Environmental Assessment

Ballistic Missile Defense Organization
Cooperative-Engagement-Capability/PATRIOT
(CEC/PATRIOT) Interoperability Test

July 2000

Executive Summary

Environmental Assessment
of the
Ballistic Missile Defense Organization
Cooperative-Engagement-Capability/PATRIOT (CEC/PATRIOT)
Interoperability Test

Proposed Action, Purpose and Need

As part of its program to develop technologies to protect against ballistic missiles, cruise missiles and high-performance aircraft, the Ballistic Missile Defense Organization (BMDO) proposes to conduct a test of radar equipment designed to detect, track and target these kinds of threats. However, no missiles will be used in conducting the test. The proposed test, termed the "Cooperative Engagement Capability/PATRIOT Interoperability Test" would continue the development of an innovative technology that will enable U.S. Army and U.S. Navy radar systems to work together to jointly track and counter air threats at longer ranges than is now possible.

The technology to be tested uses a network of radars with overlapping coverage to create a combined, larger, more detailed detecting, tracking, and targeting capability. The Cooperative Engagement Capability (CEC), a system developed by the U.S. Navy, will link radars from multiple platforms, including ships and aircraft and land, into a network to produce a single, composite picture of radar tracks.

The proposed test will link land-based Navy radar systems, a Navy AEGIS cruiser at sea, an airborne P-3 Orion aircraft, and an Army PATRIOT radar at a separate site. The test will simulate with computers the "cooperative" acquisition, tracking and engagement of various "threats" by combining the capabilities of several radars at once. This will be a test of radar, communications and computer capabilities only; there will be no actual missiles or missile launches involved in this test in any way. Although a PATRIOT radar will be involved, this unit is physically completely separate from PATRIOT missiles, which will not be present at any of the test sites, nor involved in the test in any way.

PURPOSE. The general purpose of this testing is to determine and demonstrate the capability of several radar systems, from different services, to jointly detect, track and target ballistic missiles, cruise missiles and high-performance aircraft at longer ranges than is now possible. As the ability to detect, track and target incoming threats is improved this would ultimately enable defensive systems such as the PATRIOT system to be employed more effectively not only in the aircraft defense role it was originally designed for, but also in an increasingly effective missile defense role.

NEED. Changing and increasing threats to the U.S., particularly from ballistic missiles, potentially carrying weapons of mass destruction, give rise to the need to develop improved

capability to detect, track and target such threats, so that they can be more effectively countered than is presently possible.

In accordance with the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality Regulations, 40 CFR parts 1500-1508, and E.O. 12114, an Environmental Assessment (EA) of the BMDO proposed action was developed through review of available technical and environmental documentation, an analysis of impacts by an interdisciplinary staff of environmental professionals, and consultation with local authorities.

Alternatives

The EA addresses the environmental impacts of deployment of all of the test elements, focusing on the impacts at one non-military test equipment location, Ocean City Municipal Airport. NEPA analyses for the other test elements are documented in categorical exclusions (CATEX) and are incorporated by reference in the EA.

Alternatives to the proposed action evaluated in the EA include 1) locating the CEC/PATRIOT test components at a site on Wallops Island rather than at the Ocean City Municipal Airport, and 2) not conducting the test at all (No Action Alternative).

Affected Environment

This environmental assessment describes the environmental resources that could be affected by the proposed action at Ocean City Municipal Airport, Maryland. The environment at Wallops Island, VA and that associated with the AEGIS cruiser and aircraft operations are addressed in the NEPA documents prepared for those test elements and activities. Available literature that included relevant EAs on other actions at the Airport was acquired, and data gaps were identified. To fill data gaps and to verify and update available information, installation personnel and Federal, state, and local regulatory agencies were contacted.

Twelve broad environmental components 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 environmental impacts. The Federal and/or state environmental statutes, many of which set specific guidelines, regulations, and standards, regulate several of these environmental components. These standards provide a benchmark that assists in determining the significance of environmental impacts under the NEPA evaluation process. The areas of environmental consideration, discussed briefly as follows, are geology, topography, and soils; water resources; biological resources, including protected species and habitats; land use; recreation; air quality; airspace and air traffic; health and safety, including radar emissions safety; noise; hazardous materials and waste; socioeconomics, including environmental justice; and cultural resources.

Environmental Consequences

For each environmental resource, the assessment found that there would be either no impacts at all or minimal impacts that could be readily mitigated. In particular, potential health effects from exposure to radar emissions would not be a concern because the Airport site would be secured during the entire test period and the distance at which effects might be of concern would be

limited to a zone immediately in front of the radar, lying entirely within the secured area. Noise and air emissions from test equipment and power generators would not exceed environmentally acceptable levels. No protected species or sensitive habitats would be affected. No recreational or business activities at or near the Airport would be disrupted. No cultural resources would be affected and no issues of environmental justice were found to be of concern.

There would be no impacts caused by the other test elements proposed. The AEGIS would be involved in routine operations in the open ocean. The aircraft elements would fly in restricted airspace routinely used for the conduct of military tests. The Wallops fixed radar elements would do nothing different from their normal radar operations that might affect the environment.

The alternative of locating the CEC/PATRIOT mobile elements at Wallops would also not cause environmental impacts as documented in the attached CATEX. The alternative of No Action, although it would eliminate the potential for any environmental impacts to occur would not allow the BMDO to obtain the information which would be generated from the test.

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1.0 PURPOSE AND NEED

1.1 INTRODUCTION

This Environmental Assessment (EA) documents the results of a study of the potential environmental impacts from an action proposed by the Ballistic Missile Defense Organization (BMDO). As part of its program to develop technologies to protect against ballistic missiles, cruise missiles and high-performance aircraft, BMDO proposes to conduct a series of tests of equipment designed to detect, track and target these kinds of threats.

This proposed test, termed the "Cooperative Engagement Capability/Patriot Interoperability Test" would continue the development of an innovative technology that will enable U.S. Army and U.S. Navy radar systems to work together to jointly track and counter air threats at longer ranges than is now possible.

The technology to be tested uses a network of radars with overlapping coverage to create a combined, larger, more detailed detecting, tracking, and targeting capability. The Cooperative Engagement Capability (CEC), a system developed by the U.S. Navy, will link radars from multiple platforms, including ships and aircraft and land, into a network to produce a single, composite picture of radar tracks.

The Purpose of an Environmental Assessment (EA)

An EA is done by a Federal agency, such as the Ballistic Missile Defense Organization, to determine if an action they are proposing to take would significantly affect any portion of the environment.

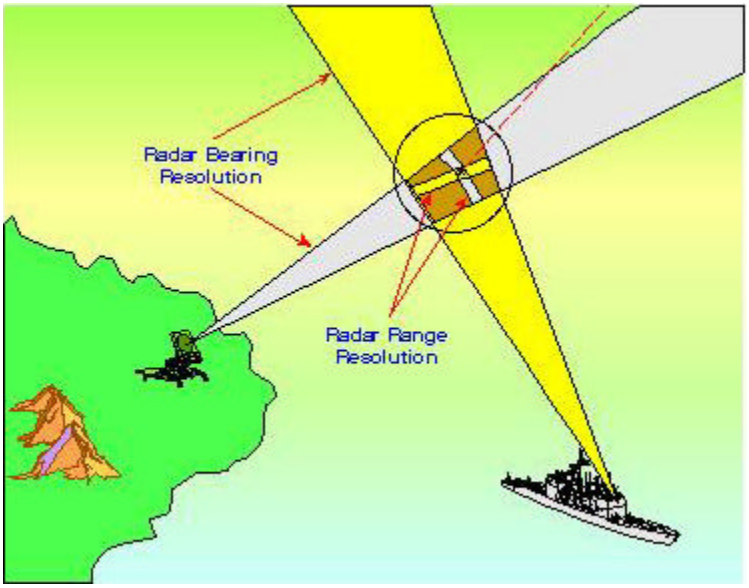
The intent is to provide project planners and Federal decision-makers with relevant information on a proposed action's impacts on the environment.

If the study finds no significant impacts, then the agency can record the results of that study in an Environmental Assessment document, and publish a Finding of No Significant Impact (FONSI). The agency can then proceed with the action. If the environmental assessment study finds that there would be significant impacts associated with the action, then the agency must prepare and publish a detailed Environmental Impact Statement (EIS) to help it decide about proceeding with the action.

The proposed test series would link land-based Navy radar systems, a Navy AEGIS cruiser at sea, an airborne P-3 Orion aircraft, and an Army PATRIOT radar at a separate site. The test will simulate with computers the "cooperative" acquisition, tracking and engagement of various "threats" by combining the capabilities of several radars at once. This will be a test of radar, communications and computer capabilities only; there will be no actual missiles or missile launches involved in this test in any way. Although a PATRIOT radar will be involved, this unit is physically completely separate from PATRIOT missiles, which will not be present at any of the test sites, nor involved in the test in any way.

1.2 PURPOSE

The general purpose of this testing is to determine and demonstrate the capability of several radar systems, from different services, to jointly detect, track and target ballistic missiles, cruise missiles and high-performance aircraft at longer ranges than is now possible.



As the ability to detect, track and target incoming threats is improved this would ultimately enable defensive systems such as the PATRIOT system to be employed more effectively not only in the aircraft defense role it was originally designed for, but also in an increasingly effective missile defense role.

Figure 1. Cooperative Engagement Capability

1.3 NEED

Changing and increasing threats to the U.S., particularly from ballistic missiles, potentially carrying weapons of mass destruction, give rise to the need to develop improved capability to detect, track and target such threats, so that they can be more effectively countered than is presently possible.

1.4 THE ENVIRONMENTAL ASSESSMENT

In accordance with the National Environmental Policy Act of 1969 (NEPA), Council on Environmental Quality Regulations, 40 CFR parts 1500-1508, and E.O. 12114, federal agencies must consider the potential impacts to the environment from their proposed activities. These agencies must integrate environmental considerations into their planning and decision-making. The method of documenting environmental considerations for an action such as this proposed series of tests is through an Environmental Assessment (EA). An EA is normally written under NEPA for actions not likely to produce significant environmental effects or where the significance of the potential effects is not yet clear. A more detailed document, an Environmental Impact Statement (EIS), is prepared for actions that would or would likely have significant effects on the environment.

When an EA determines that significant impacts would not occur, then a Finding of No Significant Impacts (FONSI) is prepared and published. An EIS is initiated when the EA determines that significant impacts would or would be expected to occur as a result of the proposed action.

This EA records the results of an analysis of this proposed test activity. The EA has been developed through the review of available technical and environmental documentation and the analysis by an interdisciplinary staff of environmental professionals and consultation with local authorities.

1.5 DECISIONS TO BE MADE

The decisions to be made by the Ballistic Missile Defense Organization, based in part on the information contained in this EA are

- Whether or not to proceed with the test activity,

AND

- If the activity is to be conducted, which of two feasible sites to use for the temporary location of the PATRIOT Radar system during the test.

2.0 PROPOSED ACTION AND ALTERNATIVES

BMDO proposes to conduct a "Cooperative Engagement Capability (CEC)/PATRIOT Interoperability Test" from 4 Aug to 18 Aug 2000. This test would involve:

- A radar system at the Navy's Surface Combat Systems Center (SCSC) at Wallops Island, Virginia
- A Navy AEGIS cruiser, USS Cape St. George, at sea
- A Navy P-3 Orion aircraft, from Naval Air Station Patuxent River
- Two Lear Jets, from Newport News Municipal Airport, Virginia
- An Army PATRIOT radar system temporarily set up at a separate site from the Navy's radars. The two feasible sites that have been identified for this temporary deployment are:
    - The Ocean City, MD airport
    - A site at Wallops Island, approximately one mile south of the Navy's radar.

In the test, the Lear Jets would fly over the ocean at an altitude and distance beyond the capability of the PATRIOT radar system to acquire them. Navy radars aboard the AEGIS cruiser would detect and track these simulated "targets". This data would be transmitted to the PATRIOT radar system by relaying the information through the P-3 Orion aircraft circling nearby. The PATRIOT radar system, which consists of a separate Command & Control element and a Fire Control Unit, will use this "target" data to initiate the tracking and engagement of the targets. The PATRIOT computer systems will determine the optimum target "engagement" zone. The computers will then conduct a strictly simulated launch and engagement. That is, there will be no actual launch of any missiles—there will be no PATRIOT missiles at the site or in any way linked to the radar. The computer systems, however, will run a program that provides data to the tracking system that simulates missile flight data. Inside the computer, therefore, a simulated PATRIOT missile will be guided to intercept the simulated target.

The AEGIS Cruiser will only be available to participate in this test for a limited time. But setting up the test will itself take several days. So, to make maximum use of the cruiser's time, a very similar radar located at Wallops Island will be used as an initial "stand-in" for the cruiser's radar. Once the PATRIOT radar is operational, then the Navy and Army personnel will establish data exchange and interoperability between the PATRIOT and the land-based Navy radar at Wallops. The process of calibrating these radars to work effectively together may take some time. After this is done, when the cruiser arrives on station, the ship-borne radar should then be able to quickly establish interoperability with the PATRIOT system, with relatively little fine-tuning. At that point, the Wallops Island radar would no longer be needed in the test.

To make this technique most effective, the PATRIOT radar system should be roughly the same distance from the Navy radar at Wallops as it will later be from the ship-borne radar. Accordingly, to obtain the most effective test geometry, BMDO proposes to locate the PATRIOT Radar system at the Ocean City, MD airport, as the preferred alternative location, for the 14-day duration of the tests.

2.1 EQUIPMENT INVOLVED IN THE TEST

2.1.1 Navy Radars at SCSC, Wallops

At the Surface Combat Systems Center, the SPY-1 Radar system would be used. It was installed over 10 years ago and is routinely used for AEGIS cruiser system testing. Accordingly, no new equipment or construction would be required at this site. Participation in this test by the SPY-1 radar at the SCSC would give rise to no changes in activities, or new activities that could affect the environment.

No Impact

The Navy has analyzed the potential for impacts associated with use of the SPY-1 radar at the SCSC facility on Wallops Island, Virginia in this test and has found that: "This action does not individually or cumulatively have a significant effect on the human environment"; accordingly, the Navy has determined that this specific activity meets all of the Navy's criteria for a "categorical exclusion" under the NEPA regulations, and would not itself require any additional documentation. (US Navy, 2000) A copy of the Navy's environmental checklist and associated documentation is included as an Appendix.

Accordingly, no additional analysis or discussions of impacts in regard to the SPY-1 radar are warranted.

2.1.2 AEGIS Cruiser

The AEGIS cruiser, the USS Cape St. George, will be returning from a 6-month cruise. Its home base is Norfolk Naval Station, Virginia. The ship is scheduled to be conducting routine operations and training activities in the area off the coast east of Ocean City for the period of the testing, regardless of whether BMDO conducts this action or not. If the BMDO test were to occur, the AEGIS' role would be to initially acquire the airborne targets, and coordinate through the P-3 Orion to the PATRIOT system for the Cooperative Engagement Capability test.
Once the cruiser arrives in the operations area, there would be an initial period of calibration between the Patriot and the cruiser's radar system. This would be the fine-tuning discussed in the previous section. Once this fine-tuning is complete, the test will begin with the P-3 Orion and the Lear jets.

Participation in this test by the SPY-1 radar aboard the cruiser would give rise to no changes in activities, or new activities that could affect the environment.

Routine Operations

The Navy has analyzed the potential for impacts associated with the involvement of the AEGIS cruiser in this test. The Navy has determined that the ship will maintain normal open-ocean operation of all of its equipment. Participating in the test will not cause the ship to conduct activities different from activities that are a normal part of its continuing operations. The Navy has therefore determined that this specific activity meets all of the Navy's criteria for a "categorical exclusion" under the NEPA regulations, and would not itself require any additional documentation. (U.S. Navy, 2000) A copy of the Navy's environmental checklist and associated documentation is included as an Appendix.

Accordingly, no additional analysis or discussions of impacts in regard to the involvement of the AEGIS cruiser in this test are warranted.

2.1.3 Support and Target Aircraft Operations

The main support aircraft would be a P-3 Orion, based at and flying out of, the Naval Air Station at Patuxent River, MD, roughly 70 miles to the west. The P-3's role is one of command, control, coordination and communication relay. The P-3 will coordinate the activities of the "target" aircraft, the Lear jets. She will also act as communications relay between the AEGIS, the PATRIOT radar system, and Wallops Island Operations. The P-3 will be operating in military training airspace and will be well clear of all civil and commercial flight operations off the coast.

The target aircraft would be two Lear jets. These are aircraft contracted by the Department of Defense (DoD) especially for the purpose of providing target training to DoD assets. These aircraft will be operating out of the Newport News, Virginia municipal airport.

2.1.4 PATRIOT Radar

The PATRIOT configuration -3 Radar Set (RS) consists of an AN/MPQ-53 multifunction phased array radar mounted on an M-860 semi-trailer (see figure x) towed by a M983 Heavy Expanded Mobility Tactical Truck. The RS is approximately 56 feet in length, 12 feet in height and weighs approximately 87,400 pounds.

The PATRIOT Electrical Power Plant (EPP) is the primary source of alternating current for the RS and Engagement Control Station (ECS). Other items of equipment that will be used in this test have their own power generators, as listed below. The EPP is truck mounted and is approximately 32 feet in length and weighs approximately 33,360 pounds. It contains two 75-gallon fuel tanks, two 150kW 400Hz direct injected diesel-powered generators interconnected through a Power Distribution Unit, and associated grounding equipment. Under normal operating conditions, one generator set can usually supply adequate power to both the ECS and RS. When continuous operation is mission essential and conditions indicate that the on-line generator set may not be capable of providing uninterrupted power, the second generator set may be started. In this situation, the second generator can be powered up and brought on-line without interruption.

The RS is controlled by the Engagement Control Station (ECS). The ECS contains the Weapon Control Computer, man/machine Interface and various data and communication terminals. The ECS is truck mounted on a 5-ton truck. It is approximately 34 feet in length and weighs approximately 38,208 pounds. The ECS communicates with the radar via a single multi-conductor cable.

Additional van-mounted components of the system such as the Information Coordination Central (ICC), the Tactical Command System (TCS), the Battery Command Posts (BCP) are essential elements of the data processing and management of the tracking process.

Several van-mounted items associated with this test will also be present. These include the Test Control Console (TCC) Van, Non-Tactical Peripheral Equipment Van, Cooperative Engagement Capability (CEC), Instrumentation Vans, Virtual Engagement (VE) Simulator, CEC Analysis/Data Reduction Van and Support van.

Figure 2 The Patriot Radar Deployed

The phased array antenna of the radar is positioned at the forward end of the shelter and is erected to a fixed 67.7-degree angle, relative to the horizontal plane, during emplacement. When operating, the radar has a safety zone that extends 120 meters (395 feet) in front of the erected array, and extending 60 degrees to each side of the center of the radar. Personnel are not allowed within this safety zone when the radar is operating.

The PATRIOT test and support equipment will originate from three sites. The PATRIOT radar system and required support equipment will originate from White Sands Missile Range (WSMR), New Mexico. A commercial carrier, equipped with all necessary permits, will transport the equipment by road to the deployment site – either Ocean City, Maryland or Wallops Island, Virginia. The equipment, because of its size and high security classification, will only travel during daylight hours, Monday through Friday. Two Battery Command Posts equipped with the CEC and required support equipment will originate from Huntsville, Alabama. Finally, a Mission Support Unit, which is a Van equipped with administrative support equipment will

originate from Laurel, Maryland. Upon completion of the test, the deployed equipment will return to its original sites, reversing the deployment process.

Upon arrival at Ocean City Municipal Airport, the heavy equipment would access the Main deployment area via the secure access-way that has been built linking Eagle's Nest Drive to the Airport infield, which is the main deployment site. This temporary aggregate-road installation allows restricted direct access to the infield radar test site across the taxiway without interfering with the main runway air traffic. Access to the Secondary deployment site would utilize the parallel taxiway next to runway 32/14 and the first portion of Runway 20. Personnel would access the two deployment sites by van that would be in direct communications with the airport tower by radio or signal lights. These measures would minimize any disruption to any normal airport flying activities.

The airport runways would be an alternative to using the temporary aggregate-road to access the Main deployment area, with equipmen or personnel vans. Aircraft flying and ground operations may be disrupted for a short time while the equipment traversed the runway/taxiway/ aircraft parking areas. Upon completion of the test, the deployed equipment would return to its original sites, reversing the deployment routing and process.

