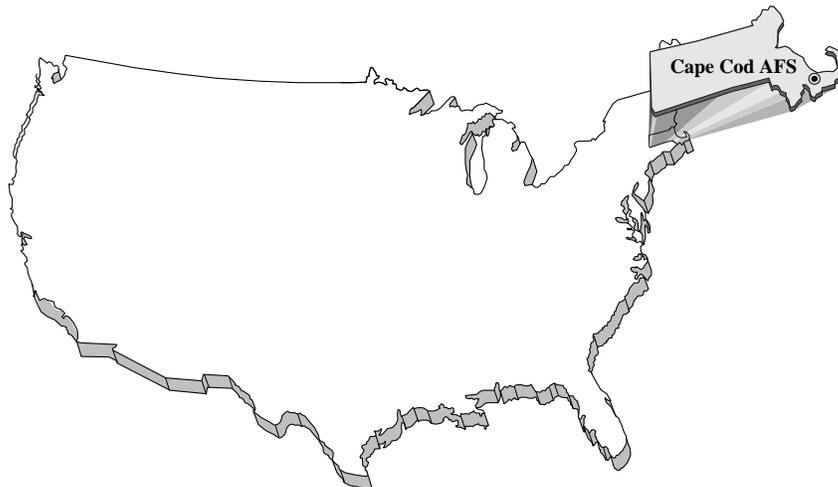




ENVIRONMENTAL ASSESSMENT

September 2002



EARLY WARNING RADAR
SERVICE LIFE EXTENSION PROGRAM
CAPE COD AFS, MASSACHUSETTS

**FINDING OF NO SIGNIFICANT IMPACT
FOR THE EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM AT
CAPE COD AIR FORCE STATION, MASSACHUSETTS**

The attached environmental assessment (EA), which is incorporated by reference, analyzes the potential for impacts to the environment as a result of the Early Warning Radar (EWR) Service Life Extension Program (SLEP) at Cape Cod Air Force Station (AFS), Massachusetts. The EA was prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, the Council on Environmental Quality regulations implementing the procedural provisions of NEPA (42 Code of Federal Regulations [CFR] Parts 1500-1508), and Air Force policy and procedures (32 CFR Part 989).

This Finding of No Significant Impact (FONSI) summarizes the results of the evaluation for implementation of EWR SLEP activities at Cape Cod AFS. The discussion focuses on activities that have the potential to affect both the natural and human environments.

Summary of Environmental Consequences

The EA concluded that no significant impacts to the environment would result from implementing EWR SLEP activities at Cape Cod AFS. Based upon the scope of proposed EWR SLEP activities, transportation, utilities, land use and aesthetics, airspace, Environmental Restoration Program sites, pesticide usage, polychlorinated biphenyls, radon, medical/biohazardous waste, ordnance, soils and geology, water resources, noise, biological resources, and cultural resources would not be affected.

The temporary increase in employment to remove the existing computer equipment and install the new replacement equipment is not expected to impact the region's employment. No permanent increase in population is expected.

EWR SLEP activities would not change the types and quantity of hazardous materials routinely used on Cape Cod AFS, with one exception. The existing main mission computer uses approximately 100 pounds of the refrigerant R-401a, a hydrochlorofluorocarbon (HCFC), whereas the replacement computer does not. Replacing the main mission computer would eliminate the need to store and use R-401a to support the radar. During the replacement of the main mission computer, the HCFC will be recovered in accordance with applicable regulations. The installation of EWR SLEP computer components may involve small quantities of hazardous materials such as cleaners and paints. These materials would be managed in accordance with existing base procedures, which comply with federal and state regulations. EWR SLEP activities would not change the amount and type of solid and hazardous wastes routinely generated on Cape Cod AFS. However, installation of new computer equipment may generate small quantities of solid or hazardous waste. These wastes would be managed in accordance with existing installation procedures, which comply with federal and state regulations. If minor interior renovation is required as a part of the EWR SLEP program and asbestos or lead-based paint is encountered, it will be managed in accordance with applicable regulations to minimize potential risk to human health and the environment.

EWR SLEP replacement components would not increase the power output of the Solid-State Phased-Array Radar System (SSPARS) or change the characteristics of the radiofrequency energy (RFE) emitted from the SSPARS. The RFE levels measured in the past have consistently been well below the applicable general public exposure limit and indicate no health hazards exist. The Air Force has not increased the power output of the radar since it became operational in 1978. The Air Force would continue to operate the radar in accordance with applicable safety standards. The Air Force is sensitive to the local community's health concerns regarding the ongoing radar operation. To address these concerns, the Air Force is funding several studies and will prepare a

Supplemental Environmental Impact Statement (EIS) to the original 1979 EIS. The SLEP EA in no way replaces or alters the timeline or substance of the Air Force's continuing Supplemental EIS. The ongoing Supplemental EIS, which incorporates several studies of the PAVE PAWS radar and is expected to be completed in 2005, will address the community's public health concerns regarding the radar's operation.

