed to, will be conducted.

Safety crews and other personnel are briefed on the survey procedures as well as harassment guidelines established by the National Marine Fisheries Service to minimize harassment. The GMD ETR program would adhere to the terms and conditions imposed on AADC by these future National Marine Fisheries Service recommendations.

Spill control procedures would be established using KLC's approved Standard Operating Procedures, and spill control kits would be present at the site in the unlikely event of a fuel leak or spill. The procedures could include the following:

- Impermeable ground cover
- Spill containment berms

Spill control procedures would be established in accordance with KLC's approved Spill Prevention Control and Countermeasure Standard Operating Procedures, and spill control kits would be present at the site in the unlikely event of a fuel leak or spill.

Geology and Soils

Best Management Practices would be used for erosion and sediment control, including the following:

- Storm water diversions

- Sediment barriers
- Stream protection
- Dust palliatives
- Other stabilization treatments

Hazardous Materials and Hazardous Waste

The following hazardous materials management techniques may be used during the construction period to minimize (1) the amount of hazardous materials stored, (2) the threat of their accidental and unplanned release into the environment, and (3) the quantity of hazardous waste generated:

- Structures may be prefabricated by manufacturers and shipped for final assembly at the site using bolts to minimize the need for welding, painting, and other activities involving hazardous materials.
- No underground tanks exist at KLC and none would be installed as a result of this activity. Diesel fuel would be stored in aboveground storage tanks with secondary containment and inspected daily in accordance with the provisions of the KLC spill prevention, control, and countermeasures plan (as appropriate). Aboveground storage tanks may be removed after tests are complete or put in standby condition at KLC to support future activities. Fueling would follow existing procedures to minimize the potential for fuel spills.
- Bulk hazardous materials [e.g., 210-liter (55-gallon) drums of anti-freeze, hydraulic fluid, compressed welding gases] would be stored in approved containers that meet National Fire Protection Association industrial fire protection codes and required containment systems.
- Spill response materials (e.g., sorbents, drain covers, mops, brooms, shovels, drum repair materials and tools, warning signs and tapes, and personal protective equipment) would be readily available for use in the event of an unplanned release.
- Storage of hazardous materials would be in protected and controlled areas designed to comply with site-specific spill prevention, control, and countermeasures plans.
- Hazardous materials would be inspected before accepting a shipment (e.g., to validate container integrity, expiration date, etc.).
- Hazardous materials would be purchased in appropriately sized containers (e.g., if the material is used by the can, it would be purchased by the can rather than in bulk-sized containers).
- Overpurchasing of hazardous materials would be avoided.
- Hazardous material containers would be appropriately labeled.
- At the completion of the construction period, unused amounts of hazardous materials would be the responsibility of the construction contractors and would be safely removed from the site.

Onsite waste management practices would include the following:

- The containerization of waste to prevent discharges of waste or leachate
- The prevention of litter
- Controlling access by wildlife or disease vectors
- Keeping the premises free of solid waste
- The use of best available management practices for the control and prevention of runoff and erosion

Emergency response actions would be in accordance with the KLC User's Manual.

Removal and disposal of nonhazardous and hazardous waste from KLC would be done in accordance with applicable state and federal requirements.

Hazardous materials management would be performed in accordance with ongoing KLC procedures, as described in the KLC User's Manual (Alaska Aerospace Development Corporation, 2001) and the Alaska Hazardous Waste Management Regulations (Alaska Administrative Code, Title 18, *Environmental Conservation*, Chapter 16).

Hazardous wastes would be collected for disposal in accordance with applicable federal, State of Alaska, and DoD requirements.

Specific restoration actions would be determined on a case-by-case basis in coordination with the procedures of KLC and the Alaska Department of Environmental Conservation.

Management of hazardous materials and hazardous waste would be performed in accordance with AADC requirements, and would not significantly impact existing KLC hazardous materials and hazardous waste management procedures.

Adherence to the existing hazardous materials and waste management systems on KLC would preclude the potential accumulation of hazardous materials or waste.

Health and Safety

Missile launches by their very nature involve some degree of risk and it is for this reason that DoD and AADC has specific launch to assure that any potential risk to the public and government assets (launch support facilities) are minimized.