The list of PATRIOT, test, and support equipment to be located at the deployed site is as follows:

- Configuration-3 Radar, ECS, and two Generators
- Configuration-3 Information Coordination Central (ICC) and Generator
- Tactical Command System (TCS) and two Generators
- Test Control Console (TCC) Van and Generator
- Non-Tactical Peripheral (NTP) Equipment Van
- Two Battery Command Posts (BCP) and two Generators each
- Two Cooperative Engagement Capability (CEC) Data Reduction Vans
- Two Instrumentation Vans and two Generators each
- Virtual Engagement Simulation Tool (VEST) Simulator and Generator
- John Hopkins University Applied Physics Lab (JHU/APL) Van and Generator
- CEC Analysis/Data Reduction Van
- Electrical Power Unit (EPU) General Purpose Generator
- Mission Support Unit (MSU) van
- Material Test Directorate (MTD) Range Support van
- Personnel Van (PV)

2.1.5 Locations

2.1.5.1 Ocean City Municipal Airport

The proposed action's preferred alternative would deploy the PATRIOT Radar system temporarily at the Ocean City Municipal Airport, Berlin, Maryland, for the duration of the testing. The alternative location for the temporary deployment would be Wallops Island, which is discussed below. The equipment would arrive on August 4, 2000 and would depart on August 19, 2000.

Established in 1958, Ocean City Municipal Airport (designation OXB) is located in Worcester County, MD approximately six miles from Ocean City on the western shore of Sinepuxent Bay, one of Maryland's coastal bays. Located about 1.5 miles south of U.S. Route 50, the airport encompasses approximately 578 acres of land situated between Sinepuxent Bay and Route 611 to the west (see figure 3) The barrier island of Assateague forms the eastern shore of the Bay.

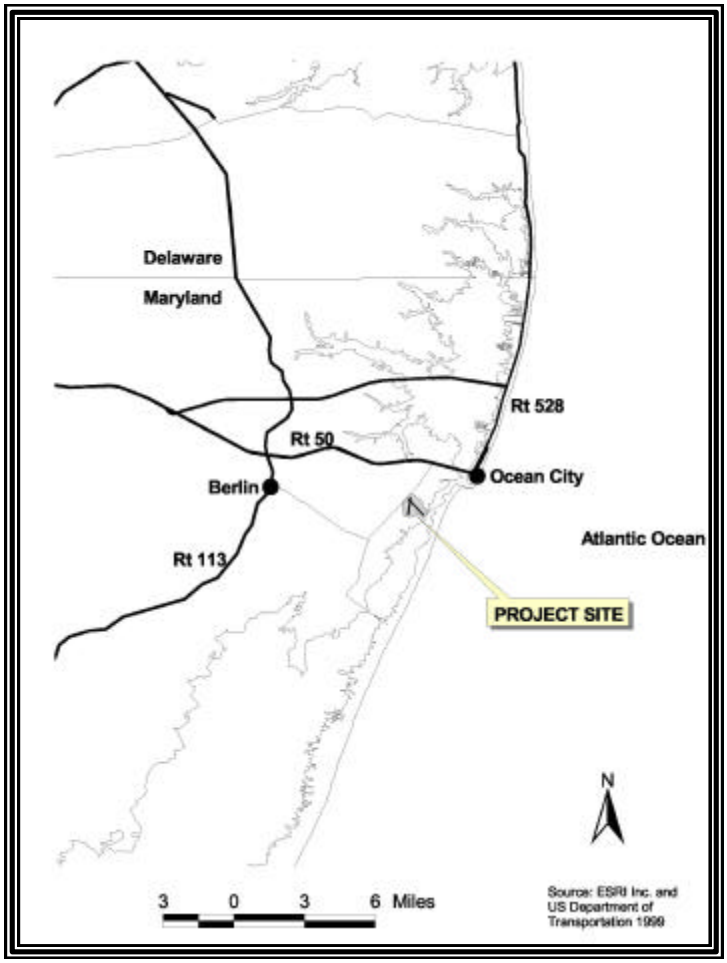


Figure 3. Site Map.

The Town of Ocean City, MD owns the Airport and the town's Public Works Department operates it. Access to the Airport's terminal area is provided from route 611 which runs south from Route 50 past the airport down Lower Sinepuxent Neck and over to Assateague Island. The majority of the aviation activities at Ocean City Municipal Airport are defined as general aviation, which comprises the bulk of civil aircraft operations.

The principal features of the Airport are its two runways (14-32 and 02-20), a taxiway, aprons, hangars and control buildings, infield area, roads, and fenced grounds. The main runway, oriented NW-SE and 4,070 ft long by 75 ft wide, is Runway 14-32. Single engine and twin-engine aircraft routinely use it. The secondary runway, oriented N-S and 3,200 ft long by 75 ft wide, is Runway 02-20. This latter runway was constructed in 1979-1980 to provide for better wind coverage and operating conditions for small aircraft. Due to its shorter length and lower pavement strength, single and light twin-engine aircraft use this runway only when prevailing winds require its use. The taxiway connects the south end of Runway 02-20 with the main runway and apron and hangar areas. Airport Road provides access to the hangars and control buildings north of the runways. Via Antique Road, Eagle's Nest Drive provides access to the

Eagle's Nest golf course and a bayside residence and campground area south and east of the airport grounds, but does not provide access to the airport itself.

Figure 4. Ocean City Municipal Airport, Maryland

As noted earlier, a secure access-way has been built linking Eagle's Nest Drive to the Airport infield. This temporary aggregate-road installation allows restricted direct access to the infield radar test site across the taxiway without interfering with the main runway air traffic. The central CEC/Patriot test command elements would be located just north of the intersection of the main and secondary runways.

For safety, Notices to Airmen (NOTAMS) would be issued advising pilots of the activities in and around the runway environment. All personnel and equipment would remain outside of applicable runway and taxiway safety areas, object free areas and special safety (Part 77) surfaces. Should any equipment temporarily access any special safety (Part 77) surfaces, that equipment would be marked and lighted in accordance with all appropriate guidances (Advisory Circular 70/7460-I). All equipment that traverses Runway or taxiway would be followed by a Foreign Object Damage (FOD) check to ensure these surfaces are clear of any debris. Radio, and as an alternative, light and flagmen would be used to coordinate with the control tower and vehicular traffic going to and from the deployment areas.

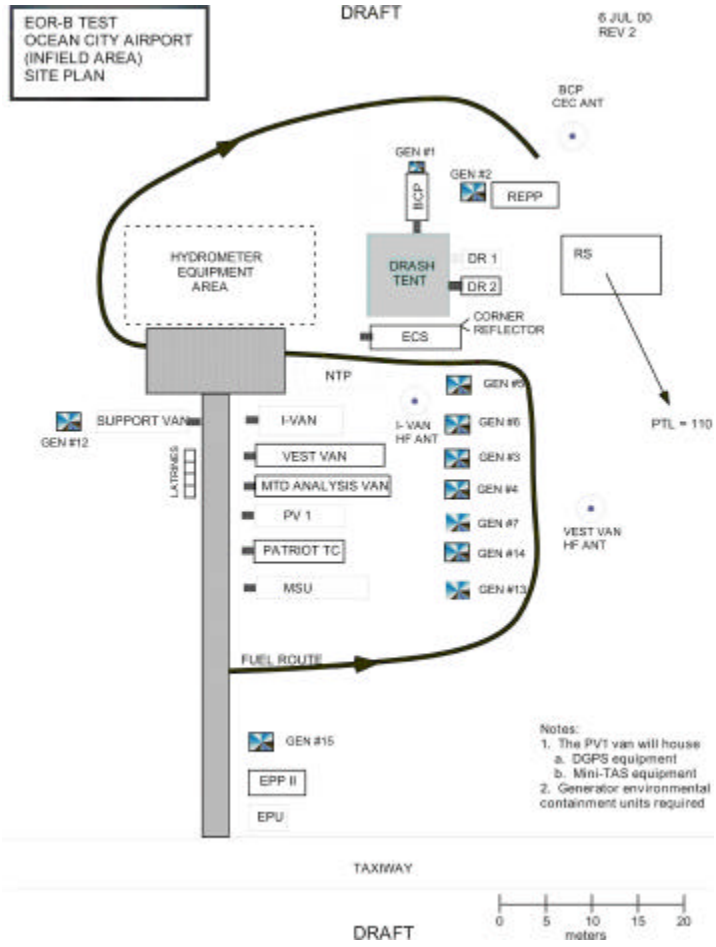


Figure 5. Main PATRIOT Deployment Area

The proposed deployment of the PATRIOT radar system would be in two separate areas of the airfield. The main deployment area would area would be located along the north-south taxiway between Runways 32 and 02. Approximately halfway down that taxiway, on the infield side is a National Weather Service Surface Hydrometer station. There is a short, approximately 200 foot, access road to the station. It is along this access road that the Fire Control Unit (FCU) or main portion of the PATRIOT site would be located. The RS, or main radar, would be located at this site and would be pointed in approximately a 110-degree heading (ie east southeast) and a 400-foot (roughly 120m) safety area would be prominently marked off. This area would coincide with the Radar emission safety zone.

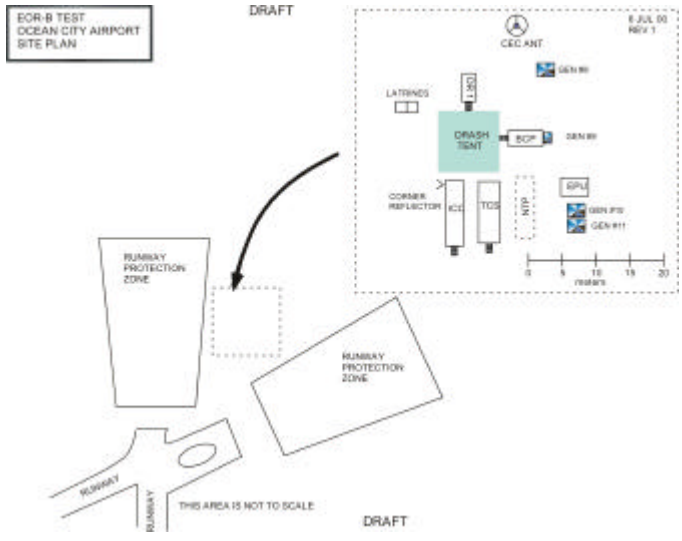


Figure 6. Secondary PATRIOT Deployment Area

The secondary deployment area would represent the Command & Control (C&C) element of the PATRIOT system, consisting of the Information Coordination Central (ICC), the Tactical Command System (TCS), one of the Battery Command Posts (BCP), and their associated generators. The reason for the separation is the required distance between the antennas of the C&C element and the FCU. The secondary site would be on the Northwest side of the airport, near the intersection of Runways 14 and 20.

The PATRIOT Radar system and associated equipment generators would be operating for approximately 8 hours per day during daylight hours. Two of the generators would be operated 24 hours a day in order to provide communications and security lighting. Security is to be provided by contract on a 24-hour basis. Portable latrines would be positioned at both deployment sites.

A series of temporary safety modifications are required at the Ocean City Municipal Airport for the employment of the PATRIOT. These entail the installation of additional communications/ telephone lines and improvements for controlling personnel access to the site. Specifically, these modifications include the installation of a conduit under an existing taxiway for the phone lines, and the temporary installation of a culvert to prevent personnel from crossing an active runway to access the site.

2.1.5.2 Wallops Island Alternative Location for the PATRIOT Radar

The Surface Combat Systems Center (SCSC) is a tenant on NASA's Goddard Space Flight Center's Wallops Flight Facility. (The base has recently changed its name from AEGIS Combat Systems Center to Surface Combat Systems Center.)

Under this alternative, the PATRIOT radar described above for Ocean City would be placed at Wallops Island instead. The radar would be placed in the center of the island, in an area previously used for similar projects and normally used as part of NASA's launch range.

If this option were implemented, the physical activities involved would be essentially a repeat of the temporary deployment of a PATRIOT Radar system to Wallops Island that occurred in 1999. That action was an earlier, simpler test of radar interoperability.

No Impact

The Navy has analyzed the potential for impacts associated with temporary deployment of the Patriot Radar to its Wallops Island site and has found that: "This action does not individually or cumulatively have a significant effect on the human environment"; accordingly, the Navy has determined that this specific activity meets all of the Navy's criteria for a "categorical exclusion" under the NEPA regulations, and would not itself require any additional documentation. (U.S. Navy, 2000) A copy of the Navy's environmental checklist and associated documentation is included as an Appendix.

Accordingly, no additional analysis or discussions of impacts in regard to the use of Wallops Island for deployment of the Patriot Radar or this test are warranted.

2.2 CONDUCT OF THE TEST

The PATRIOT Radar System would arrive at the deployment site on August 4, 2000 via highway. Equipment setup and initial testing would occur until approximately August 8. As indicated

above, until the AEGIS cruiser arrives, the PATRIOT system would be interfacing with the facilities at Wallops Island, Virginia.

The actual testing would last from the 10th to the 18th of August 2000. The P-3 Orion would takeoff from NAS Patuxent River and arrive and maintain an orbit near the AEGIS cruiser. The two Lear jets from Newport News would take off and set up for their operations east of the cruiser. The Lear jets would then fly certain profiles for the AEGIS cruiser's radar system to detect. Information would then be passed through the P-3 Orion to the PATRIOT Radar System's Command & Control (C&C) element. The C&C element would then transfer this information to the Fire Control Unit (FCU). A Cooperative Engagement Capability (CEC) system would be located at each site and would provide this interface. As the test proceeds and the Lear jets get closer to the coast, the CEC at the C&C element would transition to a higher data transfer mode and would transition the data acquisition from the P-3 Orion directly to the FCU. The test would then continue until the PATRIOT Radar System completes the simulated engagement.

2.3 NO-ACTION ALTERNATIVE

The no-action alternative is for the proposed test series not to be conducted. The PATRIOT Radar system would not be shipped to either of the alternative locations. The aircraft would not operate. The AEGIS Cruiser would however, be conducting its routine activities in the same ocean area even if the BMDO tests were not conducted.

2.4 ALTERNATIVES CONSIDERED BUT NOT CARRIED FORWARD

As discussed above, the test program can make most effective use of the limited time during which an AEGIS cruiser is available, by conducting the initial calibration phase of the test with the surrogate, shore-based radar that is available at SCSC Wallops Island. Moreover, the Navy efforts to network together the radars from multiple platforms are being performed at Surface Combat Systems Center (SCSC), Wallops Island, Virginia.

For this test, using some location with no shore-based radar available to help calibrate the PATRIOT interoperability, a longer calibration period would be required between the ship and the PATRIOT. This would thereby diminish the effective duration of the actual test period. Another disadvantage of using a location other than the Wallops Island area would be the need to transport the people and the equipment currently being used at Wallops to develop the interoperability capability, and to re-establish their capabilities at another location. The Navy believes that the interoperability system is not yet mature enough to be readily transported and efficiently re-established elsewhere.

For these reasons, attempting to conduct the proposed test at any location other than in the Wallops area would have significantly degraded the effectiveness of the test. Therefore, BMDO considered such alternative locations to be unreasonable. Accordingly, they are not identified as reasonable alternatives and are not considered further in this document.

2.5 COMPARISON OF ENVIRONMENTAL IMPACTS OF ALTERNATIVES

The following table compares the potential environmental impacts of the proposed action, alternative and the no action alternative for each resource area. The table also provides a reference as to which section of the EA contains the detailed discussion of those potential impacts.

	Alternatives		
Resource Area	**Preferred Deployment At Ocean City**	**Alternative Deployment At Wallops Island**	**No Action**
Geology, Soils and Topography Section 4.1	No significant adverse impacts; soil may experience some compaction, but original conditions would be restored by BMDO by regrading/reseeding the area, if necessary, promptly after equipment is removed. The risk of spills of fuel or oils is small, and measures wouldbe in place to minimize any damage that could result if a spill were to occur.	No significant adverse impacts	No impact
Water Resources Section 4.2	Temporary access-way would be removed after test by BMDO.	No significant adverse impacts	No impact
Biological Resources Section 4.3	Insignificant disruption of highly modified grassy habitat. If needed, reseeding would be done after equipment is removed. Individual birds and animals that remain in the exclusion zone, a mowed grassy area, during testing could be harmed by absorbing energy from the radar waves, but significant harm to wildlife is not predicted.	No significant adverse impacts	No impact
Land Use Section 4.4	No impacts to land use would occur.	No significant adverse impacts	No impact
Recreation Section 4.5	Minor visual distractions may occur to nearby campers or golfers, but this would not significantly impair their activities.	No significant adverse impacts	
Air Quality Section 4.6	Emissions of generators would be far below regulatory ceiling levels and no significant impacts to air quality would result	No significant adverse impacts	No impact
Airspace and Air Traffic Section 4.7	No conflicts with normal use of airport would occur. No conflicts with normal civilian use of airspace would occur.	No significant adverse impacts	No impact

Health and Safety Section 4.8	No conflicts are expected with skydivers operating near Airport. Radar exclusion zone would prevent adverse impacts to people outside of the zone. Security markings and surveillance would prevent people from staying within security zone long enough to be harmed. The security zone also would protect against hazards to volatile fuels from radar energies.	No significant adverse impacts	No impact
Noise Section 4.9	Noise, from generators, would be well within generally accepted levels for avoiding adverse impacts to off-site personnel.	No significant adverse impacts	No impact.
Hazardous Materials and Waste Section 4.10	Any hazardous waste generated or spilled at the site would be handled in accordance with established Airport procedures to prevent adverse impacts.	No significant adverse impacts	No impact
Socioeconomics and Environmental Justice Section 4.11	Beneficial economic impact of test personnel would be negligible in the context of summer time Ocean City. No significant adverse consequences are anticipated, so no disproportionate impacts would be experienced by any segment of the population.	No significant adverse impacts	No impact
Cultural Resources Section 4.12	No cultural resource properties would be affected.	No significant adverse impacts	No impact
Transportation Section 4.13	Limitations on shipment of equipment, as established in state and local permits, would prevent significant disruption to traffic. Appropriate precautions would be taken to avoid weight capacity problems on local roads. Test personnel would be shuttled to site from living quarters to avoid parking and congestion problems.	No significant adverse impacts	No impact
Cumulative Impacts Section 4.14	Minor floodplain and hydrology impacts could add to other minor impacts on these resources at the Airport, but Airport stormwater management, pollution prevention, and related standard practices would ensure avoidance of significant impacts	No significant adverse impacts	No impact

3.0 AFFECTED ENVIRONMENT

This section describes the environmental resources that could be affected by the proposed action at Ocean City Municipal Airport, Maryland. The environment at Wallops Island, VA and that associated with the AEGIS cruiser and aircraft operations are addressed in the NEPA documents prepared for those test elements and activities. The affected environment prior to implementation of the proposed action is described succinctly in order to provide a context or baseline for understanding the potential impacts of the proposed action. Those components of the affected environment that are of greater concern relevant to the potential impacts are described in greater detail.

Available literature that included relevant EAs on other actions at the Airport was acquired, and data gaps were identified. To fill data gaps and to verify and update available information, installation personnel and Federal, state, and local regulatory agencies were contacted.

Thirteen broad environmental components 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 environmental impacts. The Federal and/or state environmental statutes, many of which set specific guidelines, regulations, and standards, regulate several of these environmental components. These standards provide a benchmark that assists in determining the significance of environmental impacts under the NEPA evaluation process. The areas of environmental consideration, discussed briefly as follows, are:

- geology, topography, and soils;
- water resources;
- biological resources, including protected species and habitats;
- land use;
- recreation;
- air quality;
- airspace and air traffic;
- health and safety, including radar emissions safety;
- noise;
- hazardous materials and waste;
- socioeconomics, including environmental justice;
- cultural resources; and
- transportation

3.1 GEOLOGY, TOPOGRAPHY, AND SOILS

The Ocean City Municipal Airport was constructed adjacent to the Sinepuxent Bay and nearby tidal wetlands. The original soils are primarily sandy loams, loams, and loamy sands. Generally, the airport has low relief and is at a low elevation above sea level.

3.1.1 Geology

The geologic history of the area is principally depositional, as evidenced by the sandy composition of the surrounding soils. These sands are generally well drained. The surface soils are underlain by sand (approximately 3-4 feet below the surface) (Perry 2000). There is no bedrock layer associated with soils.

3.1.2 Topography

The topography of the project area is low relief with all portions of the site generally within 10 feet of sea level (USGS no date, Robinson, 2000). The lack of relief in the area suggests that the erosion potential for the soils in the project area is minimal, as there are few slopes of any size or length to create fast flowing water or other erosion-inducing flows. Generally, the soils themselves are stable. The land within the project area is generally covered in vegetation, primarily in the form of grasses that are mowed on a regular basis. The presence of vegetation also tends to slow erosional forces and create greater soil stability (FISRWG, 1998). Wooded tidal swamps and forested wetlands exist in the areas surrounding the airport, adding to the vegetative soil stability and the storm water retention and dispersion capacity of the area (Nichols, 2000).