Due to the limited number of temporary personnel that would be required during EWR SLEP activities, air emissions would be below de minimis thresholds.

No disproportionately high and adverse impacts to low-income and minority populations have been identified.

Cumulative Impacts

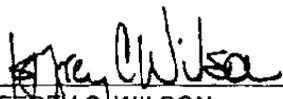
The EA reviewed cumulative impacts that could result from the incremental impact of proposed activities when added to other past, present, or reasonably foreseeable future actions. Although other actions (i.e., implementing Upgraded EWR [UEWR] activities to support the Ground-based Midcourse Defense system) could occur at Cape Cod AFS, no cumulative impacts to the environment have been identified.

Mitigations

The EA concluded that no significant impacts to the environment would result from implementing EWR SLEP activities at Cape Cod AFS. Therefore, no mitigation is required.

Decision

Based upon the findings of the EA, no significant impacts to the human environment would be expected from implementation of the Proposed Action. Therefore, issuance of a FONSI is warranted, and preparation of an environmental impact statement, pursuant to the NEPA of 1969, is not required.



JEFFREY C. WILSON,
Lieutenant Colonel, USAF
Commander, 6th SWS

12 Sept 02
Date

ENVIRONMENTAL ASSESSMENT

ENVIRONMENTAL ASSESSMENT

September 2002

**EARLY WARNING RADAR
SERVICE LIFE EXTENSION PROGRAM
CAPE COD AIR FORCE STATION, MASSACHUSETTS**

**COVER SHEET
ENVIRONMENTAL ASSESSMENT
FOR EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
CAPE COD AIR FORCE STATION (AFS), MASSACHUSETTS**

- a. Responsible Agency: U.S. Department of the Air Force.
- b. Proposed Action: Implementation of Service Life Extension Program (SLEP) activities (replace outdated computer components and rehost software) at the Early Warning Radar (EWR) installation at Cape Cod AFS to sustain the current missile warning and space surveillance missions.
- c. Written comments and inquiries regarding this document should be directed to: Mr. Robert Novak, HQ AFSPC/CEVP, 150 Vandenberg Street, Suite 1105, Peterson AFB, CO 80914-2370. Facsimile: (719) 554-3849.
- d. Designation: Environmental Assessment (EA).
- e. Abstract: This EA has been prepared in accordance with the National Environmental Policy Act to analyze the potential environmental consequences of the Proposed Action and reasonable alternatives including the No-Action Alternative. The document includes analysis of socioeconomics, hazardous materials management, solid and hazardous waste management, asbestos, lead-based paint, and environmental justice. Three actions were examined: a Proposed Action that involves implementation of EWR SLEP activities, a Spare Components Alternative that would require equipment manufacturers to reproduce and provide the necessary replacement "spare" parts to continue operating the radar, and a No-Action Alternative where EWR SLEP activities would not be implemented.

The temporary increase in employment to remove the existing computer equipment and install the new replacement equipment is not expected to impact the region's employment. No permanent increase in population is expected. EWR SLEP activities would not change the types and quantity of hazardous materials routinely used on Cape Cod AFS, with one exception. The existing main mission computer uses approximately 100 pounds of the refrigerant R-401a, a hydrochlorofluorocarbon (HCFC), whereas the replacement computer does not. Replacing the main mission computer would eliminate the need to store and use R-401a to support the radar. During the replacement of the main mission computer, the HCFC will be recovered in accordance with applicable regulations. The installation of EWR SLEP computer components may involve small quantities of hazardous materials such as cleaners and paints. These materials would be managed in accordance with existing base procedures, which comply with federal and state regulations. EWR SLEP activities would not change the amount and type of solid and hazardous wastes routinely generated on Cape Cod AFS. However, installation of new computer equipment may generate small quantities of solid or hazardous waste. These wastes would be managed in accordance with existing installation procedures, which comply with federal and state regulations. If minor interior renovation is required as a part of the EWR SLEP program and asbestos or lead-based paint is encountered, it will be managed in accordance with applicable regulations to minimize potential risk to human health and the environment. The radiofrequency energy (RFE) exposure levels measured in 1978 and 1986 were below the applicable general public exposure limit, and indicate that no known health hazards exist based on the low-intensity RFE resulting from the Solid-State Phased-Array Radar System (SSPARS) emissions. The Air Force has not increased the power output of the radar since it became operational in 1978. Replacement

components would not increase the power output of the SSPARS or change the characteristics of the RFE emitted from the SSPARS. The Air Force would continue to operate the radar in accordance with applicable safety standards. Due to the limited number of personnel that would be required during EWR SLEP activities, air emissions would be below de minimis thresholds. No disproportionately high and adverse impacts to low-income and minority populations have been identified.