Planning and execution of target launches would be in compliance with federal, state, and local health and safety requirements and regulations, as well as DoD and KLC Safety Policy.

Public access would be restricted in accordance with the KLC's Interagency Land Management Agreement that encourages public access except in cases where safety is concerned or protection of structures is needed.

All components and equipment will be handled and shipped in accordance with applicable military, state, and Department of Transportation regulations.

Appropriate safety measures as established by AADC would be instituted at the receiving terminals or airport, including the following:

- Specified receiving and parking areas (for transport vehicles)
- Establishment and enforcement of applicable explosive safety quantity-distances around receiving areas
- Restricting handling and transportation of missile components to specific and properly trained personnel
- Using established and permitted transportation routes from the receiving terminal or airport to KLC

All personnel associated with the Proposed Action would be properly trained in compliance with applicable health and safety procedures and guidelines.

All pre-flight hazardous operations would be conducted in accordance with applicable and routine safety regulations and operations plans.

All preparation activities would be conducted in accordance with applicable safety regulations and operations plans.

Adherence to appropriate safety regulations and operating plans would serve to maintain health risks to mission personnel within the Range Commanders' Council acceptable levels.

The transportation of the Exoatmospheric Kill Vehicle tanks containing liquid fuels and oxidizers would be conducted in accordance with state and federal regulations (49 Code of Federal Regulations (CFR) 106-180, University of Alaska, Fairbanks [UAF] Policy 902, Bureau of Explosives Tariff No. BOE 6000-1).

All personnel associated with the handling of the tanks and installation on the Exoatmospheric Kill Vehicle would be properly trained in compliance with UAF 601 and 29 CFR 1910 procedures and guidelines.

The implementation of AADC's safety programs and practices at KLC before and during launch activities would limit the number of personnel exposed to increased hazards and, as a result, no significant health and safety impacts are expected.

If necessary, debris recovery activities would be conducted in accordance with DoD regulations and KLC safety plans and procedures and would not be expected to effect public health and safety.

Any potentially hazardous concerns remaining after a flight or flight termination would be handled in accordance with the KLC Safety Policy and Explosive Ordnance Disposal Plan.

Disposal activities would be in accordance with KLC Explosive Ordnance Disposal Plan, NPD 600.1 Transportation Management Guidelines and applicable state and federal regulations.

Potentially hazardous operations such as fueling of the generators would be conducted in compliance with the safety standards of the Occupational Safety and Health Administration, the Kodiak Safety Plan, and applicable range operating procedures.

Work practices, worker training and engineering controls, such as ventilation, would be used to further reduce the potential of beryllium exposure.

Adherence to AADC, Federal Aviation Administration, and DoD safety procedures relative to radar operations would preclude significant impact to health and safety.

Implementation of DoD and range safety and health plans and procedures during all phases of operation would avoid or reduce the probability of potential impact to health and safety.

Land Use

The siting and use of this area would take into account explosive safety quantity-distances and applicable safety criteria preventing incompatible activities or land use conflicts.

A Coastal Project Questionnaire for GMD ETR activities would be submitted to the State of Alaska to confirm that construction activities would be consistent with the Alaskan Coastal Zone Management Program, and the Kodiak Island Borough Coastal Management Program. Submission of the Coastal Project Questionnaire would be coordinated among AADC, the U.S. Army Corps of Engineers, and the Missile Defense Agency.

Furthermore, barge beach landings would comply completely with the standards of the Alaskan Coastal Management Program.

Delivery would be conducted under routine procedures in accordance with applicable Federal Aviation Administration and Department of Transportation safety standards to minimize any possible impacts to land use.

Necessary electromagnetic radiation hazard exclusion areas would be observed in accordance with DoD and U.S. Air Force standards, and the proposed locations would not produce a land use conflict.

Delivery would be conducted under routine procedures in accordance with applicable Federal Aviation Administration, and Department of Transportation safety standards minimizing any possible impacts to land use.

Transportation

Shipping and delivery would be conducted under routine procedures in accordance with applicable Federal Aviation Administration and Department of Transportation safety standards to minimize any possible impacts to transportation.