3.1.3 Soils

According to NRCS soil surveys for Worcester County (USDA 1998), the project area consists of a variety of soil types, but all generally in the sandy or loamy classes. These soils are generally very poorly drained and highly permeable. Ponding may occur for extended durations in these soils types. Additionally, pockets of hydric soils may be found throughout the area, (Perry, 2000) and hydric soil conditions and vegetation may be found in some drainage ditches at or near the site (Nichols, 2000). During construction of the airport and runways, some grading and filling was performed to level the site and prepare for construction. Therefore, some areas inside the runways are listed as disturbed soils, but are likely very similar in composition to the neighboring soils.

3.2 WATER RESOURCES

The project area is closely linked to several components of water resources in the vicinity of the airport. Surface water, groundwater, and stormwater are important elements of the aquatic natural environment at the site.

3.2.1 Groundwater

As the project site is located near the bay and surrounding tidal marshes and is at a low elevation, the water table is generally very high, usually within 2-4 feet of the surface. (Perry 2000) The actual position of the water table in relation to the surface does vary, depending on the season, the position of the tides, and the recent precipitation (Robinson 2000). Recent boring samples and construction activity encountered wet soils near the surface, confirming the proximity of the water table (Robinson 2000).

3.2.2 Surface waters

Surface water hydrology is related to the topography of the area. Generally, the project site and the surrounding areas are very flat, which would suggest that surface runoff would tend not to coalesce into freely flowing, perennial waterbodies. Instead, sheet flow (flow across the entire surface of the ground's surface) and absorption into the soil and groundwater are likely to be significant. As stated in the soils analysis, these conditions typically do not lead to a high potential for erosion. There are currently no perennial streams at the airport and outflow is primarily composed of storm drainage outlets, culverts, and other similar waterways (Perry, 2000).

There are two main stormwater outfalls from the airport area, both draining into the Sinepuxent Bay (Robinson, 2000). One outfall is in the northeastern portion of the airport near the recent apron expansion, and the second is to the south, near the taxiway. The primary use of both waterways is for stormwater channeling and transport to the bay. The southern outfall is more natural of the two outfalls (Robinson, 2000).

The airport currently employs several strategies to attenuate storm water runoff, such as vegetative buffers, open vegetative swales, and oil/water separators.

3.2.3 Wetlands

Tidal and non-tidal wetlands are typical of the western shore of Sinepuxent Bay and occur near the Airport. No wetlands occur at the proposed communications-control location but non-tidal wetlands do occur in the Airport infield area. As discussed in the *Final Environmental Impact Statement (EIS) for the Proposed Expansion of the Ocean City Airport,* the area of the infield was disturbed when the new runway and taxiway were constructed and a road was removed from within the parcel. The wetlands that occur there developed as a result of borrow activity in that construction (Klima, 2000). These wetlands are mowed in accordance with the Airport mission to reduce wildlife attractants.

3.2.4 Floodplains

As noted in the *Final Environmental Impact Statement (EIS) for the Proposed Expansion of the Ocean City Airport,* the Airport property "lies adjacent to and on the west side of the Sinepuxent Bay and is affected to a limited extent by the tides in the Bay" (FAA, 1977). Based on the Federal Emergency Management Agency National Flood Insurance Rate Map, the majority of the Airport infield is within the 100-year floodplain. The proposed communications-control location is located within the 500-year floodplain (FEMA, 1983). Executive Order 11988 directs federal agencies to avoid long and short-term impacts caused by changes to floodplains.

3.2.5 Coastal Zone

The proposed site is located within the Coastal Zone Area for the State of Maryland. In Maryland, the Coastal Zone Management Program is based on federal laws, such as the Coastal Zone Management Act of 1972, Section 404 of the Clean Water Act of 1977, as well as existing state laws and authorities, the Tidal Wetlands Act of 1970, the Non-Tidal Wetlands Protection Act of 1989, and the state's authority under Section 401 of the Clean Water Act of 1977.

The proposed radar tests would have to comply with Worcester County's Comprehensive Coastal Bay Management Plan. The Plan primarily focuses on preventing and/or limiting the amount of sediment and nutrients entering the Sinepuxent Bay.

Compliance with relevant state, local, and federal regulatory programs constitutes consistency with the policies of the Coastal Resources Division of the Maryland Department of Natural Resources (Conley 2000; MDE 2000).

Coastal Barrier Resources Act

The Coastal Barrier Resources Act (16 U.S.C. 3501 et seq.) is intended to protect ecologically sensitive coastal barriers along the U.S. coastline. According to the U.S. Fish and Wildlife Service (USFWS), "the airport is not located within a Coastal Barrier Resource System, pursuant to the Coastal Barriers Resource Act." (FAA, 1994)

3.3 BIOLOGICAL RESOURCES

Ocean City Municipal Airport contains non-tidal emergent and forested wetlands, as well as two stormwater management ponds and various drainage ditches that generally hold water throughout the year. Disturbed grassy fields are the principal upland habitat present on the airport. For visibility and safety purposes, mowing controls all vegetation, including grass and woody shrubs.

Due to the Airport's close proximity to Sinepuxent Bay, Assateague Island National Seashore and the Atlantic Ocean, there is a relative abundance of birds (both numbers of species and numbers of individuals) in the immediate vicinity.

Wildlife surveys were conducted at the Ocean City Municipal Airport from August 1999 to May 2000 in conjunction with a wildlife hazard assessment (Healey, 2000). In the course of 35 survey days during this period, 69 species of birds were observed. Herring gulls and European starlings were the most commonly observed species. Small and large mammals are also present on the airport, with the whitetail deer being the most prominent example of the latter. Following a plane-deer collision, a deer management program was implemented in 1997 that allows for controlled hunting of the deer herd. In 1999, 32 deer were harvested (Klima, 2000).

3.3.1 Federal and State-Protected Species

The Endangered Species Act (ESA) (16 U.S.C. 1531 et. seq.) is intended to ensure that the federal government protect and conserve threatened and endangered species. Consultations are required with the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries

Service if the agency's action may affect Federally listed species or their habitats. Similarly, states list species as protected within their province and they too require special consideration even though they may not be protected under Federal law.

The presence of threatened and endangered species and critical habitat was assessed during the preparation of the *Final Environmental Assessment (EA): Land Acquisition, Resident Relocation, Runway 14-32 Extension and Apron Expansion at Ocean City Municipal Airport.* Areas considered in the Final EA include the site for which the proposed PATRIOT testing would occur. As noted in the Final EA, the USFWS indicated that, both the USFWS and the Maryland Department of Natural Resources indicated "that, except for occasional transient individuals, no federally listed or proposed endangered or threatened species are known to exist in the project area." (FAA, 1994)

In its *Wildlife Assessment Preliminary Report for Ocean City Municipal Airport, Berlin, Maryland*, the Animal and Plant Health Inspection Service (APHIS) indicates that it observed a single bald eagle at the airport during five different Wildlife Service surveys conducted between August 25, 1999 and May 5, 2000. During the same period, three least terns were observed by APHIS on a single survey day. The bald eagle is listed as a state endangered and federally threatened species. The least tern is a state-listed threatened species. (APHIS, 2000)

3.3.2 Protected Areas

Nearby protected areas include the Sinepuxent Bay Wildlife Management Area and Assateague Island National Seashore on the barrier island just across the Bay and the protected tidal wetlands and non-tidal wetlands along the western portion of the Bay. These wetland, beach, and associated environments support a variety of aquatic and terrestrial plant and animal species.

3.4 LAND USE

Land uses immediately adjacent to Ocean City Municipal Airport vary, but can generally be described as rural open space or agricultural with pockets of low to medium density residential development. Immediately north of the airport access road is the residential development of Mystic Harbor. This community is characterized by moderately dense, single story, single-family homes. Immediately southeast of the taxiway is Eagle Nest Drive, a public street leading to Eagle's Nest Mobile Home Park and Campground as well as several private residences. Several other residential subdivisions are planned, developed or under construction in the area, as it is experiencing rapid growth.

The Town of Ocean City constructed a golf course (Eagles Landing) south of, and adjacent to, Runway 2-20. The property was previously vacant or farmed. East of the airport is the Sinepuxent Bay and Assateague Island Seashore. The remainder of the property adjacent to the airport is devoted to forested areas, wetlands, or farmland.

3.5 RECREATION

The Ocean City Municipal Airport is open almost year round. Recreational opportunities provided at the airport include sightseeing tours by helicopter and airplane and skydiving.

Approximately 6-15 skydivers a day may land at the airport, from May – October primarily in the infield between the runways and taxiway (Klima, 2000). The tours and skydiving services are provided by private companies, not the airport. A Lions Club youth activities facility is located north of the Airport's property and is accessed by the Airport access road (FAA, 1994). No known recreational opportunities are present immediately west of the Airport. A public golf course is located south of the Airport. 'The golf course was constructed [by the Town of Ocean City] to attract additional tourists to the region and to provide a source of revenue for the Town-owned property" (FAA, 1994). Camping is available southeast of the airport at the Eagles Nest Mobile Home Park and Campground. Approximately five miles southwest of the airport is the Frontiertown Amusement Park and Campground.

As mentioned previously, the Sinepuxent Bay and Assateague Island National Seashore are located east of the Airport. Camping is offered about five miles away from the airport at the Assateague Island National Seashore. The Airport is not located near wild and scenic rivers designed under the Wild and Scenic Rivers Act.

3.6 AIR QUALITY

Existing information on air quality was reviewed to identify air quality issues, with particular attention paid to background ambient air quality compared to the primary National Ambient Air Quality Standards (NAAQS). The U.S. Environmental Protection Agency (USEPA), under the requirements of the 1970 Clean Air Act (CAA) as amended as 1977 and 1990, has established NAAQS for six contaminants, referred to as criteria pollutants (40 CFR 50). These are carbon monoxide, nitrogen oxides, ozone, particulate matter, lead, and sulfur dioxide.

- *Carbon Monoxide (CO)* is a colorless, odorless gas generated by the incomplete combustion of organic materials used as fuels. CO is emitted as a by-product of essentially all combustion.
- *Nitrogen Oxides (NOx)* are poisonous and highly reactive gases produced when fuel is burned at high temperatures, causing some of the abundant nitrogen in the air to burn as well.
- *Ozone (O_3)* is a photochemical oxidant and a major constituent of smog. Ozone is formed when two precursor pollutants – hydrocarbons and nitrogen oxides – react chemically in the presence of sunlight. High concentrations of ozone are a major health and environmental concern. Ozone is a principal cause of lung and eye irritation in urban environments; it is also known to damage some plants.
- *Particulate Matter (PM_{10})* consists of fine particles less than 10 micrometers in diameter. PM_{10} includes solid and liquid materials suspended in the atmosphere and formed as a result of incomplete combustion or fugitive dust generated by disturbance of exposed soils.
- *Lead (Pb)* is a toxic, heavy metal, the most significant emissions of which derive from gasoline additives, iron and steel production, and alkyl lead manufacturing. The use of lead-free gasoline has considerably reduced lead levels in the urban environment.
- *Sulfur dioxide (SO_2)* is a corrosive and poisonous gas produced mainly from the burning of sulfur-containing fuel.

In addition to these criteria pollutants, Volatile Organic Compounds (VOCs) are a source of concern and are regulated as a precursor to ozone. VOCs are created when fuels or organic waste materials are burned. Most hydrocarbons are presumed to be VOCs in the regulatory context, unless otherwise specified by the EPA.

The NAAQS include primary and secondary standards. The primary standards were established at levels to protect public health with an adequate margin of safety. The secondary standards were established to protect the public welfare from the adverse effects associated with pollutants in the ambient air. The Maryland Department of Environment has adopted the USEPA's NAAQS, without exceptions.

Areas where the ambient air quality does not meet the NAAQS are said to be non-attainment areas. Areas where the ambient air currently meets the national standards are said to be in attainment. All of Maryland is in attainment for all criteria pollutants except ozone, for which certain counties in and around Baltimore are non-attainment areas. Ocean City is located within an ozone attainment area. Nevertheless, it is also located within an ozone transport region that extends from Northern Virginia to Maine. This means that if an emissions source exceeds 100 tons of NOx and 50 tons of VOC, it will trigger a major new source review on the part of the Maryland Department of Environment (MDOE), and the need for emissions offsets (Irons, 2000).

3.7 AIRSPACE AND AIR TRAFFIC

The Ocean City Municipal Airport tower controls the airway and route segments at Ocean City Municipal Airport. The airport is an uncontrolled, non-precision (localizer approach, no-instrument) facility, which is utilized primarily during daylight hours and good weather conditions. Pilot controlled lights on the landing strips do allow for nighttime landings.

Approximately 37,000 small aircraft operations occur annually at the airport, for a daily average of about 100. (An operation consists of one take-off and one landing.) However, about 85% of these operations occur in just four months (June-September), during the peak summer tourist season (Klima, 2000).

For the AEGIS cruiser and aircraft operations, ships and planes have used the Virginia Capes Operating Area as a testing and exercise area for many years. The area is also part of Military Restricted Airspace known as W or Warning Area-208. This Warning area is normally clear of civil and commercial air traffic and is normally utilized for military aircraft training and testing.

The Surface Combat Systems Center (SCSC) on Wallops Island is within a restricted and closely monitored airspace due to its location on NASA's Wallops Flight Facility's launch range.

3.8 HUMAN HEALTH AND SAFETY

3.8.1 Airport Safety

The Airport employs standard safety procedures to protect the health and safety of the aviation community, Airport employees and the Airport's neighbors from aviation-related operations. The Ocean City Department of Public Works has a Safety Committee that oversees airport operations and makes recommendations to improve safety procedures. One fatality has occurred at the Airport in recent years when an inexperienced pilot crashed after becoming disoriented under foggy conditions (Klima, 2000).

The Airport safety program includes maintenance of low growing vegetation and filling of wet areas adjacent to runways and approaches so that aircraft are not subject to hazards if they veer from the paved portion of the runway. Bird and deer strike hazard reduction is another part of the safety program—where measures are taken to reduce the potential for collisions between aircraft and birds in flight or birds or deer on the runways. Deer on site are harvested to remove this hazard. Wetlands are mowed to reduce their attractiveness to birds.

3.8.2 Radar Emissions

Background

Because radars emit a specific type of radiation, it is important to understand the particulars of this type of radiation in order to assess its safety.

Radar emissions are electromagnetic waves. Visible light also consists of electromagnetic waves. So do the transmissions from radio and TV stations. All of these emissions are fundamentally similar—they are waves of electromagnetic energies. They differ however, in regard to the length of the waves. The length of the wave determines the amount of energy in the wave. The shorter the wavelength, the higher its energy.

Because all electromagnetic waves travel at the same speed (the speed of light), the shorter the wavelength, the more waves will pass a given point in a given time. The number of waves passing a given point in a given time is termed the frequency. It is measured in Hertz, with one Hertz representing one electromagnetic wave "cycle" (from crest to crest) passing a fixed point in one second. The unit MegaHertz is more commonly seen—1 MegaHertz is equal to one million Hertz. Therefore, the shorter the wavelength of an electromagnetic wave, the higher its the frequency, and the higher its energy. The table below compares various types of electromagnetic radiation.

"Radiation" vs. "Radioactive"

These similar terms have very different meanings.

A **radioactive** substance is one whose atoms are unstable. When an unstable atom breaks apart it emits energy and particles. In many cases, these emissions have enough energy to ionize atoms in objects they strike, potentially causing chemical or biochemical damage to the object.

These emissions from a radioactive substance are one form of radiation, but the term **radiation** is much broader than that. There are many different forms of radiation other than the ionizing emissions from radioactive substances.

As discussed in the text, the PATRIOT and other radars emit non-ionizing electromagnetic waves. That is, they "radiate", but this does not mean they are radioactive.

As shown in the table, radiation from radars is relatively low in energy (as compared to X-rays and gamma rays). These lower-energy forms of radiation do not have enough energy to dislodge electrons from the atoms of objects they hit. To dislodge electrons, which is termed ionization, electromagnetic waves need energies of at least 10 eV (electron Volts), which occurs at frequencies greater than 10^{16} Hz (that's 10 with 16 zeroes). Ionization, and the disruption of chemical molecules that can result from it, are major ways that materials, or living tissue can be damaged by powerful radiation.

In contrast to "ionizing" forms of radiation, the less energetic, "non-ionizing" types, such as radar emissions, have energies on the order of 0.00000012eV or one hundred millionth of the energy needed to produce ionization.

THE ELECTROMAGNETIC SPECTRUM

Frequency (Hz)	
	Ionizing
10^{23}	Cosmic Rays
10^{21}	Gamma Rays
10^{18}	Medical X-Rays
	Non-ionizing
10^{16}	Ultraviolet
10^{15}	Visible light
10^{13}	Infrared remote controllers
10^{11}	Microwave communications
10^{10}	Microwave Radars (including PATRIOT)
10^{9}	Microwave ovens
10^{8}	TV and FM Radio
10^{6}	AM Radio

Adapted from FEIS Relocatable OTH Radar US Navy 1997

Since radar emissions are non-ionizing, this type of radiation cannot harm objects and tissue in this way.

When non-ionizing radiation, such as that from radars, hits an object, including a living organism, the electromagnetic energy can be absorbed by the object, depending on the size and nature of the object and the wavelength of the radiation.

Although, as indicated above, this absorption of energy will not have chemical or biochemical effects caused by ionization, the energy can however cause heating of tissue. If more energy is absorbed in this way than the body's heat-regulation system can handle, then biological effects can occur. It is to guard against this that sources of non-ionizing radiation, including the PATRIOT radar, have safety provisions associated with their operation. These provisions are primarily in the form of a personnel exclusion area in the path of the radar beam. The zone is designed so that as long as individuals stay out of this area when the radar is in operation (120 m in front of the antenna) their bodies cannot absorb enough energy from the radar beam to cause any known biological effects.

To establish this exclusion zone, the energies that could be absorbed by a person at various distances from the radar were calculated based on actual measurements of radar performance. These energies were then compared to safety standards published by ANSI, the American National Standards Institute. Those standards themselves have a very substantial safety margin built in. That is, the energy that one could absorb under the ANSI safety standard is 1/10 the amount that could potentially cause biological effects. (*ANSI/IEEE 1991*) These standards are based on extensive and current research and reflect the best current state of scientific knowledge on this subject.

For a radar operating in this frequency range, Army personnel applied the formula contained in the ANSI Standard to calculate the Maximum Permissible Exposure. Such exposures are measured as the power density, which is calculated as Milliwatts (mW) per square centimeter of exposed surface. The Maximum Permissible Exposure, averaged over a 20-minute period was found to be 3.5 mW/sq. cm. (Nurre, K. 2000 Telecon with Kevin Nurre, Radar Systems Engineer, PATRIOT Program Office, U.S. Army)

The 120-meter exclusion zone was drawn to exclude personnel access to all areas where that maximum permissible exposure could be exceeded. This exclusion zone incorporates a further, very stringent safety factor: it establishes a safe distance for an extreme operating scenario of the radar. Under normal conditions, the PATRIOT emits its energy in a beam that covers 120 degrees. In the event of an abnormal operating situation (which has never occurred in PATRIOT'S 17 years as a deployed system), all of the beam's energy could be concentrated into a much narrower beam. The safety distance is calculated based on the energies that would exist in this highly unlikely situation.

Thus, the safety distance shown would be safe even under that extreme and extremely unlikely case; under normal operating conditions, therefore, the safety zone provides a significant additional measure of safety.

3.9 NOISE

The pattern (location, duration, timing and frequency) of activities gives rise to a pattern of noise. The loudest sounds that can be detected comfortably by the human ear have intensities that are 1 trillion (1,000,000,000,000) times larger than those of sounds that can just be detected. Because of this vast range, any attempt to represent the intensity of sound using a linear scale becomes very unwieldy. As a result, a logarithmic unit known as the decibel (dB) is used to represent the intensity of a sound. Such a representation is called a sound level. The loudness of sound as heard by the human ear is measured on the A-weighted decibel (dBA) scale. Normal speech has a sound level of approximately 60 dBA. Sound levels above about 120 dBA begin to be felt inside the human ear as discomfort and eventually pain at still higher levels. (DoD, 1978) Examples can be found in the following table:

Common Noise Levels and Their Effects on the Human Ear		
Source	Decibel Level (dBA)	Exposure Concern
Soft Whisper	30	Normal safe levels.
Quiet Office	40	
Average Home	50	
Conversational Speech	66	
Busy Traffic	75	May affect hearing in some individuals depending on sensitivity, exposure length, etc.
Noisy Restaurant	80	
Average Factory	80 - 90	
Pneumatic Drill	100	Continued exposure to noise over 90 dB may eventually cause hearing impairment.
Automobile Horn	120	

(DoD, 1978)

Certain land uses, facilities, and the people associated with them are more sensitive to a given level of noise than other uses. Such "sensitive receptors" include schools, churches, hospitals, retirement homes, campgrounds, wilderness areas, hiking trails, and some species of threatened or endangered wildlife. Recommended land use and associated noise levels are illustrated in the following table.