TABLE OF CONTENTS

	<u>Page</u>
1.0 INTRODUCTION.....	1-1
1.1 INTRODUCTION	1-1
1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION.....	1-1
1.3 SOLID-STATE PHASED-ARRAY RADAR SYSTEM DESCRIPTION.....	1-3
1.4 SCOPE OF THE ENVIRONMENTAL REVIEW	1-8
2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION.....	2-1
2.1 INTRODUCTION	2-1
2.2 DESCRIPTION OF THE PROPOSED ACTION	2-1
2.3 DESCRIPTION OF ALTERNATIVES	2-9
2.3.1 Spare Components Alternative	2-9
2.4 NO-ACTION ALTERNATIVE	2-9
2.5 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION	2-9
2.5.1 Relocation Alternative	2-9
2.5.2 Deactivation Alternative	2-9
2.5.3 Delay Alternative	2-9
2.6 COMPARISON OF ENVIRONMENTAL IMPACTS	2-10
3.0 AFFECTED ENVIRONMENT	3-1
3.1 INTRODUCTION	3-1
3.2 LOCAL COMMUNITY	3-4
3.2.1 Socioeconomics.....	3-4
3.3 HAZARDOUS MATERIALS MANAGEMENT	3-4
3.3.1 Hazardous Materials.....	3-5
3.4 SOLID AND HAZARDOUS WASTE MANAGEMENT	3-5
3.4.1 Solid Waste.....	3-6
3.4.2 Hazardous Waste	3-6
3.4.3 Asbestos	3-7
3.4.4 Lead-Based Paint	3-8
3.5 HEALTH AND SAFETY	3-8
3.5.1 Cape Cod Air Force Station Radiofrequency Energy Measurements.....	3-10
3.5.2 Other Radiofrequency Energy Emitters.....	3-14
3.5.2.1 Defense Satellite Communications System.....	3-14
3.5.2.2 Milstar Fixed-Communications Control Station	3-14
3.6 AIR QUALITY.....	3-
3.7 ENVIRONMENTAL JUSTICE	3-17
3.7.1 Background.....	3-17
3.7.2 Demographic Analysis	3-18
4.0 ENVIRONMENTAL CONSEQUENCES	4-1
4.1 INTRODUCTION	4-1
4.2 LOCAL COMMUNITY	4-1
4.2.1 Socioeconomics.....	4-1
4.2.1.1 Proposed Action.....	4-1
4.2.1.2 Spare Components Alternative.....	4-2
4.2.1.3 No-Action Alternative	4-2

TABLE OF CONTENTS

	<u>Page</u>
4.3 HAZARDOUS MATERIALS MANAGEMENT	4-3
4.3.1 Proposed Action.....	4-3
4.3.2 Spare Components Alternative	4-3
4.3.3 No-Action Alternative	4-3
4.4 SOLID AND HAZARDOUS WASTE MANAGEMENT	4-4
4.4.1 Proposed Action.....	4-4
4.4.2 Spare Components Alternative	4-5
4.4.3 No-Action Alternative	4-6
4.5 HEALTH AND SAFETY	4-6
4.5.1 Proposed Action.....	4-6
4.5.2 Spare Components Alternative	4-7
4.5.3 No-Action Alternative	4-7
4.6 ENVIRONMENTAL JUSTICE	4-8
4.6.1 Proposed Action.....	4-8
4.6.2 Spare Components Alternative	4-8
4.6.3 No-Action Alternative	4-8
4.7 ENVIRONMENTAL JUSTICE	4-9
4.7.1 Proposed Action.....	4-9
4.7.2 Spare Components Alternative	4-9
4.7.3 No-Action Alternative	4-9
4.8 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS	4-15
4.9 COMPATIBILITY OF THE PROPOSED ACTION WITH OBJECTIVES OF FEDERAL, REGIONAL, STATE, AND LOCAL LAND USE PLANS AND POLICIES	4-15
4.10 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY.....	4-15
4.11 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES.....	4-15
4.12 CUMULATIVE ENVIRONMENTAL CONSEQUENCES.....	4-15
5.0 CONSULTATION AND COORDINATION	5-1
6.0 LIST OF PREPARERS AND CONTRIBUTORS.....	6-1
7.0 DISTRIBUTION LIST	7-1
8.0 BIBLIOGRAPHY	8-1

Appendices

- A - EWR SLEP Emissions Calculations
- B - Radiofrequency Energy/Microwave Bioeffect Studies
- C - Public Comments and Responses
- D - EWR SLEP and Radar Waveform Effects

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1.1-1 Early Warning Radar Site Locations	1-2
1.3-1 Early Warning Radar Coverage	1-4
1.3-2 Radar Beam Viewable Areas	1-5
1.3-3 Cape Cod AFS Solid-State Phased-Array Radar Facility	1-7
2.2-1 Solid-State Phased-Array Radar System Major Components	2-2
2.2-2 Tape Drives	2-4
2.2-3 Radar Controllers, Tape Drives, and Disk Drives	2-4
2.2-4 Disk Drives	2-5
2.2-5 Network Processing Units	2-5
2.2-6 Graphic Display Console	2-6
2.2-7 Main Mission Computer	2-7
2.2-8 Solid-State Module Test Set	2-7
2.2-9 Digital Module Test Set	2-8
3.1-1 Vicinity Map, Cape Cod Air Force Station	3-2
3.1-2 Major Features of Cape Cod AFS	3-3
3.5-1 Cape Cod AFS, 1978 Power Density Measurements at Selected Locations	3-12
3.5-2 Cape Cod AFS, 1986 Power Density Measurements at Selected Locations	3-13
3.5-3 DSCS Measurement Locations	3-16
4.7-1 Disproportionate Census Tracts within the ROI	4-13