Security procedures will be established in accordance with AADC's Interagency Land Management Agreement for property, which permits public exclusion during times of danger and assists in protecting structures.

Infrastructure

As part of pre-launch and flight activities, a Launch Hazard Area would be established around the launch site in accord with the AADC Interagency Land Management Agreement has for the property, which allows public access restrictions in cases of public safety and to protect structures.

In keeping with KLC procedures, any septic systems would likely include a mounded absorption bed.

Trained personnel using only appropriately certified cranes and other materiel handling equipment would handle missile components and handling equipment in accordance with approved Standard Operating Procedures.

Water Resources

Water quality-related Standard Operating Procedures that apply to each of the action alternatives include the following:

- Site preparation—vegetation preservation and protection, topsoil preservation, dust control, and temporary gravel construction entrance and exit
- Surface stabilization—temporary and permanent seeding and use of mulches and fabric and gravel blankets
- Runoff control and conveyance measures—installation of diversions, dikes, grassed waterways, and temporary slope drains
- Sediment barriers—straw bale and rock barriers, sediment fences
- Sediment traps and basins
- Stream protection—temporary stream crossings and streambank stabilization
- Protection of soil and fill storage piles

Standard Operating Procedures related to the handling, disposal, recycling, and other use of hazardous materials and wastes would be followed including spill prevention, containment, and control measures while transporting equipment and materials.

Other water quality-related Standard Operating Procedures to be followed include the following:

- The use of portable toilets and waste disposal practices during construction
- Rapid response, control and cleanup activities in the event of unplanned spills or accidents
- Worker education and training programs

The KLC Natural Resources Management Plan commitments include the following:

- Such measures as collecting and disposing of sewage offsite
- Monitoring of soil conditions
- Periodic inspection by a designee of AADC to ensure erosion and sediment control structures are working properly
- Hazardous waste management measures and offsite disposal
- Post-launch monitoring and revegetation of areas around launch sites if needed

APPENDIX J
DETERMINATION OF NON-APPLICABILITY
GROUND-BASED MIDCOURSE DEFENSE EXTENDED TEST RANGE ENVIRONMENTAL IMPACT STATEMENT, VANDENBERG AIR FORCE BASE, CALIFORNIA

APPENDIX J
DETERMINATION OF NON-APPLICABILITY GROUND-BASED MIDCOURSE DEFENSE EXTENDED TEST RANGE ENVIRONMENTAL IMPACT STATEMENT, VANDENBERG AIR FORCE BASE, CALIFORNIA

The Clean Air Act (CAA), as amended in 1990, specifies in section 176(a) that no department, agency, or instrumentality of the Federal Government shall engage in, support in any way, or provide financial assistance for, license or permit, or approve, any activity which does not conform to an implementation plan after it has been approved or promulgated under section 110 of this title. Conformity is defined in section 176(c) of the CAA as conformity to the State Implementation Plan's purpose of eliminating or reducing the severity and number of violations of the National Ambient Air Quality Standards (NAAQS) and achieving expeditious attainment of such standards. These activities would not:

- Cause or contribute to any new violation of any standard in any area
- Increase the frequency or severity of any existing violation of any standard in any area
- Delay timely attainment of any standard or any required interim emission reduction or other mile stones in any area

Air quality in the area of Vandenberg Air Force Base (AFB) is under the jurisdiction of the Santa Barbara County Air Pollution Control District (SBCAPCD). Santa Barbara has been classified as being in serious non-attainment with respect to federal ozone standards; however, Santa Barbara is currently in the process of being redesignated by the U.S. Environmental Protection Agency (EPA) as being in attainment for the federal ozone standard. Santa Barbara is also in non-attainment with respect to California Ambient Air Quality Standards (CAAQS) for ozone and particulate matter under 10 microns in diameter (PM-10).

Potential emissions are less than the federal *de minimis* (minimal) levels established in 40 Code of Federal Regulations (CFR) 51.853(b)(1). Additionally, maximum daily reactive organic gases and oxides of nitrogen levels are less than 10 percent of the SBCAPCD budget planning values.

No federal *de minimis* levels have been established for state non-attainment areas. However, potential emissions are less than the federal *de minimis* level for moderate federal PM-10 non-attainment.