Recommended Land Use Noise Levels				
	Noise Levels			
Land Use Category	Clearly Acceptable	Normally Acceptable	Normally Unacceptable	Clearly Unacceptable
Residential	< 60	60-65	65-75	> 75
Commercial, Retail	< 65	65-75	75-80	> 85
Commercial, Wholesale	< 70	70-80	80-85	> 85
Manufacturing	< 55	55-70	70-80	> 80
Agricultural, Farming	< 75	> 75		
Natural Recreation Areas	< 60	60-75	75-85	> 85
Hospitals	< 60	60-65	65-75	> 75
Schools	< 60	60-65	65-75	> 75
Libraries	< 60	60-65	65-75	> 75
Churches	< 60	60-65	65-75	> 75
Nursing Homes	< 60	60-65	65-75	> 75
Playgrounds	< 55	55-65	65-75	> 75

(HUD, 1991)

Existing noise levels at the Ocean City Municipal Airport are what would be expected of a civil aviation facility with a daily average of over 100 small aircraft operations. The Airport's noise contours for 1992 and anticipated 2007 contours are shown in Figure 7 and are taken from the Ocean City Municipal Airport's Environmental Assessment for the runway extension. The

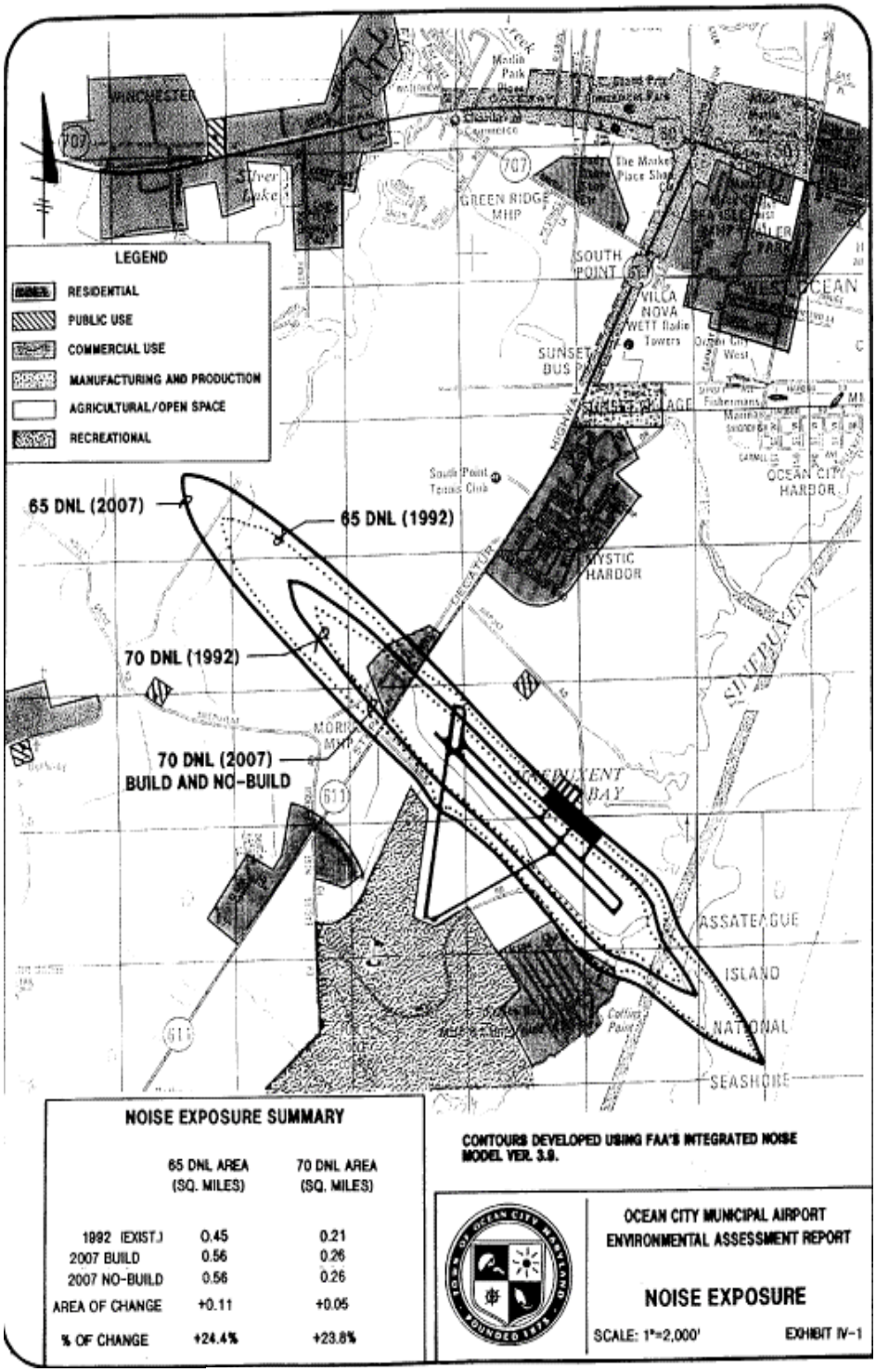


Figure 7. Airport Noise Contours

figure shows the airport noise level as measured in DNL. Community and environmental noise exposure at airports is measured in DNL. DNL stands for Day Night Level average. This DNL standard averages the noise and then compares this average to levels of annoyance to determine the acceptability for the area around the airport. Penalties are assessed in this standard for activities at night (10 PM-7 AM) in order to account for sleep disturbance. (DoD, 1978) The 65 DNL and 70 DNL areas in 1992 were 0.45 and 0.21 square miles respectively. The 65 DNL noise exposure level is considered compatible with all but noise sensitive receptors, such as schools and hospitals. There are at this time no residences, and no noise sensitive receptors, within the 65 DNL contour. Both proposed PATRIOT deployment areas would be within or along the existing 65 DNL contour.

3.10 HAZARDOUS MATERIALS AND WASTE

The Ocean City Municipal Airport has in place a standard Spill Prevention Control Countermeasures Plan to minimize the likelihood of and potential impacts from fuel and POL (petroleum, oil, lubricant) spills. A fuel farm is located within a diked, concrete-lined containment area. A sand/oil separator is on hand in the event of leakage into sandy soils. Oily rags and used oil are disposed of at a designated municipal waste disposal facility off-site. Two 500-gallon waste product sumps are available to hold spilled fuel. Booms are kept at the airport to contain fuel spills that occasionally occur on the runways, taxiway or apron (Klima, 2000).

3.11 SOCIOECONOMICS

As a beach-oriented resort town with a temperate climate, Ocean's City's population fluctuates markedly with the seasons. Its year-round population is approximately 7,000, but it can reach a quarter-million during peak summer tourist season. It is estimated that eight million people annually visit Ocean City, with the majority visiting from Memorial Day to Labor Day. During peak weeks in July and August, vacationers can total 310,000 per week or more. This population fluctuation poses unique challenges to the region, which must provide and maintain the infrastructure capable of supporting the second largest city in the state operating at near capacity for only four months out of the year.

With its tourist and service-oriented economy, the retail sales sector employs more people than any other industry in Ocean City, over 40% of the workforce. The local economy relies heavily on the spending of visitors to the area. In 1997, visitor spending contributed $1.5 billion to the local and state economy. The Town of Ocean City is consciously marketing the area as a year-round resort. Part of this campaign includes the use of the recently expanded convention center during the non-peak months. An additional strategy is to promote area golf courses with special packages in the spring and fall seasons. There are ten golf courses in the area, including Eagles Landing (adjacent to the airport), which is owned by the Town of Ocean City and has been named one of the top ten municipal golf courses in the country.

Demographic profile. Within Worcester County as a whole, the median household income was $30,352 in 1995, with a poverty rate of 11.7% (U.S. Census Bureau, 1999). In 1996, 73.5% of the county population was white, 25.7% was black, and 1.0% Hispanic (who may be of any race) (U.S. Census Bureau, 1998). Worcester County includes over 20 Census Tracts, each of which is comprised of two or more Block Groups. The Airport is located in Census Tract 9918, Block

Group 2. In the 1990 Census, this Block Group had a population of 730, all of which was classified as rural, non-farm. Approximately 96% of the residents were white, and 4% black. No other races or ethnic groups were recorded in the 1990 Census. The median household income in1989 was $27,059, well above the poverty level, and slightly below the 1989 Worcester County median household income of $27,586 (U.S. Census Bureau, undated). These data support the observation that Airport neighbors are not disproportionately minority or low-income (Johnson, 2000).

3.12 CULTURAL RESOURCES

The National Historic Preservation Act (16 U.S.C. 470) directs federal agencies to consider the impact their proposed actions may have on historic properties before they initiating their projects.

There are no historic buildings at the Airport (Klima, 2000). Also, as noted in the *Environmental Impact Statement for the Proposed Expansion of the Ocean City Airport*:

> *Contact was made with the Maryland Historical Trust and the Worcester County Historical Society concerning the project's impact on national, state, and local sites of historic significance. No sites were identified within the airport study area.*
>
> *In addition, contact was initiated with the State Archaeologist regarding sites of archaeological importance. No known sites were identified within the airport study area (FAA, 1977).*

The study area considered includes the infield area proposed for use during PATRIOT radar testing.

According to the Maryland Historical Trust Preservation Ofice (Schaeffer, 2000), there are no inventoried archeological sites in the project area.

3.13 TRANSPORTATION

The method of transportation of the equipment for the CEC/PATRIOT Testing is by road using military vehicle and commercial hauler from the sites of origin (White Sands Missile Range, NM, Huntsville, AL, and Laurel, MD) to either the Ocean City Municipal Airport, Maryland or to Wallops Island, Virginia site. The roads and highways that are to be used include the U.S. Interstate Highway system, U.S. highways, state highways, and short segments of secondary roads. Federal Department of Transportation (DOT) and state DOT's require permits for heavy loads, which would apply in particular to the radar equipment being hauled from WSMR.

4.0 ENVIRONMENTAL CONSEQUENCES

This section describes the environmental consequences of the proposed radar test activities at the Ocean City Municipal Airport. The impacts at Wallops Island and at sea for the aircraft and ship elements of the test are addressed in the attached NEPA documentation for those portions of the radar test action.

To assess the potential for and significance of environmental impacts from the proposed action (Section 2.0), the environmental setting of the proposal was described, with emphasis on any special environmental sensitivity (Section 3.0). Activities associated with the proposed action were then compared with the potentially affected environmental components to determine the environmental impacts of the proposed activities. This section also addresses the cumulative impacts of the proposed action at Ocean City Municipal Airport.

4.1 GEOLOGY, TOPOGRAPHY, AND SOILS

The proposed radar test would not affect local geology or topography. There is no blasting or earth moving associated with the tests and all test elements will be removed from the site immediately after the test.

The gated aggregate access-way will protect soils from the effects of direct bearing of test truck traffic loads until they reach the infield and will minimize the potential for soil damage from site traffic. No additional construction or other disturbance to surface or subsurface soils would occur because new construction would not be required to support the temporary deployment of the PATRIOT radar at Ocean City Municipal Airport.

Due to the flatness of the site terrain and the practice of maintaining grass cover throughout the Airport facility, the potential for soil erosion is very small, especially because this is such a short-term operation. Some soil compaction would likely occur beneath vehicles, but this would be minor, given the generally sandy soil types, since sandy soils are only slightly compactable. Nevertheless, any minor local damage to vegetation and soils that does occur would be quickly remedied through reshaping and replanting once the test vehicles and equipment are removed from the site.

The potential for soil contamination resulting from accidental spills of vehicle or generator fuels or other materials during testing activities would be minimal because standard spill prevention measures would be followed. No impacts to soils are anticipated as a result of testing activities at the Airport.

4.2 WATER RESOURCES

4.2.1 Wetlands

The intent of Executive Order 11990, Protection of Wetlands, is to "minimize the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands." (42 FR 26961, May 24, 1977).

As mentioned in Section 3, no wetlands occur at the proposed communications-control location, the secondary deployment area. Equipment placed in the infield would be located near wetlands. However, activities associated with the tests would not require the dredge or fill of the wetlands, and thus, would not degrade or destroy wetlands. To avoid the discharge of petroleum, oil, or lubricants into either of the delineated wetlands, the equipment deployed for use in the proposed testing would use catch pans in accordance with PATRIOT Standing Operating Procedures. For these reasons, the proposed PATRIOT radar tests would not be expected to result in the loss or degradation of wetlands in the infield.

The temporary access-way crosses a drainage that is considered a wetland for which permitting is required from the State of Maryland and the US Army Corps of Engineers under the provisions of Section 404 of the Federal Clean Water Act. This application is being submitted.

4.2.2 Floodplains

As mentioned in Section 3.0, the Airport installed a temporary aggregate composition access-way to the test site. BMDO would remove the access-way and restore the area to its original condition immediately after testing was completed and would thus avoid any potential of long term floodplain changes.

4.2.3 Coastal Zone

As mentioned in Section 3.0, Worcester County, in which the Ocean City Municipal Airport is located, has a Comprehensive Coastal Bay Management Plan. The Plan primarily focuses on preventing and/or limiting the amount of sediment and nutrients entering the Sinepuxent Bay. The Comprehensive Coastal Bay Management Plan does not address radar emissions. Moreover, according to the Department of Comprehensive Planning for Worcester County, radar emissions from PATRIOT testing at the Ocean City Municipal Airport would not be anticipated to be in conflict with the Management Plan (Coyman, 2000).

BMDO anticipates State approval of its Joint Federal/State Application for the Alteration of any Floodplain, Waterway, Tidal or Nontidal Wetland in Maryland, and thus, a conformity decision with Maryland's Coastal Zone Management Plan. Because the proposed radar testing is not expected to conflict with Worcester County's Management Plan and because a conformity determination is anticipated from the State, BMDO expects the proposed radar testing would comply with the Coastal Zone Management Act.

4.3 BIOLOGICAL RESOURCES

The proposed action will occupy an area of approximately 14 acres of highly modified, maintained habitat within the Airport boundaries for about 14 days. Other than some impacts resulting from alterations to surface hydrology, effects on flora and habitat should be minimal. Furthermore, there are no critical habitats or known presence of any threatened or endangered species that might reasonably be expected to be impacted by this project.

Nevertheless, concerns have been expressed about the potential impact of the proposed action on wildlife, particularly flying birds, from exposure to EMR (Electro-Magnetic Radiation) emitted by the PATRIOT radar in the direction of its beam. See Section 4.9.1, Impacts of PATRIOT Radar emissions on Humans and Wildlife.

4.3.1 Protected Species

Bald eagles forage for food primarily over open waters, such as lakes and rivers and bays. There are no such broad-scale open waters on the Airport property that would support bald eagle foraging, though they may forage over the Bay nearby. No eagle nests sites are known to be present near the Airport. Moreover, because bald eagles are not tolerant of the presence of man, Airport activities, including the movement of aircraft, would severely limit the likelihood that any eagles would be present on the Airport grounds during testing. Similarly, least terns do not nest on the Airport although they do forage for small fish over open waters and might also forage over the nearby Bay during the testing, but they would not likely fly through the Airport site during testing.

4.3.2 Protected Areas

Because the test is restricted to the in-field portion of the Airport, and air and Rf emissions would be highly localized and limited to the 2-week test period, there should be no impacts to any nearby protected areas.

4.4 LAND USE

The use of the Ocean City Municipal Airport for testing activities would not change the land use of the Airport. Therefore, at this time, no foreseeable impacts to land use would occur as a result of testing activities at Ocean City Municipal Airport. The Worcester County Department of Development Review and Permitting has authority over zoning and permits. The Town of Ocean City will apply for any zoning permits applicable to this project.

4.5 RECREATION

None of the recreational activities or resources near the Airport would be affected significantly by the radar test. Boaters and other users of the Bay would not likely notice the test activity, although users of the nearby campground or golf course might notice and be momentarily distracted by the equipment on site, the military vehicles, or security staff. Notification of these facilities beforehand with an explanation of the testing should minimize any local concerns.

Because skydiving activities into the radar site would be prohibited during the proposed testing activities, this recreational opportunity would be disrupted temporarily.

4.6 AIR QUALITY

Up to 17 power generators would be used to support the testing activities at the Ocean City Municipal Airport. These generators would operate for approximately 8 hours during normal daylight periods for the testing. Two generators would operate 24 hours a day to provide power for lights and communication to support security personnel.

As stated previously, NOx and VOCs, which are ozone precursors, are the two pollutants of primary concern in this area, which is located in an ozone transport region. Using a worse case scenario, the total emissions from these generators would be 0.28 tons of NOx and 0.028 tons of VOCs that are well below the 100 tons of NOx and 50 tons of VOC standards set by the Maryland Department of Environment. (Computations for the Air Emissions are in Appendix C1)

In summary, the daily and total emissions from these generators would not be high enough to significantly deteriorate air quality. Proper maintenance of the generators would be regularly performed to ensure peak condition. The Ocean City Municipal Airport would provide the appropriate personnel and equipment to supply approximately 200 gallons of fuel per day to run the generators.

4.7 AIRSPACE AND AIR TRAFFIC

The PATRIOT radar battery and associated equipment will not interfere with aircraft communications or navigation. The equipment would be positioned in such a manner as to not pose a hazard to aircraft flying in the Airport vicinity or during any ground operations. The radar would be positioned and oriented in such a manner that its beam would not pose a hazard to approaching or departing air traffic or ground operations at the Airport. The proposed sites are stationed well away from the runways, hangars, and terminal.

Close coordination with the Ocean City Municipal Airport Manager would minimize the potential for any impacts on airspace use. No effects on Ocean City Municipal Airport's normal operations are anticipated. Neither the volume nor the pattern of daily flights would have to be altered to accommodate the proposed action. A communication landline, and a radio backup would be established with the Airport Manager and personnel conducting the testing activities. If any unexpected events occur that could jeopardize safety, then the testing activities would be immediately shut down.

The PATRIOT radar and associated equipment has been subjected to a frequency allocation process through the Federal Aviation Administration. This process is in place to ensure that no two transmitters will operate in the same frequency range at the same time, potentially interfering with the safety of aviation activities within many miles of the proposed deployment site. The FAA has investigated the frequencies projected and has authorized the use of those frequencies for the duration of the test.

The FAA has also been consulted concerning the temporary placement of the PATRIOT radar and associated equipment in the Airport infield areas. FAA has indicated that this action does not fall under their review requirements (FAA 2000).

The Surface Combat Systems Center (SCSC) on Wallops Island is restricted and is a closely monitored airspace due to its location on NASA's Wallops Flight Facility's launch range. The probability of unexpected intrusion into this airspace is extremely low, but in that unlikely event radars could be silenced immediately to prevent damage.

The aircraft operating in the Warning Area are not likely to encounter civil or commercial aircraft, but FAA control and their own "see and avoid" standard operating procedures should alleviate any possible hazardous conflict. Again, the probability of unexpected intrusion is extremely low, but in that unlikely event the aircraft maneuvers could be terminated immediately to prevent any possible conflict.

Therefore, there would be no significant impact to airspace and aircraft operation for this proposed action.

4.8 HEALTH AND SAFETY

The proposed action does not entail significant risks to human health and safety, neither to military and civilian personnel involved with the test, nor to Airport staff, civilian aviators, skydivers, or neighboring residents. Several safety measures are being employed for PATRIOT radar testing that safeguard personnel, flight operations of aircraft and the general public:

Prior to every test, the PATRIOT radar and associated equipment are subjected to a frequency allocation process through the Army and FAA. This process ensures that no two transmitters will operate in the same frequency range at the same time.

The proposed site at the Ocean City Municipal Airport where the PATRIOT radar would be stationed is well away from public access as well as the runways, hangars, and the terminal at the Airport. A culvert is being installed by the Ocean City Department of Public Works to facilitate safe, convenient access to the infield portion of the deployment that will not interfere with Airport operations. Security guards will be posted 24 hours a day for the duration of the testing.