LIST OF TABLES

<u>Tables</u>	<u>Page</u>
3.5-1 Cape Cod AFS, 1978 Power Density Measurements	3-11
3.5-2 Cape Cod AFS, 1986 Power Density Measurements	3-11
3.5-3 2000 DSCS RFE Measurements	3-15
3.5-4 1989 Milstar RFE Measurements	3-17
3.6-1 National and Massachusetts Ambient Air Quality Standards	3-18
3.6-2 Attainment Status for National Ambient Air Quality Standards	3-19
4.7-1 Census Tracts in Barnstable County	4-9
4.7-2 Census Tracts in Plymouth County	4-11

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LIST OF ACRONYMS AND ABBREVIATIONS

AAQS	Ambient Air Quality Standards
ACM	asbestos-containing material
AFB	Air Force Base
AFI	Air Force Instruction
AFS	Air Force Station
AFOSH	Air Force Occupational Safety and Health
AHERA	Asbestos Hazard Emergency Response Act
ANSI	American National Standards Institute
BMEWS	Ballistic Missile Early Warning System
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMR	Code of Massachusetts Regulations
CO	carbon monoxide
COC	Community of Comparison
CPSC	Consumer Product Safety Commission
°	degree
DOD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
DSCS	Defense Satellite Communications System
EA	environmental assessment
EIAP	environmental impact analysis process
EIS	environmental impact statement
EO	Executive Order
EPA	Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
ERP	Environmental Restoration Program
EWR	Early Warning Radar
F	Fahrenheit
FCC	Federal Communications Commission
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FONSI	Finding of No Significant Impact
GHz	gigahertz
GMD	Ground-based Midcourse Defense
HAER	Historic American Engineering Record
HAZMART	hazardous material control program
HCFC	hydrochlorofluorocarbon
HVAC	heating, ventilating, and air conditioning
ICBM	intercontinental ballistic missile
IEEE	Institute of Electrical and Electronics Engineers
ITW/AA	Integrated Tactical Warning/Attack Assessment
kg	kilogram
MA L&I	Massachusetts Department of Labor and Industry
µg/m	micrograms per meter
mg/m ³	milligrams per cubic meter

MHz	megahertz
MMR	Massachusetts Military Reservation
mW/cm ²	milliwatts per square centimeter
NAAQS	National Ambient Air Quality Standards
National Register	National Register of Historic Places
NEPA	National Environmental Policy Act
NESHAP	National Emissions Standards for Hazardous Air Pollutants
NMD	National Missile Defense
NO _x	nitrogen oxides
OET	Office of Engineering and Technology
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
PAVE	an Air Force program name
PAWS	Phased-Array Warning System
PCB	polychlorinated biphenyl
P.L.	Public Law
PM ₁₀	particulate matter equal to or less than 10 microns in diameter
PM _{2.5}	particulate matter equal to or less than 10 microns in diameter
POL	petroleum, oil, and lubricants
ppm	parts per million
RCRA	Resource Conservation and Recovery Act
RF	radiofrequency
RFE	radiofrequency energy
RFR	radiofrequency radiation
ROI	region of influence
SAP	satellite accumulation point
SAR	Specific Absorption Rate
SLBM	sea-launched ballistic missile
SLEP	Service Life Extension Program
SO ₂	sulfur dioxide
SPCCP	Spill Prevention Control and Countermeasures Plan
SQG	Small-Quantity Generator
SPPARS	Solid-State Phased-Array Radar
UEWR	Upgraded Early Warning Radar
U.S.C.	U.S. Code
W/kg	watts per kilogram

1.0 INTRODUCTION

1.1 INTRODUCTION

This environmental assessment (EA) evaluates the potential for impacts to the human environment as a result of the Proposed Action and alternatives for the proposed Air Force Early Warning Radar (EWR) Service Life Extension Program (SLEP) for operating a Solid-State Phased-Array Radar System (SSPARS) at Cape Cod Air Force Station (AFS), Massachusetts (Figure 1.1-1). The phrase “human environment” includes the natural and physical environment and the relationship of people with that environment (40 Code of Federal Regulations [CFR] Part 1508.14). The EWR SLEP action involves the replacement of outdated computer components and rehosting software. Proposed replacement components and the rehosting of software would not change the power output of the SSPARS or the characteristics of the radiofrequency energy (RFE) emitted from the radar.

