



Ground-Based Midcourse Defense (GMD) Validation of Operational Concept (VOC)



Environmental Assessment

15 March 2002

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The MDA completed the NMD Deployment Environmental Impact Statement in July 2000 to support a future deployment decision. The Secretary of Defense has not yet made a decision to deploy the GMD. However, the need has been identified to gain a higher level of confidence in GMD's capabilities through tests under realistic operational conditions. Validation of the operational concept (VOC) through ground testing of the GMD is a vital part of operationally realistic testing.

The Preferred Alternative analyzed in this GMD VOC Environmental Assessment includes:

1. Construction and operation of a Ground-Based Interceptor (GBI) test site that would include six GBI silos and supporting facilities at Fort Greely, Alaska
2. Battle Management, Command, Control, and Communications (BMC3), which includes the Battle Management, Command and Control (BMC2) communication nodes, the GMD communication network, and the In-Flight Interceptor Communication System Data Terminal as sub-elements at Fort Greely, Alaska
3. Missile Transfer Facility at Eielson Air Force Base (AFB), Alaska
4. Use of the existing COBRA DANE Radar, with upgraded hardware and software, and BMC2 components at Eareckson Air Station
5. Use of the Early Warning Radar to be upgraded and installation of BMC2 Node at Beale AFB, California
6. BMC2 Nodes at Peterson AFB, Shriever AFB, and Cheyenne Mountain, Colorado; and Boeing Facilities in Alabama and California

Clear Air Force Station, Alaska, is being considered as an alternative location to Fort Greely for construction and operation of the GBI test site, associated BMC3, and support facilities.

EXECUTIVE SUMMARY

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Introduction

Within the Department of Defense, the Missile Defense Agency (MDA) (formerly the Ballistic Missile Defense Organization) is responsible for developing and testing the Ballistic Missile Defense System. There are three segments currently under development: Boost Phase Defense, Midcourse Defense, and Terminal Defense. An element of the Midcourse Defense Segment is the Ground-Based Midcourse Defense (GMD), formerly known as the National Missile Defense (NMD). The GMD is designed to protect all 50 states of the United States against limited ballistic missile attack by intercepting long-range ballistic missiles during the midcourse (ballistic) phase of their flight, before their reentry into the earth's atmosphere. The MDA completed the NMD Deployment Environmental Impact Statement (EIS) in July 2000 to support a future missile defense deployment decision. Following reviews directed by the Bush Administration, the MDA re-focused the GMD from near-term deployment to an effort to gain a higher level of confidence in GMD's capabilities through operationally realistic testing. This Environmental Assessment (EA) analyzes the potential impacts to the environment of constructing and operating a test bed to validate the GMD operational concept.

The facilities and operations to validate the GMD operational concept and the facilities and operations to improve the realism of GMD interceptor testing are each a part of the Ballistic Missile Defense System Test Bed. Each part of the test bed, however, serves a different test function and has independent utility, purpose, and need as well as different implementation schedules. Consequently, the independent parts of the test bed are being evaluated in separate National Environmental Policy Act analyses. The initial part of the test bed, the GMD validation of operational concept (VOC) analyzed in this EA, is designed to validate potential activities associated with the GMD operational concept by testing the interoperability of the GMD components in a realistic environment. The second type of GMD testing, not analyzed in this EA, would actually involve increasingly robust integrated flight tests in as realistic a mode as possible.

This EA analyzes potential GBI VOC test sites in Alaska and related actions in sites outside Alaska that were identified in the NMD Deployment EIS. This EA incorporates applicable portions of the NMD Deployment EIS by reference. Testing the GMD at a potential operational location would provide the decisionmaker with realistic information on which to assess future decisions.

The deployment concept analyzed in the NMD Deployment EIS was a fixed, land-based, non-nuclear missile defense system with a land and space-based detection system capable of responding to limited strategic ballistic missile threats to the United States. The proposed deployed system would consist of five components: Battle Management, Command, Control, and Communications (BMC3), which includes the Battle Management, Command and Control (BMC2) Node, the GMD communication network, and the In-Flight Interceptor Communication System Data Terminal (IDT) as sub-components; Ground-Based

Interceptor (GBI); X-Band Radar (XBR); Upgraded Early Warning Radar (UEWR); and a space-based detection system.