Introduction

The analysis below is divided into three sections. Section one describes the methodologies used to project potential mobile emissions, missile preparation, launch emissions, and In-Flight Interceptor Communication System Data Terminal (IDT) construction and operation emissions. Section two addresses the federal *de minimis* thresholds and it was determined that the project activity emissions would be less than the *de minimis* thresholds. Section three addresses regional significance and how it was determined that project activity emissions would not be regionally significant. Sections two and three must be addressed separately because the *de minimis* thresholds are measured in tons per year, and SBCAPCD planning values for regional significance are measured in tons per day.

Various aspects of the project are unspecified at this time. This is intentional on the part of the project planner to allow maximum flexibility in actual operations. Due to this built-in operational flexibility, realistic emissions, while lower than theoretically possible emissions, are indeterminable. Therefore, this study uses the theoretical maximums. This follows the logic that if the projected maximum emissions are (1) less than the *de minimis* thresholds and (2) not regionally significant, then any level of activity less than these maximums will also meet the same requirements. In order to present a conservative estimate of environmental impact, the following assumptions are used throughout all sections of the study:

- The alternatives proposed do not specify the number of personnel required to attend each launch. However, an estimated monthly build-up of personnel has been proposed for dual and single launches. Personnel required for a dual and single Peacekeeper Target launch was used throughout this analysis.
- The proposed alternatives require the capability to launch up to five missiles per year (ground-based interceptors and/or targets). No further specifics of missile types or launch times are given. Therefore, this analysis assumes the missile with the highest level of emissions (Peacekeeper Target) would be launched for all five launches.
- This analysis assumes a maximum of one dual launch and three single launches of the Peacekeeper Target in a year.
- The proposed alternatives do not specify launch site. For the purpose of this analysis it is assumed that the personnel must travel the length of the base (approximately 30 miles) to and from the launch site for a total of 60 miles per launch.
- This study assumes that 1.5 personnel would travel in each vehicle to and from the launch site.

Mobile Emissions Methodology and Calculations

Projected vehicle emission factors were calculated using previous analysis in the Programmatic Targets Environmental Assessment and the California Department of Transportation model CT-EMFAC. The model was set up to calculate emission factors in 1 mile per hour (mph) increments from 3 to 65 mph. The model's inspection and maintenance flag was turned on since vehicle inspection and maintenance occur within the county. The proposed action is a multiyear project. Vehicle emissions factors were calculated for the year 1997, as vehicles in 1997 would generate greater emissions than vehicles in the following years due to the "phasing-

out" of older (dirtier) vehicles. It is assumed that if the project met the *de minimis* levels with the older vehicles, then it would also meet them at reduced emission levels.

A temperature of 50ºF was assumed for the vehicle emission factor calculations. Emission factors were calculated for support personnel commute vehicles. Summer and winter emission factors were calculated. Emission factors for personnel commute vehicles (81.1 percent light duty automobiles and 18.9 percent light-duty trucks) were used. The first 3.59 miles of each trip would use 100 percent cold-start emissions factors and the remainder would use the 0 percent cold-start/0 percent hot start (100 percent hot stabilized) emissions factors.

For each one-way trip made by support personnel commute vehicles, the first 3.59 miles use the emission factors from the 100 percent cold start run. The remaining 26.41 miles of the support personnel commute vehicle trips use the emission factors from the 0 percent cold start/0 percent hot start (100 percent stabilized) run.

The greatest emissions would be obtained if all vehicles traveled at low speeds. Therefore, emissions factors for 10 mph are used in these calculations. Actual speeds would probably be faster, which would result in fewer emissions.

The number of vehicles per month would vary with the type of launch and the number of missiles launched. With the launching of five launch vehicles in a year, a scenario involving a dual Peacekeeper launch and three single Peacekeeper Target launches was used. The build up for a dual Peacekeeper Target would be 25 personnel the first month, 90 the second month, and 175 the third month. For a single Peacekeeper Target launch, the build-up would be 25 the first month, 75 the second month, and 150 the third month. The number of vehicles was calculated using information from the CEQA Air Quality Handbook, average vehicle ridership is 1.5.

Using these calculations, the maximum emissions for two 30-mile trips (one 60-mile round trip commute) are listed in table J-1.