This document has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, as amended, the Council on Environmental Quality (CEQ) regulations implementing the procedural provisions of NEPA (40 CFR Parts 1500-1508), and Air Force policy and procedures (32 CFR Part 989).

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

Deterring ballistic missile attacks against the United States is a fundamental mission of the Department of Defense (DOD). In direct support of this mission, the Air Force has been charged with the responsibility of detecting - with absolute certainty - a ballistic missile attack against North America, precisely identifying the origin of the attack, and then communicating the threat information to the President and senior military advisors. The Air Force must be capable of carrying out these responsibilities to ensure that a ballistic missile attack launched against North America does not go undetected or that a false alarm does not trigger an unnecessary military response. The Air Force executes these responsibilities by operating an extensive early warning network, known as the Integrated Tactical Warning/Attack Assessment (ITW/AA) system, which consists primarily of space-based sensors, ground-based early warning radars, and redundant communication systems. In the event of a ballistic missile attack on the United States, the ITW/AA system will alert the President and his key advisors, giving them a few minutes to make crucial decisions regarding a counterattack. It is imperative that the President have accurate and unambiguous information regarding an attack. The Air Force cannot provide such information without the early warning network, including two PAVE PAWS (Phased-Array Warning System) installations at Beale Air Force Base (AFB), California, and Cape Cod AFS, Massachusetts, and one Ballistic Missile Early Warning System (BMEWS) at Clear AFS, Alaska (see Figure 1.1-1).



**Early Warning
Radar Site Locations**



Not to Scale

Figure 1.1-1

The early warning radars also perform the secondary mission of space surveillance. Each radar tracks and provides positional data on objects in near-Earth orbits. The space surveillance information is used to maneuver the Space Shuttle, the International Space Station and satellites so they will not collide with other satellites or space debris.

The SSPARS utilizes 1970s and 1980s computer technologies, and many of the radars' computer components are no longer being manufactured. Although the Air Force has a limited inventory of spare computer components for the radars, if a critical component were to fail and a spare were unavailable, the radar would become inoperable. To enable the Air Force to continue performing the missions of missile warning and space surveillance, the Air Force is proposing sustainment of the Cape Cod AFS SSPARS through the EWR SLEP. The EA will analyze environmental impacts from the Proposed Action and alternatives, and determine if there are any significant impacts to the environment.

While the Air Force is sensitive to the local community's health concerns, the Air Force is also dedicated to defending the United States. Every day that passes increases the risk of failure of the radar due to lack of spare parts. The Cape Cod AFS SSPARS is the only radar in the Nation that is able to confirm a detected missile launch towards the United States from the east. Our nation requires launch detection and subsequent confirmation to give the President the necessary information to make critical, nation-affecting decisions about an incoming threat.

The Air Force is funding several studies and will prepare a supplemental environmental impact statement (EIS) to address the community's health concerns regarding the radar's ongoing operation. This EA in way no replaces or alters the timeline or substance of the Air Force's continuing Supplemental EIS. The ongoing Supplemental EIS, which incorporates several studies of the PAVE PAWS radar and is expected to be completed in 2005, will address the community's public health concerns regarding the radar's operation.

1.3 SOLID-STATE PHASED-ARRAY RADAR SYSTEM DESCRIPTION

As part of an early warning network, the Air Force operates the SSPARS to provide warning of intercontinental ballistic missile (ICBM) and sea-launched ballistic missile (SLBM) attacks against North America. The SSPARS facilities also perform a space surveillance mission. In general, during the missile warning and space surveillance missions, the SSPARS is active 25 percent of the time and listening for return signals 75 percent of the time. The specific duty cycles for missile warning and space surveillance are discussed below. The EWR installations are situated at their current locations to maximize their ability to perform these important national defense missions (Figure 1.3-1).

Missile Warning

To detect and determine attack characteristics of ICBMs and SLBMs aimed at North America, the radar generates what is called a "surveillance fence." This constitutes the center of the main beam scanning at elevations between 3 and