The fact that skydivers could land in a portion of the Airport infield, in the general vicinity of one of the batteries, during the two-week tests, is a possible source of interference as well as a safety concern. However, the Airport Manager believes that any conflicts between these simultaneous activities are avoidable (Klima, 2000). The skydiving company has been informed of the upcoming tests and the need to avoid the PATRIOT facilities. In addition, the communication line to be established between the Airport Manager and personnel conducting the testing activities would allow for the immediate shutdown of testing activities, if, for example, parachutists are observed drifting into the safety zone. Most of the skydiving at the Ocean City Municipal Airport consists of tandem jumps in which a novice customer is attached to an expert instructor, who is generally quite capable at directing the descent and landing.

In the event that any emergency occurs at the Ocean City Municipal Airport while the PATRIOT radar is operating, the Ocean City Municipal Airport can contact the PATRIOT Test Conductor on a dedicated phone line to cease operations until the emergency is under control. The PATRIOT personnel will adhere to all airfield operations and safety restrictions.

In the event of a high wind storm event, all PATRIOT and associated equipment will be adequately tied down to withstand at least a 90 mph wind speed.

4.8.1 Impacts of PATRIOT radar emissions on Humans and Wildlife

As discussed above, because the radar safety zone was designed in accordance with current standards, which are in turn based on the consensus of the scientific community, people and wildlife outside of the safety zone will not be exposed to radiation that could cause any known biological effects.

Persons entering into the safety zone during radar operation could be exposed to radiation that could cause surface tissue heating and could lead to physiological impacts if the exposure were longer than about twenty minutes. To ensure this does not happen, the exclusion zone will be clearly marked with portable construction cones and engineer tape. Test personnel will maintain surveillance of the security zone. Should anyone enter the security zone, prompt corrective measures will be taken.

Appendix A contains a more detailed discussion of radar emission safety.

Medium sized animals such as dogs, cats, birds entering the area could also experience heating effects after more than transitory exposure. Small mammals and small birds, because their body sizes are closer to the wavelengths of this radar's emissions (about 4 inches), could therefore absorb the electromagnetic energy somewhat more quickly and experience heating effects more promptly.

Birds in flight are unlikely to be within the beam for more than a few moments, not generally long enough to absorb enough energy to cause biological effects. Birds or other animals foraging or resting at ground level in the area within the security zone could conceivably be adversely affected by the radar's energy. Information is not available to determine the exact extent of this risk. However, a risk assessment performed in 1993 for a radar operating in the 8-10GHz frequencies (somewhat higher energies than the 4-6 GHz of the Patriot), determined that birds in flight had a small fraction of one percent risk of incurring harm from the beam. That same study analyzed the risk to wildlife at ground level and concluded that even small animals would not be adversely affected. (USASSDC 1993). These radars are not identical. But they are close enough in operating frequency to support a reasonable conclusion that the PATRIOT radar beam is not likely to have any significant effects on wildlife.

This conclusion is strengthened by consideration that much of the area within the safety zone is managed to lower its attractiveness to wildlife. Specifically, the Airport authority, with the concurrence of the Corps of Engineers keeps the non- tidal wetlands frequently mowed. They do this to diminish its value as habitat for birds, whose presence creates bird strike hazards for aircraft using the Airport.

Also strengthening this conclusion is the observation that PATRIOT radars have been deployed and have operated in a variety of locations for about 17 years. According to PATRIOT Office personnel, they are unaware of any reports from any location during this time of any adverse effects, such as injured or dead birds or other animals, associated with operation of the radar.

4.8.2 Impacts on Volatile Fuels from the PATRIOT Radar

During handling and ventilation of aviation and automotive gasoline, it is possible for the mixture of fuel vapor and air to achieve a combustible concentration. This concentration could then be ignited if a spark were introduced by the presence of electromagnetic energy. Although the chances of its occurring are small, such sparks can occur when two metal objects in contact are exposed to a sufficiently strong electromagnetic field so that currents are induced within the two objects. If the objects are then separated, the breakage of the induced currents could cause a drawn arc, that is, a spark, which could ignite the fuel air mixture if it surrounded the spark in a combustible combination.

To guard against this, standards have been developed to limit the handling of volatile fuels in any areas within which metal objects could be exposed to strong enough energies that a spark could be produced. For the PATRIOT radar, the personnel exclusion zone also provides an adequate safety zone for fuel hazards. That is, metal objects outside of this exclusion zone could not experience sufficiently strong exposures to electromagnetic energy that they could generate a spark (Nurre, 2000).

4.9 NOISE

Potential noise impacts from proposed activities at Ocean City Municipal Airport include noise from the portable generators used to power PATRIOT equipment. The generators would be operating for about eight hours a day, from morning until early evening, during the two-week test. Two generators would operate 24 hours a day in order to provide power for communications equipment and security lighting. In-place regulations would be used during testing activities and operation of noise producing equipment to provide hearing protection to workers in close proximity of the test areas.

The generators are the primary noise producing equipment associated with the PATRIOT system under consideration. There are two types of generators that would be used in the test. One generator would be the PATRIOT Electrical Power Plant (EPP), which is the primary source of alternating current for the RS and Engagement Control Station (ECS). The EPP has two 150kW 400Hz direct injected diesel powered generators interconnected through a Power Distribution Unit, and associated grounding equipment. Under normal operating conditions, one generator set can usually supply adequate power to both the ECS and RS. When continuous operation is mission essential and conditions indicate that the on-line generator set may not be capable of providing uninterrupted power, the second generator may be started. In this situation, the second generator can be powered up and brought on-line without interruption. The noise level generated by this type of generator is 85 dB (measured from 1 meter)

The other main type of generator is a Prime Power Unit that has two 60kW 400Hz turbine engine-driven generator sets positioned on a single fuel pallet and mounted on a 3-½ ton trailer.

This unit would supply electrical power to the Information and Coordination Central (ICC) and the Communications Relay Group. There would be 15 of this type of generator deployed. The noise level generated by this type of generator is 70 dB (measured from 7 meters). Projecting all of the generators operating at one location continuously for 8 hours during the day and then two generators operating through the night the following table shows the noise levels at various distances form the site.

Deployed PATRIOT Radar System Noise Levels		
Distance from site	Day Operations (dBA)	Night Operations (dBA)
At the site	88.93	83.01
100 Feet	69.34	80.23
200 Feet	63.32	74.21
300 Feet	59.80	70.69
400 Feet	60.43	68.19
500 Feet	55.36	66.25
750 Feet	51.84	62.73
1,000 Feet	49.34	60.23
2,000 Feet	43.32	54.21
3,000 Feet	39.80	50.69

As can be seen, at a distance of 750 feet during daytime operations the noise level is 51.84 dBA that is well within acceptable standards for any noise receptor. The nighttime operations have a higher level of noise because of the 10-decibel penalty for night operations. But even at 1,000 feet, with the penalty, the noise level is 60.23 dBA. There are no noise receptors, sensitive or otherwise within 1,000 feet of either of the proposed deployment sites at the airfield. (Computations for the Noise analysis is in Appendix C2)

While the levels of noise emitted by the generator may disturb wildlife in the immediate vicinity of the proposed deployment, they should not be loud enough to cause harm. Most of the noise of the generators would be overcome by the noise of departing and arriving aircraft at the airfield. The short duration of the test would not result in any long term or significant impacts. Therefore, there would be no significant impacts from noise.

4.10 HAZARDOUS MATERIALS AND WASTE

All hazardous materials used on site will be stored in their original containers in a secured locker until use. After use, excess or used materials will be declared to be waste and Airport personnel will be notified within 24 hours. All such waste will be isolated in its original container in a secured area until pickup for disposal or recycling by Airport personnel.

Limited quantities of hazardous waste may be generated during testing activities, including spilled diesel fuel, unused cleaning solvents, lubricants, or hydraulic fluids. All containment, collection, and disposal activities for hazardous waste will be performed in accordance with established Ocean City Municipal Airport procedures.

4.11 SOCIOECONOMICS

4.11.1 Impacts to the Local Economy

Approximately 50 temporary contractor and government personnel would be required to support the testing activities over a two-week period at Ocean City Municipal Airport. These personnel would patronize local hotels and restaurants. In view of summer peak weekly tourist populations of some 300,000 or so in the Ocean City resort area, this number of workers would have a negligible effect on local accommodations, traffic, and on the local economy through their spending.

Neither the Airport itself nor any nearby industries, including the golf course, would suffer any adverse economic consequences in terms of lost revenues because the proposed action is short-term, restricted to the Airport grounds, and secure, and would not disrupt normal traffic flows or the routine activities of these local industries in any way.

4.11.2 Environmental Justice Impacts

There would be no disproportionately high and adverse consequences to minority or low-income populations from the BMDO proposed action at the Airport. First, no one in the communities near the site would experience any high and adverse effects from the action. Second, there are no minority or low-income communities near the Airport to be affected; the local population is predominantly white and middle-income.

4.12 CULTURAL RESOURCES

No impacts to historic or archaeological sites of significance are anticipated.

4.13 TRANSPORTATION

There would be no impacts to transportation infrastructure (roads, highways, bridges) from road hauling of the equipment to be used in the CEC/PATRIOT Testing. A commercial carrier would haul the heavy load of the PATRIOT radar with all permits in place for all states along the route of travel from WSMR to the Ocean City Airport or Wallops Island sites. Special requirements, such as restrictions of hauling to daytime hours from Monday through Friday, would apply to hauling of the radar. Other equipment would have no such restrictions. No hauling would occur unless and until all required permits for hauling are in place. Restriction of the heaviest loads to daytime and weekday hours would limit the likelihood that traffic along the route would be affected in any way by the hauling vehicles. All hauling surfaces at the Airport and Wallops Island site would be checked for their capacity to support the heavy loads and precautions taken as necessary. Two fifteen person vans would be utilized to shuttle personnel from living quarters to and from the deployment sites, thereby limiting potential congestion and parking problems.

4.14 CUMULATIVE IMPACTS

Council on Environmental Quality implementing regulations for the National Environmental Policy Act (40 CFR 1508.7) define cumulative impact as the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor, but collectively significant actions taking place over a period of time.

This is the only such testing of radar and associated equipment that has ever been conducted at the Ocean City Municipal Airport. There are no other radars associated with the Airport and no such similar test is planned nor reasonably foreseeable in the future at the Airport so any cumulative impacts that might result from extremely small but incremental exposures to Rf frequency radiation at the Airport would not occur.

Minor degradation of the site in terms of soil compaction, minor leaks of POLs, or alterations of surface hydrology, may occur from the vehicles and equipment use for the radar test and the access-way construction and may add to other minor degradation of non-tidal wetlands onsite or nearby tidal wetlands. The Airport's stormwater pollution prevention plans and grounds maintenance procedures would generally mitigate these minor impacts by using best-management practices to minimize and clean up spills and prevent erosion and sedimentation, however such cumulative impacts may still occur. In the long-term, the Airport's goal is to eliminate wetlands onsite to minimize the site's attractiveness to wildlife and reduce the hazard to aircraft from that source. However, part of this long-term plan for wetlands would compensate for loss at the Airport by creation of new wetlands offsite at a 2-acres created to 1-acre lost ratio. Therefore, long-term cumulative wetlands impacts should not be significant.

There should be no other cumulative environmental or socioeconomic impacts from the proposed radar testing because there would be no direct or indirect impacts to these resources to add to impacts from any other actions at or near the Airport. This is due to the short-duration, securely restricted, localized nature of the proposed test activity and the fact that all elements of the testing will be removed immediately upon test completion.

4.15 ENERGY REQUIREMENTS AND CONSERVATION POTENTIAL

Energy requirements would be subject to any established energy conservation practices. Other than the use of fuels during testing activities, the Proposed Action requires no significant use of natural or depletable resources. Of the fuel burning generators required for the test, these generators would only be used during daylight hour operations for the tests. Only two generators would be utilized during the nighttime for security purposes.

4.16 IRREVERSIBLE OR IRRETRIEVABLE COMMITMENT OF RESOURCES

Although the Proposed Action would result in some irreversible commitment of resources such as fuel and labor, this commitment of resources is not significantly different from that necessary for regular activities taking place at the various locations associated with the Proposed Action. The Proposed Action would take advantage of existing facilities and infrastructure where

available and practicable. The upgrades to the Ocean City Municipal Airport would not alter the use of the site. Therefore, the proposed action does not eliminate any options for future use of the environment for the locations under consideration.

4.17 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE HUMAN ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The short-term use of the site for radar testing would not affect the productivity of the site. The natural habitats supported are man maintained grasses and some associated wetland. Any damages to these grasses would be mitigated immediately after the action. No damage to the wetlands would occur.

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Mr. Crate J. Spears, BMDO, Washington, D.C. Environmental Program Manager

COL Samuel Harris, BMDO, Washington, D.C.

LTC Karen Judkins, BMDO, Washington, D.C., Office of General Counsel

LTC Paul Hoburg, BMDO, Washington, D.C., Office of General Counsel

Mr. Steven Waugh, BMDO, Washington, D.C.

Mr. Arthur Tysen, BMDO Security

Mr. Michael Riley, BMDO Support Contractor, Security

PATRIOT Project Office

Mr. Don Adams

Mr. Phillip Burroughs

Mr. Patrick Duggan

Mr. Kevin Nurre

Other Agencies

Mr. J. Michael Jones, PE. AMCOM Engineering, Environment and Logistics Oversight Office

Support Contractors

Mr. David Carlisle, SCICOMM, Inc.

Mr. Greg Donatelli, CAS, Inc.

Mr. Matthew Estes, Tetra Tech, NUS

Mr. Jeff Jones, CAS, Inc.

Mr. George M Wheeler, SCICOMM, Inc.

Principal Contractor
The Mangi Environmental Group, Inc.

Name	*Discipline/Expertise*	*Years*	*Role in Preparing EA*
Dr. James I. Mangi	Ph.D. Biology	27	Project Manager; Purpose and Need, Description of Proposed Action and Alternatives, Radar emissions effects analysis
Mr. Stephen A. Shiell	B.A. History	15	Senior Analyst; Purpose and Need, Description of Proposed Action and Alternatives, air, noise, air space, and air traffic impacts analysis
Dr. Philip Sczerzenie	Ph.D. Wildlife Biology, M.S. Biology, B.S. Biology	20	Senior Analyst; Affected Environment, environmental socioeconomic, and cumulative impacts analysis
Ms. Lydia Quinn	B.S. Clothing & Textiles	8	Senior Analyst; Regulatory analysis and permit review
Mr. Leon Kolankiewicz	M.S. Environmental Planning and Natural Resources Management; B.S. Forestry and Wildlife Management	15	Senior Analyst; Affected Environment
Mr. Anthony Petruzzi	M.S. Logistics Management; B.S. General Engineering	20	Description of radar test elements
Mr. Ron Denton	B.S. Business Management	30	Description of radar test elements
Mr. Kelly Meadows	Masters of Environmental Management (MEM); B.A. Environmental Science, Astronomy	3	Data gathering, analysis of impacts to soils, topography, and geology
Mr. Steven J. Quarterman	Masters of Environmental Management (MEM); B.A. Biology	1	Data gathering and graphics
Ms. Diana Saccone	Masters in Professional Studies (M.P.A); B.S. Environmental Science	1	Data gathering

AGENCIES & PERSONS CONTACTED

The following agency personnel and contractors were contacted during the preparation of this environmental assessment:

- Mr. Hal Adkins, Ocean City Public Works Director
- Ms Marilyn Ailes, U.S. Department of Navy, Wallops Island SCSC
- Ms Mary Conly, Maryland Department of Natural Resources, Coastal Zone Management
- Ms Sandy Coyman, Worcester County (MD) Department of Comprehensive Planning
- Mr. Steve Dawson, Maryland Department of the Environment
- LT. Dedicatoria, U.S. Department of Navy, Wallops Island SCSC
- Mr. Rudy Espinoza, Worcester County, Department of Development, Review & Permitting
- Mr. Woody Francis, U.S. Army Corps of Engineers, Baltimore, MD
- Mr. Elder Ghigiarelli, Maryland Department of the Environment, Nontidal Wetlands and Waterways Division
- Mr. Dave Guignet, Maryland Department of the Environment, Nontidal Wetlands and Waterways Division
- Mrs. Kelly Henry, Worcester County Zoning Administrator, MD
- Ms Karen Irons, Maryland Department of the Environment, Air Permits Program
- Ms Kamesha Johnson, Ocean City Municipal Airport
- Mr. John Joyce, Federal Emergency Management Agency
- Mr. Kurt Klima, Ocean City Municipal Airport Manager
- Lt.Cmdr. Mark Lokay, U.S. Department of Navy, CEC Program Office, Washington D.C.
- Mr. Glen Long, John Hopkins University
- Mr. Bruce Nichols, USDA Natural Resources Conservation Service, Snow Hill (MD) Service Center
- Mr. Arthur Patrick, National Weather Service
- Mr. Joe Perry, Eagle's Landing Golf Course
- Mr. Tom Persilla, Federal Aviation Administration
- Mr. John Robinson, Talbert & Bright.
- Mr. Ryan Rorick, PATRIOT Project Office
- C.P.O. Struss, U.S. Department of Navy, Wallops Island SCSC
- Mr. Ed Tudor, Director, Worcester County, Department of Development, Review & Permitting
- Ms Phyllis Winbrow, Deputy Director, Worcester County, Department of Development, Review & Permitting

APPENDIX A
Biological and Human Health Effects of Radar

This Appendix, with minor changes, is taken in its entirety from an Environmental Impact Statement published in 1997 by the Navy concerning a different radar, but one which operates in a roughly similar frequency range (8-10 GHz) vs the Patriot's 4-6 GHz. The information and discussion here is considered to be potentially useful and informative to the interested reader, even though it was not originally written for precisely the Patriot system. The reference is: US Navy 1997. *Final Environmental Impact Statement Relocatable Over The Horizon Radar System.* US Navy, Norfolk, VA.

This section describes the approach taken to evaluate potential effects on health from the system. The approach consisted of a literature- based health assessment, and a comparison of expected emissions to permissible exposure levels set in the safety standards.

The health assessment is a review and evaluation of scientific studies to identify what effects, if any, Radiofrequency (RF) fields have on health and at what exposure levels these effects might occur. Because over a thousand studies have been conducted on RF fields over the last 50 years, the review for this EIS focused on pertinent studies, selected because they 1) are relevant to the fields produced by the proposed radar, 2) are relevant to human health, and 3) are of reasonable scientific quality as indicated by publication in peer-reviewed scientific journals.

The health assessment included research completed up to mid-1996. The process used in this health assessment followed the standard approach used by scientific organizations and regulatory agencies worldwide to assess the information from numerous and diverse studies. It is the one used for evaluating the potential health risks for any chemical, medical drug, or physical agent, and is described, in fact, in documents of the US National Academy of Science (1983) and the US Environmental Protection Agency (EPA 1986).

The basis of a health assessment, or of standard-setting, is the knowledge that risk of an effect on health, regardless of the type of exposure, depends on the amount of exposure. Almost anything in our environment can affect health in some way if the exposure is of sufficient magnitude. This is true for sound (noise), sunlight, pesticides used in agriculture or lawns, emissions from 'cars and buses, therapeutic drugs, even vitamins and chemicals naturally found in foods. Levels that are acceptable are described in "safety or operational standards" that are usually set to limit exposures to levels well below those associated with even minor effects.

The literature review reviews both epidemiological and laboratory evidence. Epidemiological and laboratory studies are both important because each has certain strengths and limitations. Epidemiology studies provide information on humans, but are limited because they cannot identify, and therefore control for, many variables among humans and their environment. Laboratory studies are performed in environments where exposures, diets, genetics, even air and water, can be carefully controlled. Laboratory studies are limited because health decisions require extrapolation from animal to humans. Together, animal and human studies provide complementary information.

No single study can be all-encompassing or even definitive. In striving for objectivity, scientists expect that if the results of any study are valid, the observation can be replicated.. Therefore, the health assessment considered evidence from a variety of sources, assessed the quality of individual studies, and gave more weight to consistent patterns observed in reliable scientific studies.