The NMD Deployment EIS analyzed several deployment location alternatives for the GBI, BMC3, and XBR. The primary location for the majority of the deployment components and support facilities that maximized NMD performance was Alaska. The IDTs and communication network (Defense Satellite Communication System [DSCS] and Fiber Optic Cable [FOC]) were not specifically analyzed in the NMD Deployment EIS due to undefined operational requirements and specific locations, but a general programmatic description of the types of impacts that could be expected from deploying the IDTs was included within the EIS. In addition, since not all sites and requirements for the communications network had been finalized, the exact locations to support and link the components also were excluded from specific analysis in the EIS. However, a general programmatic description of the types of impacts that could be expected was provided in the EIS.

The NMD Deployment EIS described the integration of the entire GBI (rocket boosters and Exoatmospheric Kill Vehicle [EKV]) into a canister (creating a Canisterized Air Vehicle [CAV]) at an integration facility before shipment to the deployment site. Because of a potential change in the interceptor design configuration since the NMD Deployment EIS was published, there are now three revised concepts for integration of the GBI: The GBI may arrive at the GBI test site totally assembled and fueled in the CAV as discussed in the NMD Deployment EIS; the GBI and EKV components may arrive uncanisterized at the GBI test site to be assembled onsite; or the GBI may arrive canisterized with the un-fueled EKV attached requiring the bi-propellant tanks to be installed in a Missile Assembly Building (MAB) or EKV Assembly and Checkout Facility.

Proposed Action

The Proposed Action analyzed in this GMD VOC EA includes construction and operation of a GBI VOC test site at either Fort Greely or Clear Air Force Station (AFS), Alaska containing six GBI silos and supporting facilities, an IDT, a DSCS earth terminal, and an Execution Level BMC2 Node; an IDT and two co-located DSCS earth terminals at Eareckson Air Station (AS), Alaska; and a Missile Transfer Facility at Eielson Air Force Base (AFB), Alaska. The Proposed Action also includes use of the existing COBRA DANE Radar, with upgraded hardware and software, at Eareckson AS; the Early Warning Radar (EWR) to be upgraded at Beale AFB, California; and communications among all facilities analyzed.

This EA evaluates alternative GBI VOC test sites at Fort Greely and Clear AFS, Alaska; several alternative locations for an IDT and DSCS earth terminal at Fort Greely and Clear AFS; alternative IDT and DSCS sites at Eareckson AS; and the alternative FOC routes associated with these sites. No reasonable alternatives to use of the EWR at Beale AFB and the COBRA DANE radar at Eareckson AS were identified.

Proposed activities at Fort Greely, the preferred GBI test site, would include:

- Construction and operation of six GBI silos and support facilities required to support test activities, including a MAB, interceptor storage facilities, and an

EKV Assembly and Checkout Facility; repair and interior modification of existing facilities to house Government and Prime Contractor personnel or administrative mancamp (temporary camp to house administrative personnel); and construction mancamp (temporary camp to house construction personnel)

- Construction and operation of one IDT to support test activities
- Construction and operation of GMD communication network facilities required to support test activities to include one DSCS earth terminal
- Installation and operation of an Execution Level BMC2 Node
- Installation of terrestrial FOC
- Electricity distribution upgrades
- Solid waste landfill extension/construction debris disposal
- Allen Army Airfield runway repairs

Proposed activities at Eareckson AS include:

- Construction and operation of one IDT required for test activities
- Construction and operation of communication network support facilities required to support test activities to include two co-located DSCS earth terminals
- Software and hardware upgrades to the existing COBRA DANE Radar and interior facility modifications to accommodate those hardware upgrades.
- Installation of terrestrial FOC
- Refurbishment of existing Air Force power plant including addition of one 9.5 million liter (2.5 million gallon) previously designed fuel tank
- Establishment of a mancamp if interior modification to existing facilities are not adequate to house the number of personnel involved in the project
- Repair and interior modification of existing facilities for support of construction and operation
- Interior modifications to Building 600 for installation and operation of Element Site Communication BMC2 Node workstations

Proposed activities at Eielson AFB include:

- Construction and operation of a GBI Missile Transfer Facility
- Road modifications such as resurfacing and construction of emergency pull-off ramp

Proposed activities at Beale AFB:

- Interior facility modifications to the existing EWR analyzed in Appendix H of the NMD Deployment EIS
- Upgraded hardware and associated software changes analyzed in Appendix H of the NMD Deployment EIS
- Interior modifications to existing facility for installation and operation of Element Site Communication BMC2 Node workstations

Proposed activities at Peterson AFB, Shriever AFB, and Cheyenne Mountain Complex, Colorado:

- Interior modifications to existing facility for installation and operation of Command Level BMC2 Node workstations

Proposed activities at Boeing Facilities, Alabama and California:

- Interior modifications to existing facilities for installation and operation of Element Site Communication BMC2 Node workstations

Proposed activities at Clear AFS Alternative GBI Site, if selected instead of Fort Greely, would include:

- Construction and operation of six GBI silos and support facilities required to support test activities, including a MAB, interceptor storage facilities, and an EKV Assembly and Checkout Facility, and a mancamp or temporary use of existing facilities to house administrative personnel, construction workers, and operators of the test facilities
- Construction and operation of one IDT to support test activities
- Construction and operation of GMD communication network facilities required to support test activities to include one DSCS earth terminal with one antenna
- Installation of terrestrial FOC
- Installation and operation of an Execution Level BMC2 Node

No-action Alternative

Under the No-action Alternative, the GMD VOC test site would not be established, the GMD and its components could not be tested under operationally realistic conditions, and prove-out of interoperability functions could not be accomplished.

Methodology

To assess the significance of any impact, a list of activities necessary to accomplish the Proposed Action was developed. The affected environment at all applicable locations was then described. Next, those activities with the potential for environmental consequences were identified. The degree of analysis of proposed activities is proportionate to their potential to cause environmental impacts. Many of the locations for the infrastructure and facilities proposed for use in testing the GMD VOC were analyzed in the NMD Deployment EIS and are, in general, smaller scale, or closely related versions of actions at locations identified in the EIS. This EA incorporates by reference much of the analysis in the NMD Deployment EIS. Those activities not addressed in the EIS, or that are significantly different than those analyzed in the EIS, will be analyzed in detail in this EA.

Thirteen broad areas of environmental consideration were considered to provide a context for understanding the potential effects of the Proposed Action and to provide a basis for assessing the severity of potential impacts. These areas included air quality, airspace, biological resources, cultural resources, geology and soils, hazardous materials and waste,

health and safety, infrastructure, land use, noise, socioeconomics, water resources, and environmental justice. The areas were analyzed as applicable for each proposed location or activity.

Results

This section summarizes the conclusions of the analyses made for each of the areas of environmental consideration based on the application of the described methodology. Within each resource summary, only those activities for which a potential environmental concern was determined are described.

Air Quality—All areas under consideration are in attainment areas, and as such no General Conformity Applicability Analysis requirements are anticipated for the Proposed Action. Construction and operation emissions would be intermittent and are not anticipated to cause exceedances of air quality standards.

Airspace—There are no requirements for additional new restricted airspace. Radiated peak and average power and operating bounds of the UEWR at Beale AFB and the COBRA DANE radar at Eareckson AS would remain the same as current levels.

Biological Resources—No threatened or endangered species have been identified at Fort Greely, Eielson AFB, Beale AFB, or Clear AFS. Under the Proposed Action, no impacts would be expected to threatened or endangered species found on or in the vicinity of Eareckson AS. Since Shemya Island is part of the Alaska Maritime National Wildlife Refuge, construction and operation activities would include close coordination with the U.S. Fish and Wildlife Service to identify and incorporate any additional potential mitigations of impacts to biological resources. No federally designated critical habitat has been identified at any of the proposed locations.

Some wetlands would be affected by the project through filling, draining, trenching, and other general construction activities. Wetlands would be avoided at all locations, to the maximum extent practicable in accordance with Executive Order 11990, *Protection of Wetlands*. Since almost all of Shemya contains wetlands, however, some impacts to wetlands are unavoidable. Best Management Practices such as stabilizing fill slopes from erosion and the use of hay bales to filter sediment from storm water runoff would be implemented. Permits under Section 404 of the Clean Water Act and state Section 401 water quality certification would be obtained where wetlands would be affected and before any discharge of fill material. Compliance with the required wetland permits guidelines would also help to minimize impacts. Maintenance of wetland quality and value would be coordinated with applicable agencies. The permitting process would entail review of proposed activities and possible mitigations through the public and agency review process. Mitigation measures would be developed during the 404 permitting process with the U.S. Army Corps of Engineers. Agency-recommended mitigations would take into account the size and quality of the wetlands involved.