PAVEPAWS/0650

EXPLANATION



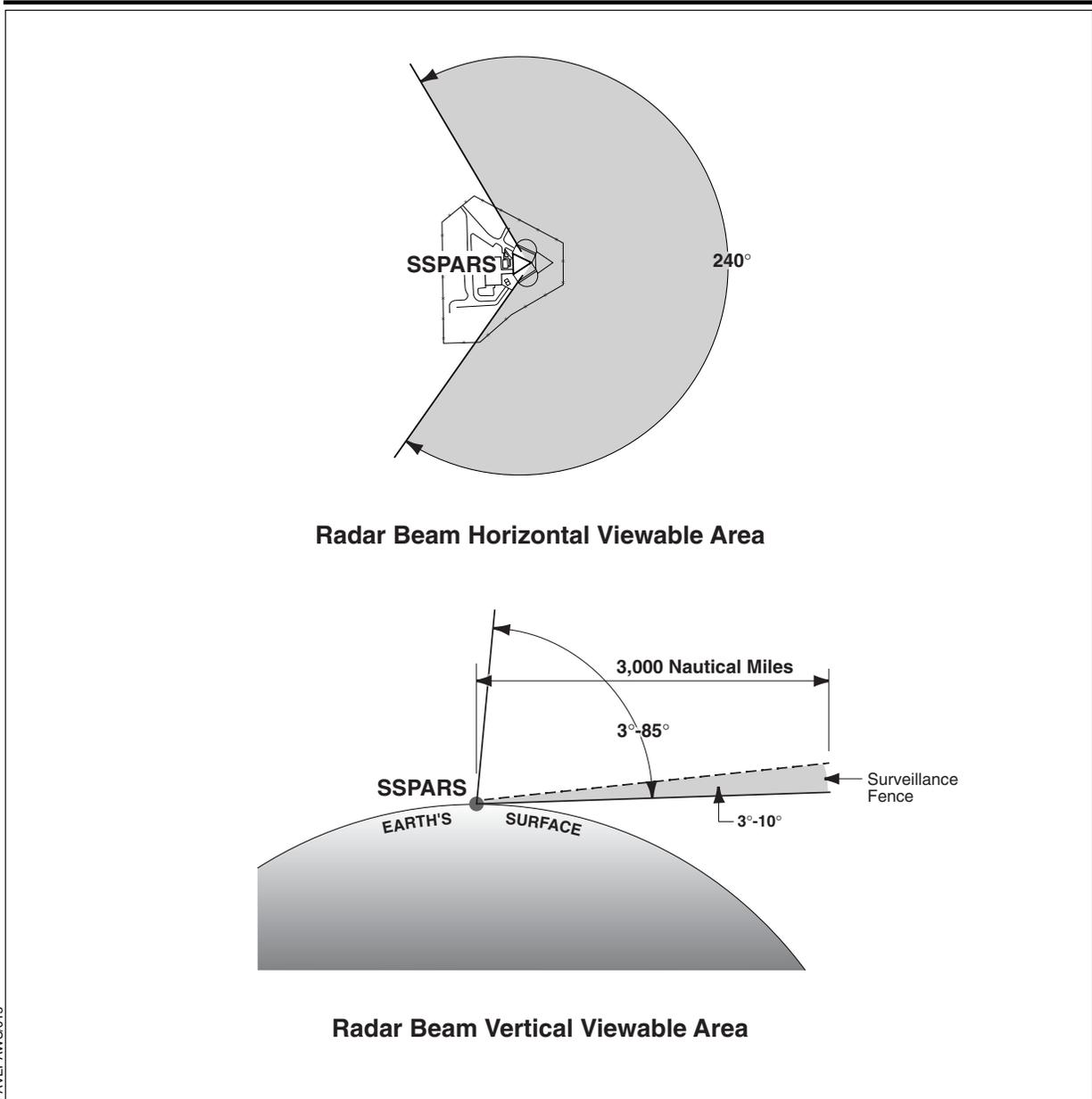
Radar viewable area

Early Warning Radar Coverage

Not to Scale

Note: Radar coverage to the south is provided by other radar systems.
Source: Weitzel, 1999.

Figure 1.3-1



PAVEPAWS/015

EXPLANATION



Viewable Area

SSPARS Solid-State Phased-Array Radar System

Radar Beam Viewable Areas

Figure 1.3-2

10 degrees (°) above horizontal over a 240° (120° per face) scan area (Figure 1.3-2). The surveillance fence is normally at 3°. In the missile warning mode, the direction of the beam is steered according to a computer-programmed pattern, moving from one position to another. In the surveillance mode, both faces of the radar are simultaneously active, sending out two parallel beams moving in a fashion similar to windshield wipers. Under normal operational circumstances, the radar is transmitting 11 percent of the time to maintain the surveillance fence, and waiting/receiving the return signal 89 percent of the time. The SSPARS is capable of transmitting for up to 18 percent of the time to perform the missile warning mission with no space surveillance mission.

Space Surveillance

The space surveillance mission is conducted to track and catalog earth satellites and to identify other space objects. The radar is capable of focusing on particular objects or a small cluster of objects. The radar can transmit from 7 to 25 percent of the time, as long as the maximum average time, in any combination of modes (i.e., missile warning and space surveillance), does not exceed 25 percent.

SSPARS Operations

The SSPARS is a phased-array radar that transmits pulsed radiofrequency (RF) signals within the frequency range of 420 to 450 megahertz (MHz). Signals are reflected by objects back to the radar. These signals are analyzed to determine the location, distance, size, and speed of the object.