Absorption of RF Energy

Interactions of RF fields with the human body are largely dependent on the wavelength in relation to the size of the body. When the wavelengths are much smaller than the size of the human body, RF energy is absorbed in the skin surface of the body facing the antenna. Very little energy is deposited in the deeper organs and tissues of the body. For wavelengths that are closer in size to the length of the human body, the body itself acts as an antenna to enhance the coupling of RF energy into the body. Dosimetry studies have shown that maximum energy transfer occurs when a person's height is approximately four-tenths as long as that of the RF wavelength. This is often referred to as our resonant frequency. For averaged-size adults, the resonant frequency is around 70 to 80 MHz. For children, peak absorption occurs at higher resonant frequencies near 100 MHz due to their smaller size. When wavelengths are much longer than the body, direct absorption of the RF energy in the body rapidly decreases with longer wavelengths

Radio Frequencv Thermal Effects

The absorption of RF energy at sufficiently high levels would result in energy being deposited in biological tissues in the form of heat. This fact is used in medical diathermy units for deep heating of tissues to aid in healing, and in microwave ovens for cooking. The human body has evolved an elaborate thermoregulatory mechanism to maintain internal core body temperatures within a narrow range around 37 degrees centigrade, even under widely varying ambient conditions. Normal physiological processes compensate for heat that is generated or introduced into the body through several mechanisms such as sweating, increased blood flow to the skin, and increased respiration. If RF exposure conditions add excessive amounts of heat, especially when exposures are also prolonged, then the body's thermoregulatory capabilities may be exceeded, with adverse effects arising from increased internal temperatures.

A large amount of scientific data has been developed to quantify the distribution and absorption of RF energy in the body. Research using various animal models has established a threshold level for imposing thermal stresses on the body from RF exposures. Changes in animal behavior are consistently seen when RF energy is absorbed at a rate near four watts per kilogram (W/kg) of body mass. RF safety guidelines in the US and in other major countries have included an additional safety factor of 10 in defining a safe level for human exposure, which is equivalent to an absorption rate 0.4 W/kg as averaged over the whole body. Exposures where absorption rates are at or below 0.4 W/kg contribute to a heat load that is well within the body's thermoregulatory capabilities, and would correspond to levels typically experienced during minor physical exertions or under moderate ambient temperature conditions.

RF Exposure Standards

Safety exposure guidelines have been established to prevent harmful effects in human beings frorn exposure to RF fields. The most widely observed RF exposure guidelines in the US are the recommendations published by the Institute of Electrical and Electronic Engineers (IEEE) "Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz", which, has been recognized as an American National Standard by American National Standards Institute (ANSI) (ANSI/IEEE 1992). These guidelines were developed after more than nine years of open, public review by over 120 internationally recognized experts from over 14 different disciplines, including scientists, public health officials, medical doctors, and technical experts. The experts came from industry, academia, and government agencies 'including DOD, Department of Energy, US Environmental Protection Agency, Federal Drug Administration, National Institute of Occupational Safety and Health, and Occupational Safety and Health Administration. Thus, the Standard is broad-based, with no single agency or group of individuals exerting dominating influence. The ANSI/IEEE (1992) guidelines cover the frequency range 3 kHz to 300 GHz and separately state the maximum allowable RF field exposure in "uncontrolled environments" (generally accessible by the general public, who have no knowledge or control of their exposure) and "controlled environments" (where exposure may be incurred by persons who are aware of the potential for exposure such as in occupational exposure). The limits for controlled environments incorporate a safety factor of 10 (to 0.4 W/kg). For uncontrolled environments, the limits have a reduction factor of 50 (to 0.08 W/kg) instead of 10.

The Department of Defense (DOD) has officially adopted the exposure recommendations in ANSI/IEEE (1992) for use in defining safe RF exposure conditions for personnel. DOD Instruction 6055.11, "Protection of DoD Personnel from Exposure to Radiofrequency Radiation," February 21, 1995, is the applicable DOD standard that provides required guidelines for exposure of DOD personnel..

The vast majority of the population receives exposure to RF levels that are typically hundreds of times lower than permissible guidelines. Somewhat higher exposures occur to those living adjacent to transmitting antennas or having occupations involved with RF work, but generally, these levels are still within permissible levels. Since the intensity of RF fields decreases with distance from an antenna, an individual's exposure to RF fields is primarily governed by the nearest single RF source, which could be a cellular phone, a car's CB radio, a neighbor's HAM radio station, or the local FM radio station. Thus, in many cases, exposures arising from nearby RF emitting sources would overshadow those from major RF emitting antennas that are located at a greater distance from the individual.

Wildlife Exposure to Radio Frequency Fields

The bodies of mammals and birds absorb RF energy, and effects would be expected to be seen if absorption resulted in excessive heating of body tissues or interference with the animal's ability to maintain proper internal body temperatures. Extensive research studies have been conducted with various animals as surrogates for humans in order to derive safe levels for exposure. Since the wavelengths transmitted by ROTHR would be even larger in relation to the size of small bids

and mammals, absorption of RF energy at these frequencies would be less than the absorption that would occur in taller humans.

Review of Human Health Effects Studies

Following War World II, the development of microwave technology greatly expanded the use of radars and high frequency communication systems. Installation of these systems created a demand for studies to .quantify biological interactions with RF fields and to determine levels which could cause adverse effects. Over the last four decades, an extensive data base has been developed. A comprehensive review of bioeffects research was published by the National Council on Radiation Protection and Measurements (NCRP) in a 1986 report entitled Biological Effets andExposure Criteria for Radiofequency Electromagnetic Fields (NCRP, 1986). This review covered RF research up to 1982 on effects on cells and tissues and body systems (such as cardiovascular, endocrine, nervous, reproduction), and whether RF fields cause cancers, birth defects, and other health effects. Based on their review, NCRP recommended an exposure criteria that would limit RF absorption over the whole body to less than 0.4 W/kg for occupational workers and to 0.08 W/kg for general public continuous exposure.

An analysis was conducted for the US Air Force, entitled Critique of the Literature on Bioeffects of Radiofrequency Radiation: A Comprehensive Review Pertinent to Air Force Operations that involved assessment of more than 500 detailed reviews and analyses of research projects published before 1987. This review was extended in a 1993 Supplemental Environmental Assessment (SEA) of the Effects of Electromagnetic Radiation from the WSR-88D Radar (1993), which considered EM research papers published in scientific journals through mid 1991. This review of research studies did not find evidence of adverse biological effects from RF exposure levels that are within established safety guidelines for controlled environments. In 1993, the National Academy of Sciences (NAS) published an Assessment of the Possible Health Effects of Ground Wave Emergency Network (GWEN) (NAS, 1993) to weigh the potential for health effects associated with RF fields emitted by GWEN. This system operates at frequencies in two bands at 150-175 kHz and 225-400 MHz. The NAS concluded that there is no evidence that adverse effects on public health would occur from the fields emitted by the GWEN system, which are less than the safety guidelines established by scientific standard-setting organizations.

APPENDIX B

Copies of Supporting NEPA Documents

5090
Ser 5000/

From: Commanding Officer, Surface Combat Systems Center
To: File

Subj: CATEGORICAL EXCLUSION FOR CEC/PATRIOT INTEROPERABILITY TEST AT WALLOPS ISLAND

Ref:
(a) OPNAVINST 5090.1B
(b) Documentation Worksheet
(c) Environmental Assessment for the Construction, Installation, and Operation of the AEGIS Combat Systems Center on Wallops Island, Virginia. Naval Surface Weapons Center, Dahlgren, Virginia.
(d) Environmental Assessment for Range Operations Expansion at the National Aeronautics and Space Administration Goddard Space Flight Center, Wallops Flight Facility, Wallops Island, Virginia 23337.
(e) Categorical Exclusion for Sensor Data Registration Experiment -- TPS-59

1. Per references (a) through (e), the CEC/PATRIOT Interoperability Test at Surface Combat Systems Center (SCSC) and on Wallops Island, Virginia is hereby determined to be categorically excluded under the National Environmental Policy Act for the following reasons:

a. Council on Environmental Quality Regulations (40 CFR 1500.4 of 1 July, 1990): This action does not individually or cumulatively have a significant effect on the human environment. Wallops Island is closed to access except by employees; there is no public access and thus this project will have no impact on the public.

b. This project corresponds with reference (a) (09 Sept 1999) as required. Paragraph 2-5.2 (e): This project is a study, data and information gathering that involves no physical change to the environment. Paragraph 2-5.2(i): Although temporary, this project involves new construction that is consistent with existing land use and, when completed, the use or operation of which complies with existing regulatory requirements (see reference (d)).

c. No effects are expected to exceed in kind or quantity the impacts discussed in reference (c).

d. The General Conformity Rule of the Clean Air Act is not applicable to this action because it will not emit criteria air pollutants (O_3, SO_2, NO_2, CO, Pb, or particulate matter) in excess of current, negligible quantities, either in construction or in use. Although generators will be used, their emissions will not be sufficient to alter ambient air quality. Since the SCSC is located in an Attainment Area for all air quality standards, a General Conformity Analysis under the Clean Air Act is not required.

e. This project does not violate environmental justice goals. SCSC is located near communities with substantial minority populations. Due to the nature of the project, negative environmental impacts are not anticipated while minor positive socioeconomic impacts may occur.

f. None of the exceptions under OPNAVINST 5090.1B Paragraph 2-4.1 apply to this project. The project will not impact endangered or threatened species. Although piping plovers are in the area, the radiation hazard zone extends 120 meters from the radar whereas the plover habitat begins 2.5 km from the radar. Neither historical nor archeological resources are in the area. Hazardous waste sites will not be affected nor disturbed in any way. The generators will be placed in containment basins that have a capacity exceeding that of the generators, so spillage of fuel is highly unlikely. No effects are anticipated to be controversial, unique, or to include unpredictable risks. No precedents will be established, and no laws or regulations are expected to be violated.

g. Public health and safety will not be negatively affected. Radiation will not be hazardous except along the water 120m from the radar location. This is a restricted area normally; the public does not have access this close to Wallops. Workers in the area will be warned to stay away from the area where they may be at risk. Should unforeseen penetration occur, the radar can be turned off quickly.

2. References are on file at the Public Works Office, Surface Combat Systems Center, Wallops Island, Virginia.

J. MCGETTIGAN

National Environmental Policy Act
Documentation Worksheet

Description of action (name of project):
__CEC/PATRIOT
Interoperability_____

Person in charge of action or Project Coordinator[1]:
___FCC
Struss_____

Phone Number: _757 824-7274_____ Date: __July 28, 2000_____

Short narrative description of action or project (if action impacts any area outside a facility fence line, attach a site plan[2]):

Test ability of CEC program to use of radar image from a portable land-based radar unit as the position source for a simulated missile engagement.

Yes	No	
	X	1. Is construction required? a. Anticipated date of construction:_____ b. Note on the attached site plan for the action any alternatives you may be considering.
	X	2. Will this action be confined entirely within the Navy fenceline, with no anticipated disturbance to other areas (e.g. noise, erosion runoff, increased traffic, radhaz zone expansion)?
X		3. Does this action involve any change in the support structure required? (e.g. change in traffic patterns, utility services, phone lines, etc.) *Phone lines and electric power*
X		4. Does this action require a permit from any other agency, including NASA? *JFMOLANT and NASA Frequency Authorization.*
	X	5. Does this action involve a change from current land or facility use?

[1]The Project Coordinator or other individual overseeing an action is responsible for reporting all known impacts, including those created by contractors, to the Public Works Ecologist. Significant changes in planned operations which may impact the human or natural environment will require the submission of a new Documentation Worksheet.

[2]This form will be considered incomplete without a site plan unless all impacts will be confined to current structures.

X 6. Is there any potential for contamination of air or water?
Diesel fuel spill potential --- Containment Areas constructed around fuel tanks and generator engines.

NEPA Documentation Worksheet, Continued

Yes	No	
	X	7. Could any impact of this action be considered controversial?
X		8. Will this action emit radiation? If no, proceed to question #9.
X		a. Will there be a change in the radiation patterns described in the Environmental Assessment (copies available at Q-29)?
		b. During normal operations:
X		(1) Does the Personnel Exposure Limit (PEL) for radiation hazard extend further than 1517 feet along the beam direction (500 feet from shore)?
X		(2) When the beam is directed toward the horizon, is the radiation at the shore line more than 0.015 mW/sq cm?
		c. If the emitter should malfunction:
X		(1) Could a hazard zone extend more than 500 feet from shore?
X		(2) Could radiation at the shore exceed 15 mW/sq cm?
X		d. In the event of malfunction or unplanned penetration into the hazard area, would it be difficult to turn the beam off quickly?
X		9. Do you know of any impacts this project or action will have on the environment, either human or natural (ie pacemaker or traffic interference, waterway restrictions, wetland impacts, etc.)? If so, please describe:

Note: The radiation distribution pattern is shown in the attached drawings depicting the location of the two sites (Figure 1), the proposed setup of the Information Coordination Site (Figure 2), and the proposed setup of the PATRIOT Radar Site showing the cutouts of the radar transmission (050deg T and 210deg T).

When complete, return original to the Public Works Office and a copy to the department head. Point of contact is Marilyn Ailes (x2082).

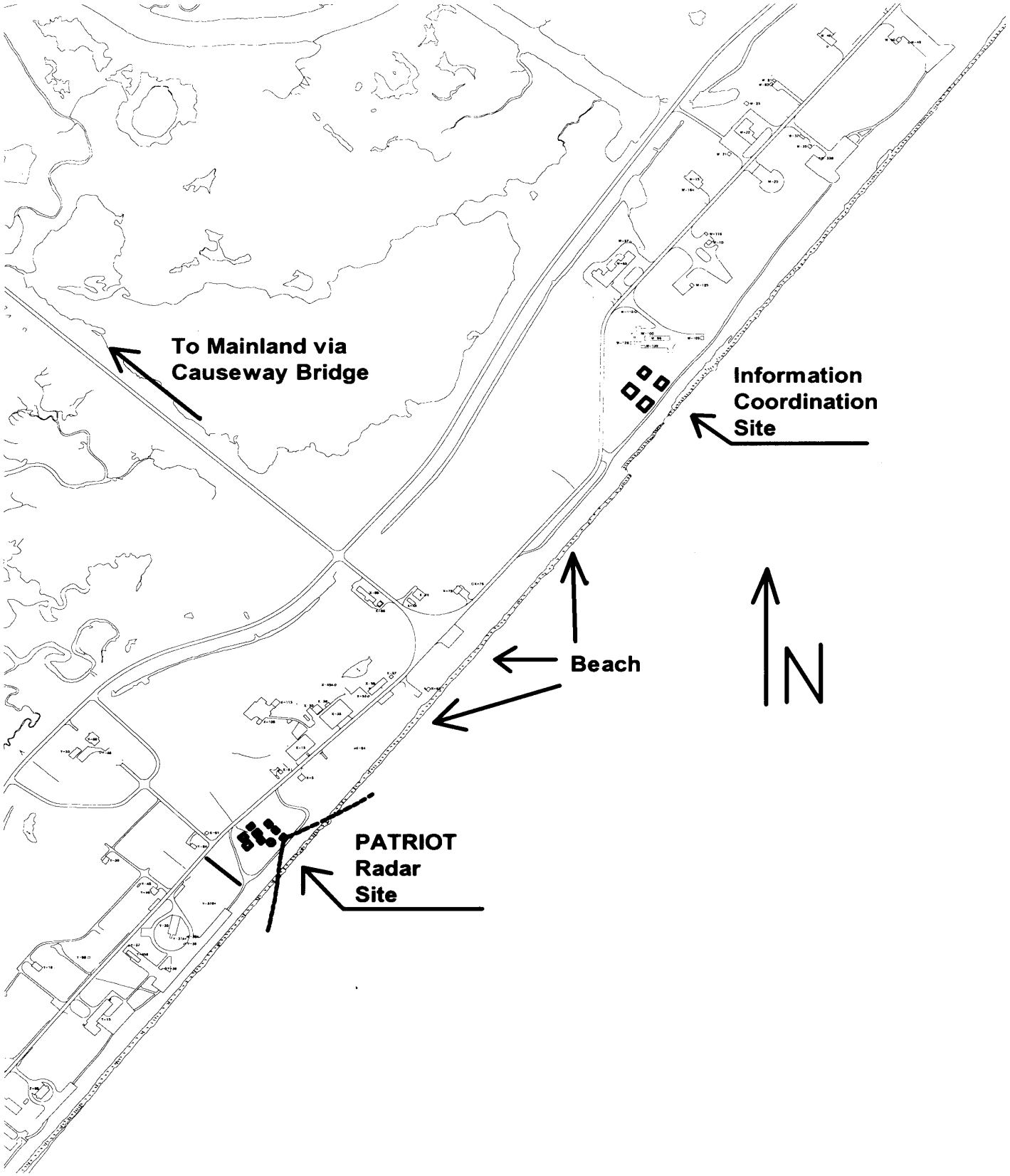


Figure 1: PATRIOT Site Locations on Wallops Island.

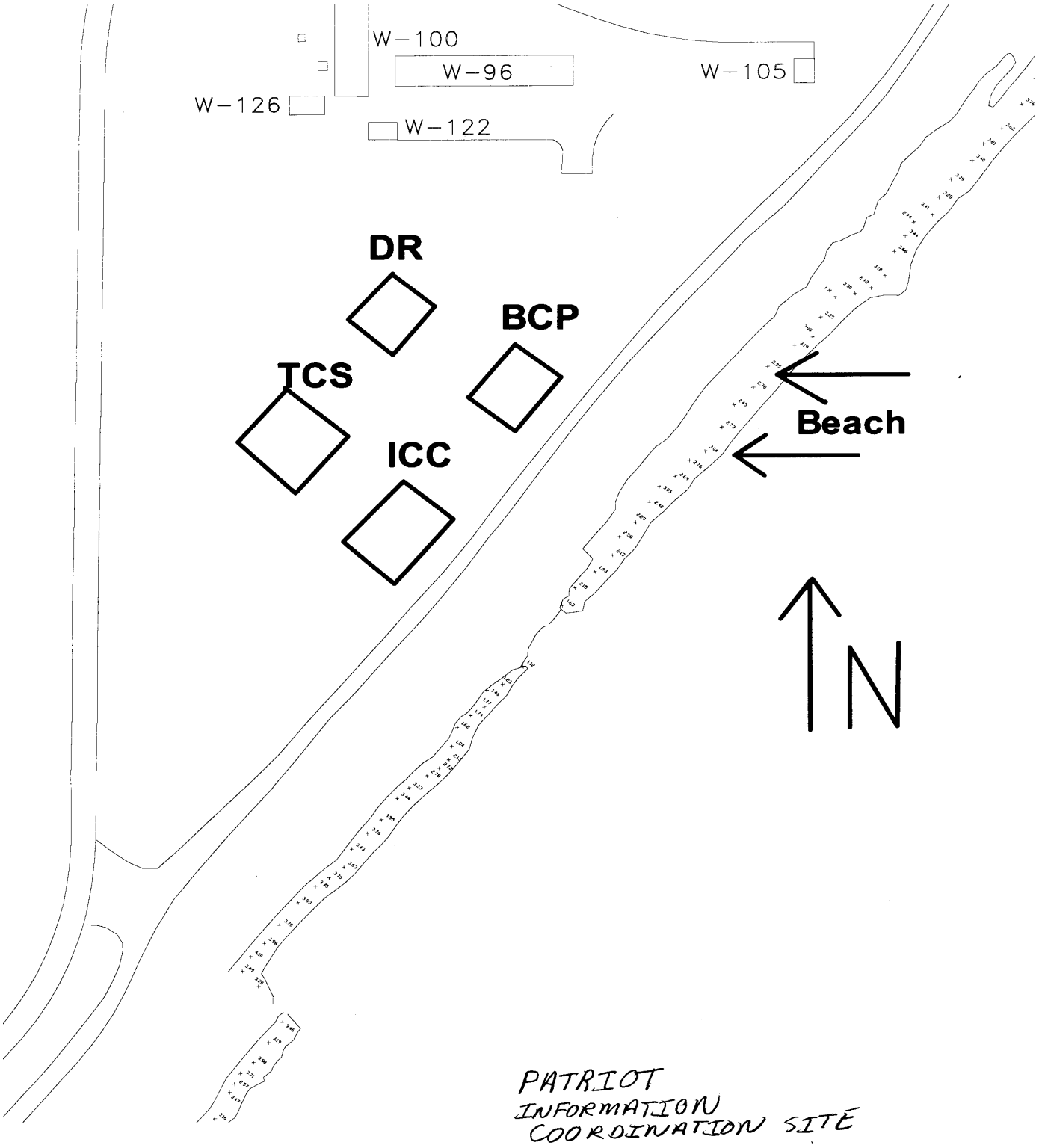


Figure 2: Proposed PATRIOT Information Coordination Site Layout on Wallops Island.