Cultural Resources—Although the COBRA DANE radar at Eareckson AS and the EWR at Beale AFB are considered historically significant Cold War era facilities, only interior modifications are proposed for these two facilities. A Memorandum of Agreement between the U.S. Army and the Alaska State Historic Preservation Officer stipulates that the 26 buildings on Fort Greely eligible for listing on the National Register “may be altered, demolished, leased with no restrictions, or transferred out of federal ownership with no restrictions” following completion of Historic American Buildings Survey (HABS) Level 1 recordation. All HABS information has been delivered. No historically significant facilities would be affected at Eielson AFB or Clear AFS.

If during construction or operation of the proposed facilities cultural items are inadvertently discovered, activities would cease in the immediate area and the State Historic Preservation Officer and potentially affiliated Native Alaskan entities would be notified through the host installation. Subsequent actions would follow guidance provided.

Geology and Soils—Best Management Practices such as stabilizing fill slopes from erosion and the use of erosion control measures to filter sediment from storm water runoff would be followed to reduce the potential for soil erosion. Construction of facilities would incorporate seismic design parameters consistent with the critical nature of the facilities and their geologic setting. Site design would also avoid construction in permafrost areas to the extent practicable.

Hazardous Materials and Waste—Although an increase in hazardous materials use and hazardous waste generation is anticipated, it would be handled and disposed of in accordance with appropriate regulations. During all stages of construction and operation, the Government would look for opportunities to reduce the use of hazardous materials.

Health and Safety—Overall there would be a minimal increase in health and safety risk from construction and operation of a GBI VOC test site. The construction of new facilities is routinely accomplished for both military and civilian operations and presents only occupational-related effects on the safety and health of workers involved in the performance of construction activity. Facility and equipment design would incorporate measures to minimize the potential for and impact of accidents. The potential for a mishap during handling of a GBI or fueling of an EKV is small due to safety precautions that would be in place. Specific health and safety plans would be developed including evacuation plans, and notification of local and offsite emergency response as required. An emergency response team would be on call during bi-propellant EKV tank installation. The local fire departments would be notified through the existing cooperative agreements with the installation. Electromagnetic radiation levels would not exceed established personnel exposure limits.

Infrastructure—The electrical power distribution system on Fort Greely, if selected, would need to be expanded to support the proposed GBI VOC test site. Implementation of the Proposed Action would not result in impacts to existing electrical service to Fort Greely. The solid waste disposal system on Fort Greely, if selected, would also need to be upgraded or expanded to support the GBI VOC test site. All current infrastructure systems at other proposed locations have adequate capacity to support anticipated demands.

Land Use—Construction and operation of the GBI VOC test site and related support facilities would be compatible with regional and local planning/zoning and surrounding on and off base land uses.

Noise—No noise sensitive receptors (e.g., churches, schools, residential communities, etc.) have been identified in the vicinity of the proposed construction sites. Construction noise would be short-term and would not constitute a health risk. No long-term impacts are anticipated.

Socioeconomics—It is anticipated that construction and operation of the proposed GBI VOC test site would result in an economic benefit to the installation and surrounding region.

Water Resources—A minor potential exists for short-term increases to sediment in surface water during construction. Storm water permit provisions and storm water plans would be implemented to minimize these potential impacts. Best Management Practices such as stabilizing fill slopes from erosion and the use of erosion control measures to filter sediment from storm water runoff would be implemented. For Clear AFS, due to the shallow water table, dewatering of the site during silo construction and/or operation would require authorization under a state-wide general permit.

Environmental Justice—No low-income or minority populations would be disproportionately affected.

Cumulative Impacts—GMD VOC Test Bed activities are proposed for a number of widely separated geographic areas. Consequently, there is little or no potential for significant cumulative impacts between the various Test Bed sites. Nor are any significant cumulative environmental impacts foreseen at Beale AFB, California or at any of the BMC2 sites in the Continental United States, since activities at these sites involve primarily interior modifications to existing facilities.