The SSPARS is housed in a 32-meter (105-foot) -high building. Two flat arrays transmit and receive RF signals generated by the radar. Each array face contains 1,792 active antenna elements out of a total of 5,354 elements. The additional 3,562 elements per array face are not used, and would not be changed as part of the EWR SLEP. There are no plans to use these additional elements, and these elements cannot be easily activated due to a lack of solid-state transmitter/receiver modules and a lack of necessary infrastructure for heating and cooling the elements. The computers, computer monitors, tape drives, disk drives, and associated equipment, which control the generation of the RF signals, and then analyzes the return signals, are housed inside the radar building. The two array faces are 31 meters (102 feet) wide, and are tilted back 20° from vertical (Figure 1.3-3). The active portion of each array face is situated in the center of a circle 22.1 meters (72.5 feet) wide. Each active antenna element is connected to a separate solid-state transmitter/receiver within the radar building that provides 322 watts of power for transmitting RF signals and amplifies the returning signal. The peak power from the radar is determined by the solid-state modules, which are not being replaced. Software algorithms that determine radar beam patterns, duty cycles, and pulse width are not being modified. Radar output (e.g., beam width, frequency, wavelength, average/peak power, and pulse width/duration) would remain unchanged by proposed EWR SLEP modifications.



**Cape Cod AFS
Solid-State Phased-
Array Radar Facility**

Figure 1.3-3

The RF signals transmitted from each of the array faces form one narrow main beam with a width of 2.2°. Most (approximately 90 percent) of the energy is contained in the main beam (MITRE Corporation, 2000). Each of the main beams can be directed electronically between 3° and 85° above horizontal. Figure 1.3-2 shows the minimum and maximum vertical angles to which the main beams can be directed.

1.4 SCOPE OF THE ENVIRONMENTAL REVIEW

This EA describes and addresses the potential environmental impacts of the activities associated with implementing proposed EWR SLEP activities at the SSPARS facility at Cape Cod AFS. The EA also evaluates the potential environmental impacts of the Spare Components Alternative and the No-Action Alternative. Consistent with 32 CFR Part 989 and the CEQ regulations, the scope of analysis presented in this EA is defined by the potential range of environmental impacts that would result from implementation of the Proposed Action and alternatives. Under the Proposed Action, the Air Force would replace outdated computer components and rehost software at the existing SSPARS facility at Cape Cod AFS.

Environmental resources that may be affected by the Proposed Action and alternatives were considered in more detail in order to provide the Air Force decision maker with sufficient information and analysis for determining whether or not additional analysis is required pursuant to 40 CFR Part 1508.9. Environmental resources that are addressed in further detail include socioeconomics; the storage, use, and handing of small quantities of hazardous materials; the generation of small quantities of solid and hazardous waste; asbestos; lead-based paint; health and safety; air quality; and environmental justice. The affected environment and the potential environmental consequences relative to these resources are described in Chapters 3.0 and 4.0, respectively.

Initial analysis indicated that implementation of the Proposed Action or alternatives would not result in either short- or long-term impacts to transportation, utilities, land use and aesthetics, airspace, Environmental Restoration Program (ERP) sites, storage tanks, pesticide usage, polychlorinated biphenyls (PCBs), radon, medical/biohazardous waste, ordnance, soils and geology, water resources, noise, biological resources, or cultural resources. The reasons for not addressing these resources are briefly discussed in the following paragraphs.

Transportation. A temporary increase in traffic can be expected during removal and replacement of computer equipment. Approximately 20 engineers and technicians would be required to complete the computer modifications. Work crews are expected to commute from the Bourne or Sandwich areas, where temporary lodging is available. These workers are expected to increase the morning and evening peak hour traffic to Cape Cod AFS by approximately 15 vehicles. The affected roads include U.S Route 6W, U.S. Route 6, the Mid Cape Connector, and the Site Access Road. It is expected that multiple tasks would be required over an 18 month period for the removal and replacement of computers and that the duration of each task would not be greater than 20 workdays. In addition, some increased truck traffic would occur during the

delivery of new computer components and for shipment of the computer equipment that is removed. Increases in vehicle traffic from these deliveries would be minimal (less than five trips per day), and most would occur outside the morning and evening peak hour. The minimal increase in traffic is not expected to impact the existing level of service on roads in the region. Therefore, impacts to transportation are not expected and are not further analyzed in this EA.

Utilities. The replacement of computer equipment may reduce the installation's demand for electricity; however, no change to the electric utility infrastructure would be required. Replacement of computer equipment would not cause any changes in potable water requirements or wastewater generation over that required under existing conditions. Impacts to utilities are not expected and are not further analyzed in this EA.

Land Use and Aesthetics. The Proposed Action and alternatives would not involve construction activities or modifications to the exterior of the SSPARS facility. The Proposed Action and alternatives would not affect the current or future land use and aesthetics within the region; therefore, impacts to land use and aesthetics are not expected and are not further analyzed in this EA.

Airspace. Because the Proposed Action and alternatives would not increase the energy output from the SSPARS or change current operations, no impacts on controlled or uncontrolled airspace, special use airspace, Military Training Routes, enroute airways and jet routes, airports and airfields, or air traffic control within the region are anticipated. Similarly, since none of these activities would restrict a clear view of runways, helipads, taxiways, or traffic patterns from any airport traffic control tower, decrease airport capacity or efficiency, or affect future visual flight rule or instrument flight rule traffic, they also would not constitute an obstruction to air navigation. Impacts to airspace are not expected and are not further analyzed in this EA.