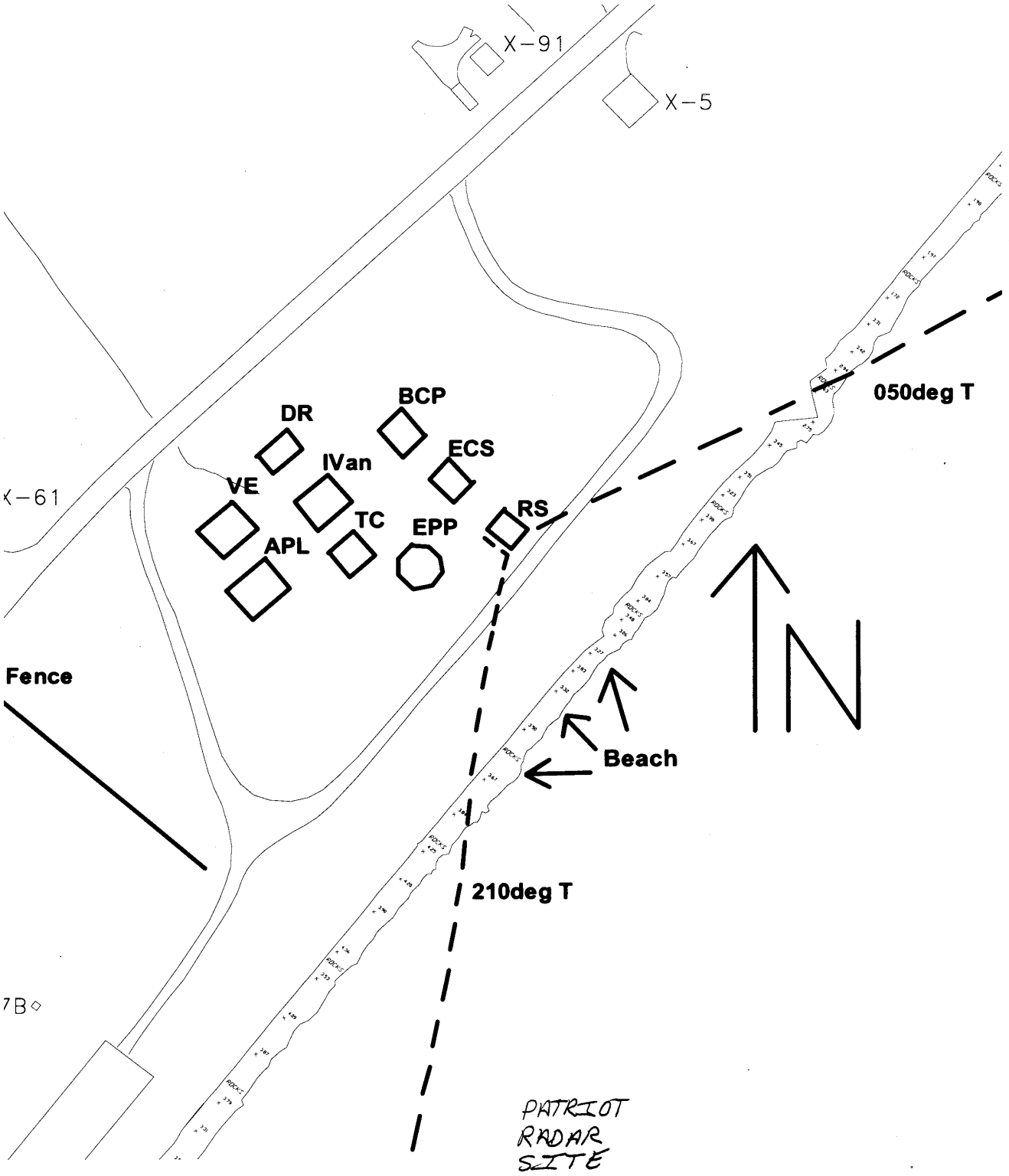


Figure 3: Proposed PATRIOT Radar Site Layout on Wallops Island showing recommended radar transmission cutout angles.

(4)

DEPARTMENT OF THE NAVY
AEGIS COMBAT SYSTEMS CENTER
WALLOPS ISLAND, VIRGINIA 23337

5090
Ser 5000/ 039
14 JAN 1999

From: Commanding Officer, AEGIS Combat Systems Center
To: File

Subj: CATEGORICAL EXCLUSION FOR CEC-PATRIOT INTEGRATION PROJECT

Ref: (a) OPNAVINST 5090.1B
(b) Documentation Worksheet
(c) Environmental Assessment for the Construction, Installation, and Operation of the AEGIS Combat Systems Center on Wallops Island, Virginia. Naval Surface Weapons Center, Dahlgren, Virginia.
(d) Environmental Assessment for Range Operations Expansion at the National Aeronautics and Space Administration, Goddard Space Flight Center, Wallops Flight Facility, Wallops Island, Virginia 23337. June 20, 1997.

1. Per references (a) through (d), the CEC-Patriot Integration Project at AEGIS Combat Systems Center (ACSC) is hereby determined to be categorically excluded under the National Environmental Policy Act for the following reasons:

a. Council on Environmental Quality Regulations (40 CFR 1500.4 of 1 July, 1990): This action does not individually or cumulatively have a significant effect on the human environment.

b. OPNAVINST 5090.1B (02 Feb 1998) Paragraph 2-4.2(e): This is a study which involves no physical change to the environment. Paragraph 2-4.2(p): This project involves the operation of a communication system which uses existing facilities and ranges.

c. No effects are expected to exceed in kind or quantity the impacts discussed in references (c) or (d).

d. The General Conformity Rule of the Clean Air Act is not applicable to this action because it will not emit significant quantities of criteria air pollutants (O_3, SO_2, NO_2, CO, Pb, or particulate matter) in excess of current, negligible quantities, either in construction or in use, and because ACSC does not lie in a nonattainment zone.

e. This project does not violate environmental justice goals. ACSC is located near communities with substantial minority populations. Due to the nature of the project, negative environmental impacts are not anticipated while minor positive socioeconomic impacts may occur.

f. None of the exceptions under OPNAVINST 5090.1B Paragraph 2-4.1 apply to this project. Public health and safety will not be negatively affected. The project will not impact endangered or threatened species, historical or archeological resources, or hazardous waste sites. No effects are anticipated to be controversial, unique, or to include unpredictable risks. No precedents will be established, and no laws or regulations are expected to be violated.

2. References are on file at the Public Works Office, AEGIS Combat Systems Center, Wallops Island, Virginia.

J. S. MURGATROYD
By direction

National Environmental Policy Act Documentation Worksheet

Description of action (name of project): _CEC-Patriot Integration Test_____

Person in charge of action or Project Coordinator[1]: David Tyler_____

Phone Number: 757-824-7222 Dtyler

Short narrative description of action or project (if action impacts any area outside a facility fenceline, attach a site plan[2]):

Yes No

X 1. Is construction required?
a. Anticipated date of construction:_____
b. Note on the attached site plan for the action any alternatives you may be considering.

X 2. Will this action be confined entirely within the Navy fenceline, with no anticipated disturbance to other areas (e.g. noise, erosion runoff, increased traffic, radhaz zone expansion)? Mobile Patriot Radar will be set-up on Wallops Island, 100 yards South of Fire Station. Radhaz approved by NASA. behind seawall

[1]The Project Coordinator or other individual overseeing an action is responsible for reporting all known impacts, including those created by contractors, to the Public Works Ecologist. Significant changes in planned operations which may impact the human or natural environment will require the submission of a new Documentation Worksheet.

[2]This form will be considered incomplete without a site plan unless all impacts will be confined to current structures.

Enclosure (3)

☐ X 3. Does this action involve any change in the support structure required? (e.g. change in traffic patterns, utility services, phone lines, etc.)

X ☐ 4. Does this action require a permit from any other agency, including NASA? NASA POC John Dickerson. 757-824-1482.

☐ X 5. Does this action involve a change from current land or facility use?

NEPA Documentation Worksheet, Continued

Yes No

☐ X 6. Is there any potential for contamination of air or water? Minor risk of water contamination. Diesel-power generators will accompany Patriot system to provide electricity. ≈ 100 gallons diesel fuel

☐ X 7. Could any impact of this action be considered controversial?

X ☐ 8. Will this action emit radiation? If no, proceed to question #9.

X ☐ a. Will there be a change in the radiation patterns described in the Environmental Assessment (copies available at Q-29)? Patriot is a phased-array (non-rotating) radar that will be positioned at the waters edge and emit seaward.

b. During normal operations: Operations will take place daily including weekends (Jan 18 – Feb 2)

YES NO

X (1) Does the Personnel Exposure Limit (PEL) for radiation hazard extend further than 1517 feet along the beam direction (500 feet from shore)? 120 meters seaward.

(2) When the beam is directed toward the horizon, is the radiation at the shore line more than 0.015 mW/sq cm? Denigned occupancy area extends 120 meter from the front of the radar.

c. If the emitter should malfunction:

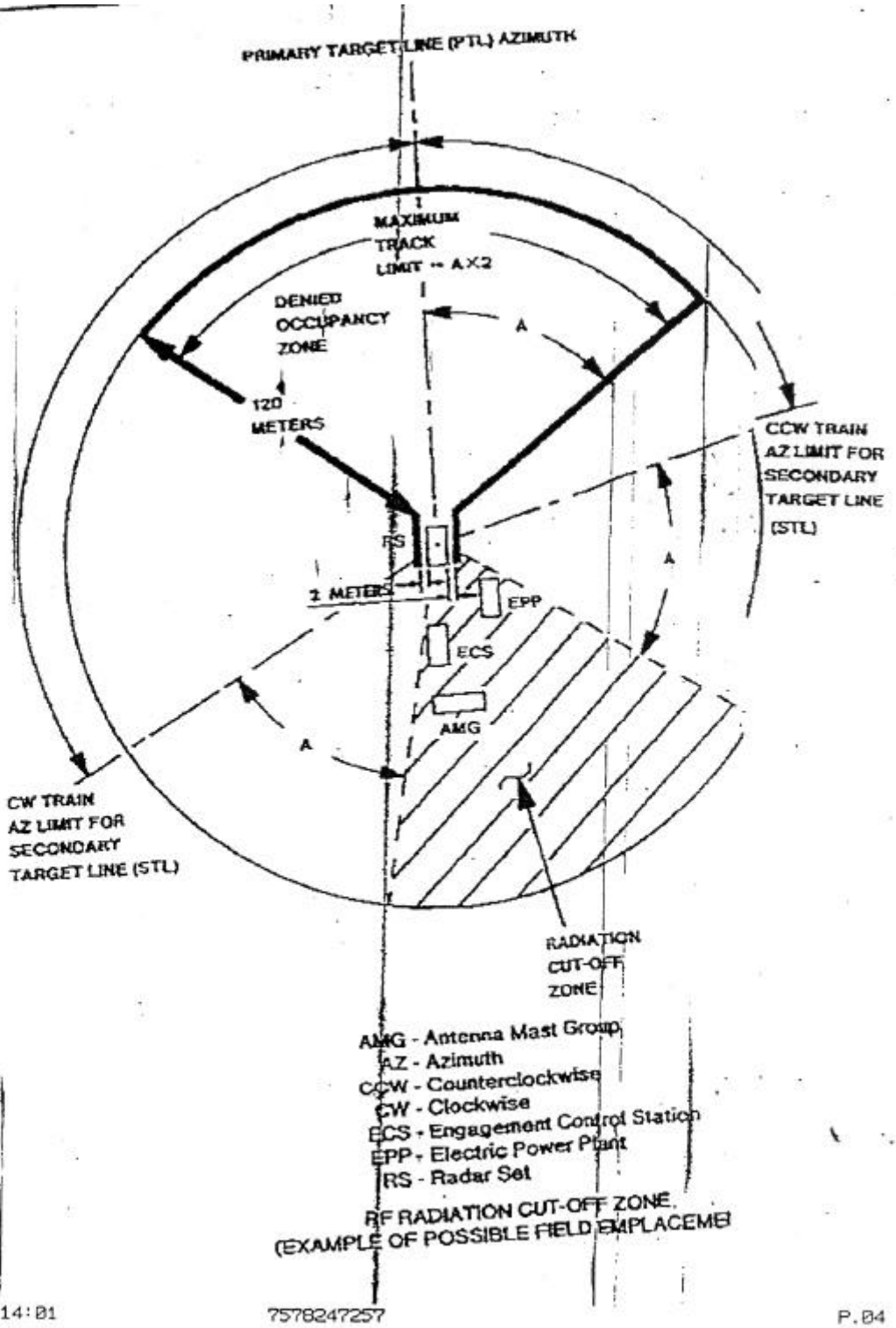
X (1) Could a hazard zone extend more than 500 feet from shore?

(2) Could radiation at the shore exceed 15 mW/sq cm? Doubtful

X d. In the event of malfunction or unplanned penetration into the hazard area, would it be difficult to turn the beam off quickly?

X 9. Do you know of any impacts this project or action will have on the environment, either human or natural (ie pacemaker or traffic interference, waterway restrictions, wetland impacts, etc.)? If so, please describe:_____

When complete, return original to the Public Works Office and a copy to the department head. Point of contact is Marilyn Ailes (x2082).


PRIMARY TARGET LINE (PTL) AZIMUTH
MAXIMUM TRACK LIMIT = AX2
DENIED OCCUPANCY ZONE
A
120 METERS
CCW TRAIN AZ LIMIT FOR SECONDARY TARGET LINE (STL)
RS
2 METERS
EPP
ECS
AMG
A
A
CW TRAIN AZ LIMIT FOR SECONDARY TARGET LINE (STL)
RADIATION CUT-OFF ZONE
AMG - Antenna Mast Group
AZ - Azimuth
CCW - Counterclockwise
CW - Clockwise
ECS - Engagement Control Station
EPP - Electric Power Plant
RS - Radar Set
RF RADIATION CUT-OFF ZONE.
(EXAMPLE OF POSSIBLE FIELD EMPLACEMEI

DEPARTMENT OF THE NAVY
SURFACE COMBAT SYSTEMS CENTER
WALLOPS ISLAND, VIRGINIA 23337

5090
Ser 5000/ 359
21 JUL 2000

From: Commanding Officer, Surface Combat Systems Center
To: File

Subj: CATEGORICAL EXCLUSION FOR SENSOR DATA REGISTRATION EXPERIMENT -- TPS-59

Ref: (a) OPNAVINST 5090.1B
(b) Documentation Worksheet
(c) Environmental Assessment for the Construction, Installation, and Operation of the AEGIS Combat Systems Center on Wallops Island, Virginia. Naval Surface Weapons Center, Dahlgren, Virginia.
(d) Environmental Assessment for Range Operations Expansion at the National Aeronautics and Space Administration Goddard Space Flight Center, Wallops Flight Facility, Wallops Island, Virginia 23337.

1. Per references (a) through (d), the Sensor Data Registration Experiment -- TPS-59 Project at Surface Combat Systems Center (SCSC) is hereby determined to be categorically excluded under the National Environmental Policy Act for the following reasons:

a. Council on Environmental Quality Regulations (40 CFR 1500.4 of 1 July, 1990): This action does not individually or cumulatively have a significant effect on the human environment.

b. This project corresponds with reference (a) (09 Sept 1999) as required. Paragraph 2-5.2 (e): This project is a study, data and information gathering that involves no physical change to the environment. Paragraph 2-5.2(i): Although temporary, this project involves new construction that is consistent with existing land use and, when completed, the use or operation of which complies with existing regulatory requirements (see reference (d)).

c. No effects are expected to exceed in kind or quantity the impacts discussed in references (c) or (d).

d. The General Conformity Rule of the Clean Air Act is not applicable to this action because it will not emit significant quantities of criteria air pollutants (O_3, SO_2, NO_2, CO, Pb, or particulate matter) in excess of current, negligible quantities, either in construction or in use. Since the SCSC is located in an Attainment Area for all air quality standards, a General Conformity Analysis under the Clean Air Act is not required.

e. This project does not violate environmental justice goals. SCSC is located near communities with substantial minority populations. Due to the nature of the project, negative environmental impacts are not anticipated while minor positive socioeconomic impacts may occur.

f. None of the exceptions under OPNAVINST 5090.1B Paragraph 2-4.1 apply to this project. The project will not impact endangered or threatened species. Although piping plovers are in the area, the radiation hazard zone extends 120 meters from the radar whereas the plover habitat begins 2.5 km from the radar. Neither historical nor archeological resources are in the area. Hazardous waste sites will not be affected nor disturbed in any way. The generators will be placed in containment basins that have a capacity exceeding that of the generators, so spillage of fuel is highly unlikely. No effects are anticipated to be controversial, unique, or to include unpredictable risks. No precedents will be established, and no laws or regulations are expected to be violated.

g. Public health and safety will not be negatively affected. Radiation will not be hazardous except along the water 120m from the radar location. This is a restricted area normally; the public does not have access this close to Wallops. Workers in the area will be warned to stay away from the area where they may be at risk. Should unforeseen penetration occur, the radar can be turned off quickly.

2. References are on file at the Public Works Office, Surface Combat Systems Center, Wallops Island, Virginia.

J. MCGETTIGAN

National Environmental Policy Act
Documentation Worksheet

Description of action (name of project):
Sensor Data Registration Experiment --- TPS-59

Person in charge of action or Project Coordinator[1]:
FCC(SW) Struss

Phone Number: 757 824-~~7078~~ 7377 Date: July 20, 2000

Short narrative description of action or project (if action impacts any area outside a facility fenceline, attach a site plan[2]):

The TPS-59 radar array will track aircraft and send the information to SCSC via JTIDS transmission. The Sensor Data Registration equipment will monitor the transmissions and data exchange to ensure the SCSC system is able to translate the data to usable information in the combat system.

Yes	No	
☐	X	1. Is construction required? a. Anticipated date of construction: Mon. - Fri 7/24 - 7/28 not full time b. Note on the attached site plan for the action any alternatives you may be considering.
☐	X	2. Will this action be confined entirely within the Navy fenceline, with no anticipated disturbance to other areas (e.g. noise, erosion runoff, increased traffic, radhaz zone expansion)?
X	☐	3. Does this action involve any change in the support structure required? (e.g. change in traffic patterns, utility services, phone lines, etc.) *Phone lines and Electric Power* already in place extensions ≈ 50 feet. ≈ 50 amps for computers. Emissions power radar
X	☐	4. Does this action require a permit from any other agency, including NASA? *JFMOLANT Frequency Permit* - already done
☐	X	5. Does this action involve a change from current land or facility use?

[1]The Project Coordinator or other individual overseeing an action is responsible for reporting all known impacts, including those created by contractors, to the Public Works Ecologist. Significant changes in planned operations which may impact the human or natural environment will require the submission of a new Documentation Worksheet.

[2]This form will be considered incomplete without a site plan unless all impacts will be confined to current structures.