There may be some temporary minor cumulative impacts to air quality at sites in Alaska during construction activities. Similarly, there would be a minor cumulative increase in the use of hazardous materials, generation of hazardous waste, and demand on infrastructure and utility systems during the construction phase. There would be no long-term significant cumulative impacts to soils or water quality, since disturbed areas would be restored after construction was completed. There would be a net loss of about 1 percent of the wetlands at Shemya Island, and there is also the potential for a net loss of 1 to 12 percent of the wetlands at Clear AFS if it is selected as the GBI VOC site. Some cumulative beneficial impacts on local economies in the vicinity of construction activities and from operation of GMD VOC Test Bed sites would be expected. There is the potential for an increase in fire and safety risk from operation of a Missile Transfer Facility at Eielson AFB. However, the risk would be minimized by observing explosive safety zones and procedures.

Table ES-1: Summary of Environmental Impacts

Resource Category	Fort Greely	Clear AFS	Eareckson AS	Eielson AFB	Beale AFB	Delta Junction	No-action
Air Quality	Temporary localized increase in air emissions from construction and minor emission levels from operation would not affect the region's current attainment status	Temporary localized increase in air emissions from construction and minor emission levels from operation would not affect the region's current attainment status	Temporary localized increase in air emissions from construction. No change to the region's current attainment status	Temporary localized increase in air emissions from construction. No change to the region's current attainment status	No change to the region's current attainment status	Temporary localized increase in air emissions from construction of mancamp. No change to the region's current attainment status	No change to the region's current attainment status
Airspace	No impact	No impact	No change in airspace status or use	No impact	No change in airspace status or use	No impact	No impact
Biological Resources	Short-term noise-related impacts to wildlife during construction. Minimal impacts are expected to vegetation and wildlife; no threatened or endangered species have been identified; no direct impacts to wetlands	Short-term noise-related impacts to wildlife during construction. Minimal impacts are expected to vegetation and wildlife; no threatened or endangered species have been identified. The potential exists to impact between 2.7 hectares (6.6 acres) and 55 hectares (135 acres) of wetlands depending on location selected (1 to 12 percent)	Short-term noise-related impacts to wildlife during construction. Minimal impacts are expected to vegetation and wildlife, including the threatened and endangered species found on and in the water surrounding Shemya Island. No impacts to biological resources from GMD-related radar operations. The potential exists to impact up to 7 hectares (17 acres) of wetlands, less than 1 percent of the wetlands on the island	Short-term noise-related impacts to wildlife during construction; continued minimal impacts to wildlife from aircraft activities, no impacts to biological resources from proposed road modifications associated with the Missile Transfer Facility. No threatened or endangered species have been identified	No impacts to biological resources including threatened or endangered species from GMD-related radar operations	Short-term noise-related impacts to wildlife during construction. Minimal impacts are expected to vegetation and wildlife. No threatened or endangered species have been identified	Fort Greely: Continued minor impacts to vegetation and wildlife from current training activities
Cultural Resources	No impacts to identified cultural resources since applicable HABS documentation has been completed	No impact since no historic or traditional properties have been identified within the area proposed for use	No impact to historically significant Cold War era facilities (COBRA DANE Radar); only interior modifications are proposed	No impact to cultural resources since area proposed for use is previously disturbed and already leveled and graveled	No impact to historically significant Cold War era facilities (EWR); only interior modifications are proposed	No impact anticipated to cultural resources	No impacts, resources would continue to be managed in accordance with cultural resource regulations
Geology and Soils	Minor localized soil erosion during construction. No impacts to permafrost expected	Minor localized soil erosion during construction. No impacts to permafrost expected	Minor localized soil erosion during construction. No impacts to permafrost expected	Minor localized soil erosion during construction. No impacts to permafrost expected	No impact	Minor localized soil erosion during construction. No impacts to permafrost expected	No impact
Hazardous Materials and Hazardous Waste Management	Slight increase in amount of hazardous material used and hazardous waste generated	Slight increase in amount of hazardous material used and hazardous waste generated	Slight increase in amount of hazardous material used and hazardous waste generated	Slight increase in amount of hazardous material used and hazardous waste generated	No impact	No impact	Continued use of hazardous materials and generation of hazardous waste

Table ES-1: Summary of Environmental Impacts (Continued)