Missile Emissions

If used as a target, the fourth stage of a Peacekeeper target would utilize a single liquid propellant and require onsite fueling. Although total vapor emissions can vary depending on the propellant transfer equipment used and how it is assembled, it is anticipated that only very small amounts (approximately 10 grams [0.4 ounce]) of vapors would be released to the atmosphere during the transfer operation.

The assumption was made that 100 percent of the missile exhaust products are released at or near ground level. In reality, only a small portion of the exhaust products would be released in the launch area. Table J-2 lists exhaust emissions for the Peacekeeper Target (the largest of the proposed targets).

Table J-1: Mobile Emissions Data and Calculations (at 50ºF)

Vehicles	Carbon Monoxide	Volatile Organic Compounds	Oxides of Nitrogen	Particulate Matter
1 Vehicle: Cold Start (first 3.59 miles)	91.31 grams/mile	7.99 grams/mile	2.79 grams/mile	0.01 grams/mile
1 Vehicle: Hot Stabilized (after first 3.59 miles)	9.24 grams/mile	1.59 grams/mile	0.93 grams/mile	0.01 grams/mile
1 Vehicle: Total (round-trip emissions)	1.14 kg	0.141 kg	0.69 kg	0.0006 kg
17 Vehicles Total	19.4 kg	2.4 kg	11.7 kg	0.010 kg
60 Vehicles Total	68.4 kg	8.5 kg	41.4 kg	0.036 kg
117 Vehicles Total	134.0 kg	16.5 kg	80.7 kg	0.070kg
Total Vehicle Emission: Dual Target Launch	221.8 kg	27.4 kg	267.6 kg	0.116 kg
17 Vehicles Total	19.4 kg	2.4 kg	11.7 kg	0.010 kg
50 Vehicles Total	57.0 kg	7.1 kg	34.5 kg	0.030 kg
100 Vehicles Total	114.0 kg	14.1 kg	69.0 kg	0.060 kg
Total Vehicle Emission: Single Target Launch	190.4 kg	23.6 kg	145.2 kg	0.100 kg

Note: kg = kilograms

Table J-2: Potential Exhaust Emissions Peacekeeper Target

Missile	Aluminum Oxide metric tons (tons)	Chlorine metric tons (tons)	Carbon Monoxide metric tons (tons)	Carbon Dioxide metric tons (tons)	Nitrogen Oxide metric tons (tons)	Hydrogen Chloride metric tons (tons)	Nitrogen metric tons (tons)
Peacekeeper Target	15.58 (17.17)	0.085 (0.093)	9.75 (10.75)	0.65 (0.72)	0.029 (0.030)	7.12 (7.85)	3.65 (4.03)

IDT Emissions

Construction for an IDT site would require the disturbance of approximately 5.9 hectares (14.6 acres). Potential construction emissions were determined by using emission factors from various sources including the EPA. Conservative estimates are based on building square footage, acreage disturbed, and duration of construction, as well as general meteorological and soil information. Table J-3 lists estimated carbon monoxide, oxides of nitrogen, volatile organic compounds, oxides of sulfur, and PM-10 emissions from construction equipment, earth moving and commuting workers anticipated during 7 months of construction. Best management practices including proper tuning and preventative maintenance of construction vehicles would serve to minimize exhaust emissions and maximize vehicle performance, as well as dust suppression measures such as periodically watering the areas being graded, minimizing unnecessary traffic, reducing vehicle speeds near the work areas, and wet sweeping or otherwise removing soil and mud deposits from paved roadways and parking areas.

It is anticipated that construction and launch emissions would not occur concurrently or in the same year.

Table J-3: Potential IDT Construction Emissions

Emissions	7 Months metric tons (tons)
Carbon Monoxide	0.36 (0.40)
Oxides of Nitrogen	1.6 (1.8)
Volatile Organic Compounds	0.35 (0.39)
Oxides of Sulfur	0.11 (0.13)
PM-10	4.8 (5.3)

Operational power for the IDT would be provided by offsite commercial power sources; however, in the event of a loss of power, a 275-kW diesel generator would be used. Along with the generator itself, there would be a 3,785-liter (1,000-gallon) aboveground storage tank for fuel. Table J-4 lists the possible emissions associated with the use of this generator. The generator is assumed to be tested weekly during non-launch periods and used during power outages for approximately 200 hours a year.