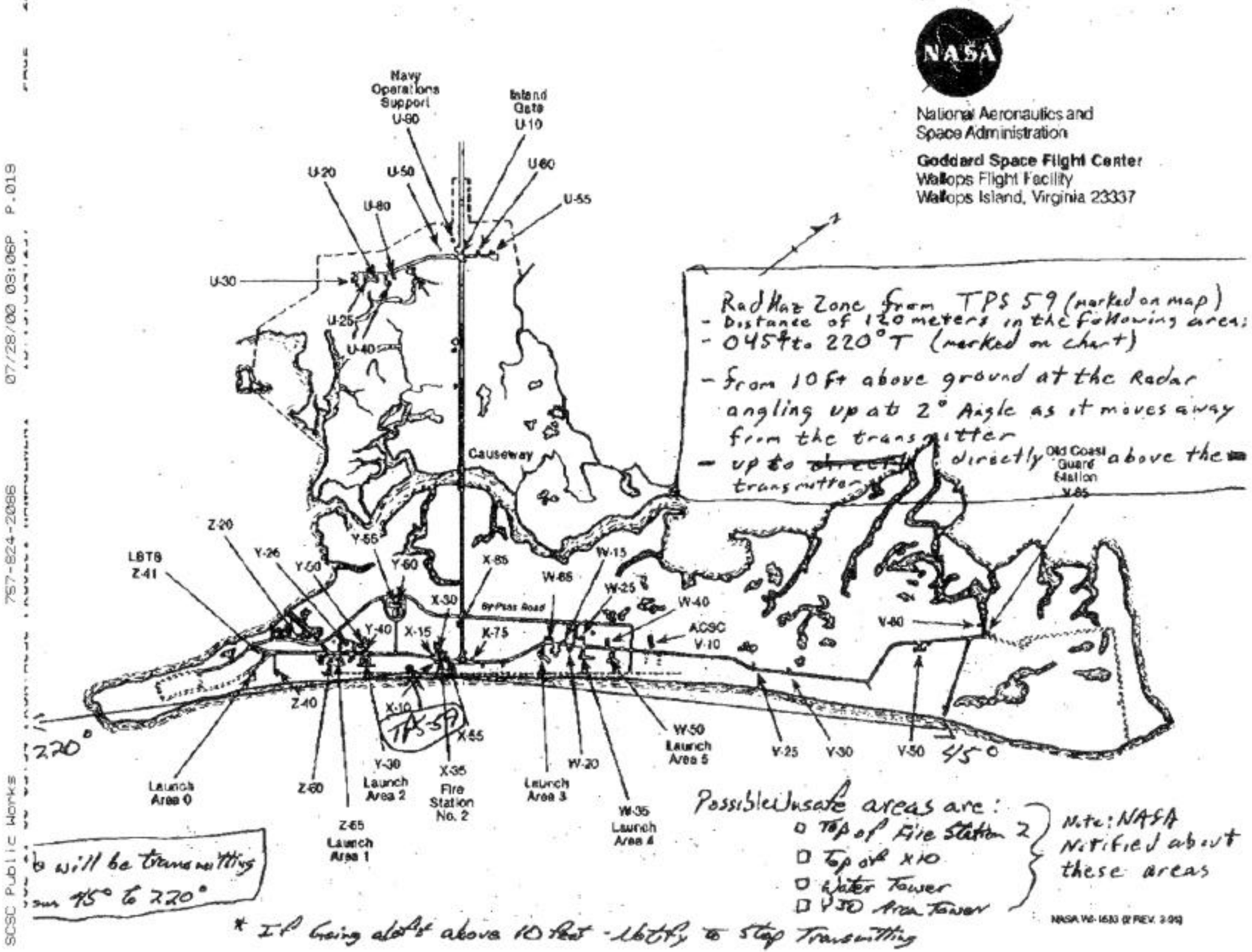
NEPA Documentation Worksheet, Continued

Yes	No	
X	☐	6. Is there any potential for contamination of air or water? *Diesel fuel from electric generators, catch basins around generators have greater capacity than generators.*
☐	X	7. Could any impact of this action be considered controversial?
X	☐	8. Will this action emit radiation? If no, proceed to question #9.
☐	X	a. Will there be a change in the radiation patterns described in the Environmental Assessment (copies available at Q-29)?
		b. During normal operations:
☐	X	(1) Does the Personnel Exposure Limit (PEL) for radiation hazard extend further than 1517 feet along the beam direction (500 feet from shore)?
☐	X	(2) When the beam is directed toward the horizon, is the radiation at the shore line more than 0.015 mW/sq cm?
		c. If the emitter should malfunction:
☐	X	(1) Could a hazard zone extend more than 500 feet from shore?
☐	X	(2) Could radiation at the shore exceed 15 mW/sq cm?
☐	X	d. In the event of malfunction or unplanned penetration into the hazard area, would it be difficult to turn the beam off quickly?
☐	X	9. Do you know of any impacts this project or action will have on the environment, either human or natural (ie pacemaker or traffic interference, waterway restrictions, wetland impacts, etc.)? If so, please describe:

Seaward radiation only, Navy will be warned to keep workers out of side lobes.

When complete, return original to the Public Works Office and a copy to the department head. Point of contact is Marilyn Ailes (x2082).

Note from phone conversation 7/31 - Marilyn Ailes



DEPARTMENT OF THE NAVY
SURFACE COMBAT SYSTEMS CENTER
WALLOPS ISLAND, VIRGINIA 23337

5090
Ser 5000/358
21 July 2000

From: Commanding Officer, Surface Combat Systems Center
To: File

Subj: CATEGORICAL EXCLUSION FOR CEC/PATRIOT INTEROPERABILITY TEST

Ref: (a) OPNAVINST 5090.1B
(b) Documentation Worksheet
(c) Environmental Assessment for the AEGIS Combat Systems Center Main Base Site Development Plan at Wallops Flight Facility

1. Per references (a) through (c), the CEC/Patriot Interoperability Test at Surface Combat Systems Center (SCSC), Wallops Island, Virginia is hereby determined to be categorically excluded under the National Environmental Policy Act for the following reasons:

a. Council on Environmental Quality Regulations (40 CFR 1500.4 of 1 July, 1990): This action does not individually or cumulatively have a significant effect on the human environment.

b. This project corresponds with reference (a) (09 Sept 1999) as required. Paragraph 2-5.2(e): This test is a study, data and information gathering test that involves no physical change to the environment. Paragraph 2-5.2(h): This test is a routine action normally conducted to operate military-owned property.

c. Per reference (b), no effects are expected to exceed in kind or quantity the impacts discussed in reference (c).

d. The General Conformity Rule of the Clean Air Act is not applicable to this action because it will not emit criteria air pollutants (O_3, SO_2, NO_2, CO, Pb, or particulate matter) in excess of current, negligible quantities, either in construction or in use. Since the SCSC is located in an Attainment Area for all air quality standards, a General Conformity Analysis under the Clean Air Act is not required.

e. This project does not violate environmental justice goals. SCSC is located near communities with substantial minority populations. Due to the nature of the project, negative environmental impacts are not anticipated while minor positive socioeconomic impacts may occur.

f. None of the exceptions under OPNAVINST 5090.1B Paragraph 2-4.1 apply to this project. The project will not impact endangered or threatened species, historical or archeological resources, or hazardous waste sites because there are none in the areas which may be impacted (ref. (c)). No effects of the test at SCSC are anticipated to be controversial, unique, or to include unpredictable risks. No precedents will be established, and no laws or regulations are expected to be violated.

g. Public health and safety will not be negatively affected. The only radiation will be no change from the normal operations at SCSC, as addressed in reference (c). Ship activities will be those normally undertaken by Aegis vessels. Any private or commercial vessels that might carry personnel into hazardous radiation areas are normally warned away or avoided as described in reference (b).

2. References are on file at the Public Works Office, Surface Combat Systems Center, Wallops Island, Virginia.

J. MCGETTIGAN

National Environmental Policy Act
Documentation Worksheet

Description of action (name of project):
SCSC Involvement in CEC/PATRIOT Interoperability Testing

Person in charge of action or Project Coordinator[1]:
LTJG Medley and FCC Struss

Phone Number: 757 824-7438 Date: July 20 2000

Short narrative description of action or project (if action impacts any area outside a facility fenceline, attach a site plan[2]):

Coordination with an AEGIS ship at sea and the PATRIOT radar at the Ocean City Airport to test the information exchange capability of a new system designed to increase the ability of the different services to operate together as a single entity. SCSC will be utilized as an information exchange node in a network consisting of at least these three units.

Yes	No	
☐	X	1. Is construction required? a. Anticipated date of construction: _____ b. Note on the attached site plan for the action any alternatives you may be considering.
X	☐	2. Will this action be confined entirely within the Navy fenceline, with no anticipated disturbance to other areas (e.g. noise, erosion runoff, increased traffic, radhaz zone expansion)?
☐	X	3. Does this action involve any change in the support structure required? (e.g. change in traffic patterns, utility services, phone lines, etc.)
☐	X	4. Does this action require a permit from any other agency, including NASA?
☐	X	5. Does this action involve a change from current land or facility use?
☐	X	6. Is there any potential for contamination of air or water?

NEPA Documentation Worksheet, Continued

[1]The Project Coordinator or other individual overseeing an action is responsible for reporting all known impacts, including those created by contractors, to the Public Works Ecologist. Significant changes in planned operations which may impact the human or natural environment will require the submission of a new Documentation Worksheet.

[2]This form will be considered incomplete without a site plan unless all impacts will be confined to current structures.

Yes	No	
☐	X	7. Could any impact of this action be considered controversial?
☒	X	8. Will this action emit radiation? If no, proceed to question #9.
☐	X	a. Will there be a change in the radiation patterns described in the Environmental Assessment (copies available at Q-29)?
		b. During normal operations:
☐	X	(1) Does the Personnel Exposure Limit (PEL) for radiation hazard extend further than 1517 feet along the beam direction (500 feet from shore)?
☐	X	(2) When the beam is directed toward the horizon, is the radiation at the shore line more than 0.015 mW/sq cm?
		c. If the emitter should malfunction:
☐	X	(1) Could a hazard zone extend more than 500 feet from shore?
☐	X	(2) Could radiation at the shore exceed 15 mW/sq cm?
☐	X	d. In the event of malfunction or unplanned penetration into the hazard area, would it be difficult to turn the beam off quickly?
☐	X	9. Do you know of any impacts this project or action will have on the environment, either human or natural (ie pacemaker or traffic interference, waterway restrictions, wetland impacts, etc.)? If so, please describe:

When complete, return original to the Public Works Office and a copy to the department head. Point of contact is Marilyn Ailes (x2082).

Description of Operation of AEGIS Cruiser Involved in CEC/PATRIOT Interoperability Test Near Ocean City Maryland

The AEGIS ship, working in conjunction with the PATRIOT radar at Ocean City airport and SCSC Wallops Island, will be testing the capabilities of an information sharing system called Cooperative Engagement Capability (CEC). There have been no modifications of the shipboard systems that will change the normal Radio Frequency (RF) emissions from the ship. RF includes radar and radio communications equipment.

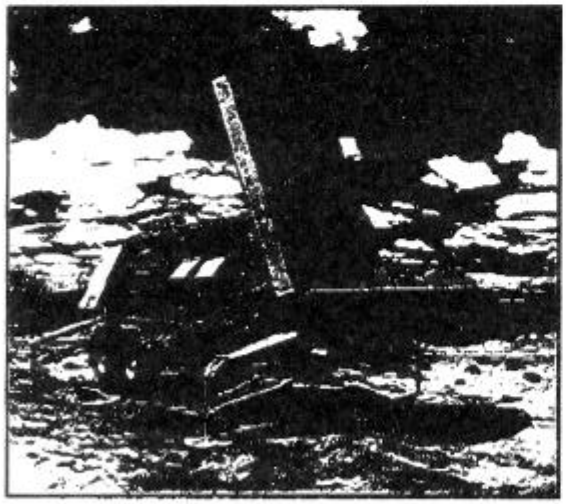
During the tests, the ship shall maintain normal open-ocean operation of all its equipment. The radar systems on board the ship will be operating, however the systems have been designed such that any small vessels that sail close to the ship cannot enter the radiation hazard zones. A prudent operator of a recreational or fishing vessel will normally avoid a ship the size of the AEGIS cruiser. The radar antennas are too high on the ship to radiate to the water close to the ship. Any ship tall enough to penetrate the radiation hazard zones will be avoided as a collision hazard long before it is in any danger from RF.

As usual for all U. S. Navy ships, the ship involved in this testing shall obey all maritime regulations for operation in open ocean or coastal waters. The safety of the public and the personnel on board the ship will not be compromised for this testing.

– INFORMATION SHEET –

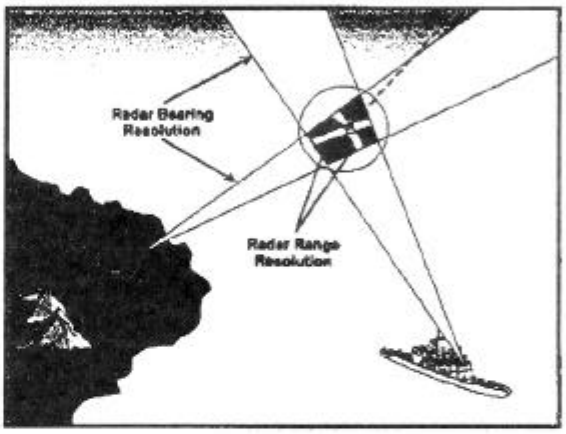
PATRIOT RADAR TESTING AT OCEAN CITY, MARYLAND

U.S. Army personnel and civilian technical staff will be working at the Ocean City, Maryland Airport for approximately two weeks in August 2000 to conduct a radar test with Navy radars which are located down the coast at Wallops Island, Virginia. This activity is sponsored by the Ballistic Missile Defense Organization (BMDO). A PATRIOT radar and communications equipment will arrive at Ocean City Airport approximately August 4, 2000 and be temporarily deployed to conduct radar testing. The PATRIOT capability was used during the Gulf War against Iraqi Scud missiles which where aimed at U.S. and coalition forces, and at Israeli territory. The general purpose of this testing is to develop innovative technology which will enable U.S. Army and Navy radar systems to jointly track and counter emerging air defense threats at longer ranges. These threats to the United States include ballistic missiles, cruise missiles and high-performance aircraft. The solution is to establish a network of overlapping radar coverage to create a combined and larger picture to assist in detecting and tracking the targets, which can be very difficult to track.



The PATRIOT equipment deployed to the Ocean City Airport is scheduled to be packed up and shipped back to Alabama on August 19, 2000.

The Ocean City Airport was selected for the PATRIOT test site because it provided the best location to meet the geometry required for overlapping radar coverage with U.S. Navy radars located at Wallops Island, Virginia and offshore on an AEGIS cruiser. The testing will track aircraft flying offshore over military restricted airspace, and will not affect any Ocean City Airport activities. Only the PATRIOT radar is being sent to the test event; there will be no interceptor missiles involved in any way.

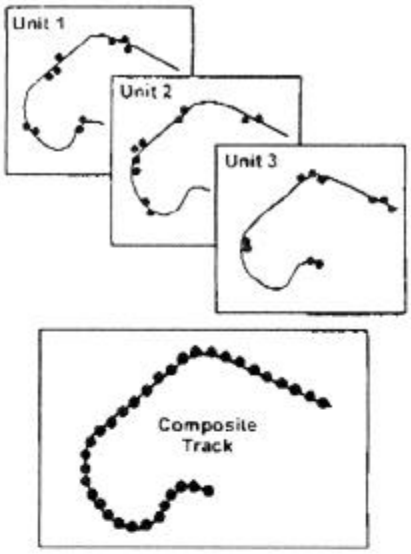


The PATRIOT air defense system was originally designed to defend against aircraft rather than missiles. However, because of the changing and increasing threats from ballistic missiles, the PATRIOT was improved and modified to provide a defense against ballistic missiles. The U.S. Navy will be using their shipboard AEGIS systems which use SPY-1 radars.

Linking the Army and Navy radars together in a network will result in a new system called the Cooperative Engagement Capability (CEC). CEC is a Navy developed system that will network together the radars from multiple platforms, including ships and aircraft, to produce a single, composite combined picture of radar tracks. During the testing at Ocean City, Maryland the U.S. Navy will include the PATRIOT radar in the network and will demonstrate that the PATRIOT can receive and process the composite tracking data.

Sensor Cooperation

Without composite tracking, the autonomous radars detect the target at different times due to horizon limitations, multipath, and jamming. Their tracks consequently start and stop at different times and have different track numbers. With composite tracking, data from each unit is distributed to all other units, filtered, and combined using identical algorithms into a single common air picture. Each unit combines its own source radar measurement data with that from the other units using the same algorithms. The result is an air picture based on all the data available (thus superior to that of any single sensor) providing the same tracks with the same track numbers throughout the net.



Safety

Several safety measures are being employed for PATRIOT radar testing that safeguard personnel and flight operations of aircraft.

- Prior to every test, the PATRIOT radar and associated equipment are subjected to a frequency allocation process through the Army and FAA. This process guarantees that no two transmitters will operate in the same frequency range at the same time.
- PATRIOT has defined a safety zone out to 120 meters in front of the radar face that acts as a buffer between the radar and personnel in case of a radar mode failure where RF energy goes to a fixed beam. (This failure mode has never occurred.)
- The proposed site at the Ocean City Airport that the PATRIOT will be stationed is well away from the runways, hangars, and the terminal.
- In the event that an emergency occurs at the Ocean City Airport while PATRIOT is operating, the Ocean City Airport can contact the PATRIOT Test Conductor on a dedicated phone line to cease operations until the emergency is under control. The PATRIOT personnel will adhere to all airfield operations and safety restrictions.

Finally, a few minor improvements to the Ocean City Airport will result from conducting this PATRIOT radar test. Improvements consists of a new underground conduit to assist airport communications and a roadway addition to facilitate access to the site.

APPENDIX C

Air Quality and Noise Calculations

Appendix C1 **Air Emissions Computations**

Possible Surrogates

Equipment Type		Fuel	HP	VOC Ex	CO Ex	NOx Ex	CO2 Ex	SOx Ex	PM Ex
				One Day Emission Totals (tons)					
Generators		Gasoline 4-stroke	175	0.0000594983	0.0017991984	0.0000399673	0.0066916402	0.0000020442	0.0000005739
Generators	Worse Case	Diesel	175	0.0000916316	0.0003602977	0.0009047530	0.0603237750	0.0001641314	0.0000789263
Generators		Gasoline 4-stroke	300	0.0000023475	0.0000709870	0.0000015769	0.0002640173	0.0000000807	0.0000000226
Generators	Worse Case	Diesel	300	0.0000822196	0.0003198844	0.0008191244	0.0551755170	0.0001501381	0.0000681834

Worse Case Analysis

Equipment Type	Hours	Days (8 hrs)	Fuel	HP	VOC Ex	CO Ex	NOx Ex	CO2 Ex	SOx Ex	PM Ex
Day Operations					One Day Emission Totals (tons)					
Generators	120	15.0	Diesel	175	0.0000916316	0.0003602977	0.0009047530	0.0603237750	0.0001641314	0.0000789263
Generators	120	15.0	Diesel	300	0.0000822196	0.0003198844	0.0008191244	0.0551755170	0.0001501381	0.0000681834
Night Operations										
Generators	360	45.0	Diesel	175	0.0000916316	0.0003602977	0.0009047530	0.0603237750	0.0001641314	0.0000789263

Total Emissions for the Entire Project (tons)

VOC Ex	CO Ex	NOx Ex	CO2 Ex	SOx Ex	PM Ex
0.0164936799	0.0648535878	0.1628555382	10.8582795000	0.0295436592	0.0142067405
0.0082468400	0.0324267939	0.0814277691	5.4291397500	0.0147718296	0.0071033702
0.0036998824	0.0143947962	0.0368605980	2.4828982650	0.0067562123	0.0030682526

References:

(EPA, 1998)

(EPA, 1999)

Totals (tons)

VOC Ex	CO Ex	NOx Ex	CO2 Ex	SOx Ex	PM Ex
0.0284404023	0.1116751779	0.2811439053	18.7703175150	0.0510717011	0.0243783634

Appendix C2 - Noise Computations

Patriot Daytime Worse Case Noise Projection

Equipment					100 Feet		200 Feet		300 Feet	
Type	**Function**	**Max dB**	**Leq**		30.48		60.96		91.44	
Patriot	150 kW	85.00	85.00	316227766	55.32	340385	49.30	85096	45.78	37821
Patriot	150 kW	85.00	85.00	316227766	55.32	340385	49.30	85096	45.78	37821
Patriot	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Patriot	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Patriot	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Patriot	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Patriot	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Patriot	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Test/Support	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Test/Support	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Test/Support	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Test/Support	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Test/Support	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Test/Support	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Test/Support	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Test/Support	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Test/Support	60 kW	70.00	70.00	10000000	57.22	527432	51.20	131858	47.68	58604
Total				782455532		8592244		2148061		954694
			88.93		69.34		63.32		59.80	

400 Feet		500 Feet		750 Feet		1000 Feet		2000 Feet		3000 Feet	
121.92		152.40		228.60		304.80		609.60		914.40	
46.41	43769	41.34	13615	37.82	6051	35.32	3404	29.30	851	25.78	378
46.41	43769	41.34	13615	37.82	6051	35.32	3404	29.30	851	25.78	378
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
48.31	67820	43.24	21097	39.72	9377	37.22	5274	31.20	1319	27.68	586
	1104838		343690		152751		85922		21481		9547
60.43		55.36		51.84		49.34		43.32		39.80	

Patriot Nighttime Worse Case Noise Projection

Equipment Type	Function	Max dB	Leq		100 Feet		200 Feet		300 Feet	
					30.48		60.96		91.44	
Test/Support	60 kW	70.00	80.00	100000000	77.22	52743161	71.20	13185790	67.68	5860351
Test/Support	60 kW	70.00	80.00	100000000	77.22	52743161	71.20	13185790	67.68	5860351
Total				200000000		105486322		26371581		11720702
			83.01		80.23		74.21		70.69	

400 Feet		500 Feet		750 Feet		1000 Feet		2000 Feet		3000 Feet	
121.92		152.40		228.60		304.80		609.60		914.40	
65.18	3296448	63.24	2109726	59.72	937656	57.22	527432	51.20	131858	47.68	58604
65.18	3296448	63.24	2109726	59.72	937656	57.22	527432	51.20	131858	47.68	58604
	6592895		4219453		1875312		1054863		263716		117207
68.19		66.25		62.73		60.23		54.21		50.69	