Resource Category	Fort Greely	Clear AFS	Eareckson AS	Eielson AFB	Beale AFB	Delta Junction	No-action
Health and Safety	Minimal increase in health and safety risks during construction and operation	Minimal increase in health and safety risks during construction and operation	Minimal increase in health and safety risks during construction and operation	Minimal increase in health and safety risks during construction and operation	No impact	Minimal increase in health and safety risks during construction	No impact
Infrastructure	New wells, upgraded electrical transmission lines, and expanded or new solid waste landfill would handle the increase in demand for these services	Utility systems are adequate to handle demand	Utility systems are adequate to handle demand; power plant upgrades would increase reliability of the system	Utility systems are adequate to handle demand	Utility systems are adequate to handle demand	Utility systems are adequate to handle demand	No impact
Land Use	No impact	No impact	No impact	No impact	No impact	No impacts anticipated	No impact
Noise	No impact	No impact	No impact	No impact	No impact	No impact	No impact
Socioeconomics	Positive economic impact from increase in jobs associated with proposed action	Positive economic impact from increase in jobs associated with proposed action	No impact	No impact	No impact	Positive economic impact from increase in jobs associated with Proposed Action	No impact
Water Resources	Minor potential for short-term increase in sediment in surface water during construction	Minor potential for short-term increase in sediment in surface water during construction. Potential for long-term dewatering of GBI silo field	Minor potential for short-term increase in sediment in surface water during construction	Minor potential for short-term increase in sediment in surface water during construction	No impact	Minor potential for short-term increase in sediment in surface water during construction	Fort Greely: Continued potential for impacts to water resources from military training activities
Environmental Justice	No low-income or minority populations would be disproportionately affected	No low-income or minority populations would be disproportionately affected	No low-income or minority populations would be disproportionately affected	No low-income or minority populations would be disproportionately affected	No low-income or minority populations would be disproportionately affected	No low-income or minority populations would be disproportionately affected	No low-income or minority populations would be disproportionately affected

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ACRONYMS AND ABBREVIATIONS

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AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AFB	Air Force Base
AICUZ	Air Installation Compatible Use Zone
ANSI	American National Standards Institute
AFS	Air Force Station
AS	Air Station
AST	aboveground storage tank
AWCRSA	Aleutians West Coastal Resource Service Area
BMC2	Battle Management, Command and Control
BMC3	Battle Management, Command, Control, and Communications
BMP	Best Management Practices
CAV	Canisterized Air Vehicle
CDP	Census Designated Place
CFR	Code of Federal Regulations
dB	decibel
dBA	decibel, A-weighted
DNL (L _{dn})	A-weighted Day-Night Equivalent Sound Level
DoD	Department of Defense
DSCS	Defense Satellite Communication System
EA	environmental assessment
EIS	environmental impact statement
EKV	Exoatmospheric Kill Vehicle
EPA	Environmental Protection Agency
ESQD	Explosive Safety Quantity-Distance
EMR	electromagnetic Radiation
EWR	Early Warning Radar
FAA	Federal Aviation Administration
FOC	Fiber Optic Cable
GBI	Ground-Based Interceptor
GCN	Ground-Based Midcourse Defense Communication Network
GMD	Ground-Based Midcourse Defense

HABS	Historic American Buildings Survey
HAER	Historic American Engineering Report
ICAO	International Civil Aviation Organization
IDT	In-Flight Interceptor Communication System Data Terminal
IRP	Installation Restoration Program
kVA	kilovolt-ampere
kW	kilowatt
L _{eq}	Continuous Equivalent Sound Level
MAB	Missile Assembly Building
MDA	Missile Defense Agency
MHz	megahertz
MW	megawatt
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NMD	National Missile Defense
NPDES	National Pollutant Discharge Elimination System
OSHA	Occupational Safety and Health Administration
PAWS	Phased Array Warning System
PCB	polychlorinated biphenyl
PM-10	particulate matter of 10 microns in diameter or smaller
ppm	parts per million
PSD	Prevention of Significant Deterioration
RF	radio frequency
ROI	region of influence
SHPO	State Historic Preservation Officer
SWPPP	Storm Water Pollution Prevention Plan
UEWR	Upgraded Early Warning Radars
USFWS	United States Fish and Wildlife Service
UST	underground storage tank
VOC	Validation of Operational Concept
VHF	very high frequency
XBR	X-Band Radar

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