Table J-4: Potential Generator Emissions for IDT Facilities

	Emissions		
	Oxides of Nitrogen metric tons (tons)	Carbon Monoxide metric tons (tons)	PM-10 metric tons (tons)
275-kW Diesel Generator	0.51 (0.56)	0.63 (0.70)	0.02 (0.03)

De Minimis Thresholds

The *de minimis* thresholds are federal limits listed in the 40 CFR 51.583(b)(1). If any of the project emissions would exceed these values, a conformity determination is required. Table J-5 defines the *de minimis* thresholds.

As shown in table J-5, total project emissions per year would be less than the federal *de minimis* thresholds. Therefore the project meets the *de minimis* requirement for non-applicability.

Regional Significance

Regional significance is the second part of the General Conformity analysis. Even if a project would emit less than the *de minimis* thresholds of all pollutants, it may still produce significant amounts of pollutants based on the area in which the project is to take place. Therefore, any action which produces 10 percent or more of an area's budgeted amount for a federally non-attainment pollutant would be considered regionally significant and must conduct a conformity determination.

Santa Barbara County has been classified as being in serious non-attainment with respect to federal ozone standards; however, Santa Barbara County is currently in the process of being redesignated by the EPA as being in attainment for the federal ozone standard. Only the pollutants requiring budgeting are ozone and ozone precursors, specifically volatile organic compounds and oxides of nitrogen. Federal regulations refer to volatile organic compounds instead of reactive organic gases. There are minor differences between the two, but for the

purposes of this study they can be considered synonymous. Ozone is not addressed because the proposed actions would not generate ozone.

Table J-5: *De Minimis* Threshold and Potential Project Emissions

Criteria Pollutant	*De Minimis* Threshold	Calculated Emissions (per year) metric tons (tons)	IDT Construction Emissions metric tons (tons)
Volatile Organic Compound	45.4 metric tons (50 tons) per year in federal serious non-attainment area	0.10 (0.11)	0.35 (0.39)
Oxides of Nitrogen	45.4 metric tons (50 tons) per year in federal serious non-attainment area	2.80 (3.00)	1.6 (1.8)
Carbon Monoxide	90.7 metric tons (100 tons) per year in all federal non-attainment areas	49.9 (55.0)	0.36 (0.40)
Sulfur Dioxide or Nitrogen Dioxide	90.7 metric tons (100 tons) per year in all federal non-attainment areas	0	0.11 (0.13)
PM-10	90.7 metric tons (100 tons) per year in federal moderate non-attainment area	77.9 (85.8)	4.8 (5.3)
Lead	22.7 metric tons (25 tons) per year in all federal non-attainment areas	< 1 (<1)	0

Santa Barbara County's budget planning values are presented as maximum daily emissions. The determination of regional significance is based on the maximum amount of amount of a pollutant emitted in a single day, which would be the launching of two Peacekeeper Targets in one day. Calculations include total emissions from two Peacekeeper Targets and mobile emissions stemming from personnel commuting to the launch site. Table J-6 lists the relationship between the daily budgeted amounts and potential emissions.

Table J-6: Regional Budget and Potential Emissions for Ozone Precursors

Pollutant	Daily Budget metric tons (tons)	10 Percent of Budget metric tons (tons)	Potential Emissions metric tons (tons)	Regionally Significant
Oxides of Nitrogen	37.53 (41.37)	3.753 (4.137)	0.91 (1.0)	No
Reactive Organic Gas	10.80 (11.91)	1.080 (1.191)	0.027 (0.030)	No

Potential project emissions would not amount to 10 percent or more of SBCAPCD's budget planning values for oxides of nitrogen or reactive organic gases. Therefore, this program would not be regionally significant.

In conclusion, the estimated emissions due to the proposed Extended Test Range would not exceed the *de minimis* thresholds and would not be regionally significant. Therefore, it should be ruled as being exempt from the requirement for a Conformity Determination due to non-applicability as defined 40 CFR 51.853(c)(1) and CFR 51.853(i).

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