Environmental Restoration Program. The Proposed Action and alternatives would not affect any ERP sites. There are no ERP sites at Cape Cod AFS. The 11,000-gallon diesel fuel release from an underground fuel transfer line that occurred in 1990 has been remediated with contaminant concentrations being reduced below clean-up standards. A 5-year monitoring program for the site ended in 1999. The Air Force is continuing to monitor the groundwater to ensure water quality standards are being met. The Proposed Action and alternatives would not affect groundwater monitoring.

There are several ERP sites/groundwater contamination plumes associated with the Massachusetts Military Reservation (MMR) due to past military activities. None of these ERP sites/groundwater contamination plumes affects or underlies Cape Cod AFS. Remedial actions at these sites would not affect activities at Cape Cod AFS. Impacts to ERP sites are not expected and are not further analyzed in this EA.

Storage Tanks. The Proposed Action and alternatives would not require the installation of additional storage tanks. Existing storage tanks at Cape Cod AFS would continue to be utilized and managed in accordance with applicable regulations and the current Spill Prevention Control and Countermeasures Plan

(SPCCP). Therefore, impacts from storage tanks are not expected and are not further analyzed in this EA.

Pesticide Usage. The Proposed Action and alternatives would not change pesticide usage from current conditions. Management practices would be subject to Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) and state regulations to ensure the proper and safe handling and application of pesticides; therefore, impacts from pesticide usage are not expected and are not further analyzed in this EA.

Polychlorinated Biphenyls. The Proposed Action and alternatives would not involve equipment containing PCBs. Federally regulated PCB equipment and PCB-contaminated equipment at Cape Cod AFS have been replaced with equipment containing less than 1 part per million (ppm) PCBs. Cape Cod AFS is considered PCB-free with the exception of light ballasts that may have sealed PCB-containing components; therefore, impacts from PCBs are not expected and are not further analyzed in this EA.

Radon. The Proposed Action and alternatives would not affect radon levels, and radon is not a concern within the radar building. Radon sampling conducted at Cape Cod AFS identified two facilities (Buildings 50 and 58) with radon levels above the U.S. Environmental Protection Agency (EPA)-recommended action level of 4 picocuries per liter. Currently, no radon exposure guidelines or action levels have been established by federal or state regulatory agencies for buildings other than schools or residences. Building 58 is being monitored to confirm the findings, and there is no further radon management and mitigation planned for these buildings. These buildings are not directly associated with the SSPARS structure; therefore, impacts from radon are not anticipated and are not further analyzed in this EA.

Medical/Biohazardous Waste. Cape Cod AFS would not generate or store medical/biohazardous waste; therefore, impacts from medical/ biohazardous waste are not expected and are not further analyzed in this EA.

Ordnance. The Proposed Action and alternatives would not require the use of ordnance. Therefore, impacts from ordnance are not expected and are not further analyzed in this EA.

Soils and Geology. Because the Proposed Action and alternatives would not involve ground-disturbing activities, no adverse impacts to soils and geology would occur. Proposed EWR SLEP activities would occur within the SSPARS facility. Impacts to soils and geology are not anticipated and are not further analyzed in this EA.

Water Resources. Because the Proposed Action and alternatives would not involve ground-disturbing activities, no adverse impacts to water resources would occur. Proposed EWR SLEP activities would occur within the SSPARS facility and would not impact groundwater resources. Therefore, impacts to water resources are not expected and are not further analyzed in this EA.

Noise. The Proposed Action and alternatives would not cause any changes in the noise environment over existing conditions; therefore, impacts from noise are not expected and are not further analyzed in this EA.

Biological Resources. The terrain in the vicinity of Cape Cod AFS is dominated by pitch pine (*Pinus rigida*), or scrub oak (*Quercus ilicifolia*), and a variety of tall oak species. Much of the area adjacent to Cape Cod AFS remains in an undisturbed state. Maintained areas within the Cape Cod AFS boundary are generally limited to the entrance area of the installation, as well as a radial area around the facility. Representative wildlife species typically utilizing the pitch pine/scrub oak habitat include red fox (*Vulpes vulpes*), red-tailed hawk (*Buteo jamaicensis*), New England cotton tail (*Sylvilagus transitionalis*), raccoon (*Procyon lotor*), masked shrew (*Sorex cinereus*), white-footed mouse (*Peromyscus leucopus*), white-tailed deer (*Odocoileus virginianus*), red squirrel (*Tamiasciurus hudsonicus*), bluejay (*Cyanocitta cristata*), eastern chipmunk (*Tamias striatus*), and mockingbird (*Mimus polyglottos*).

There are no known federally endangered or threatened plant or wildlife species occurring on Cape Cod AFS. Eight state-listed species of butterflies and moths (Lepidoptera) have been recorded as occurring within or adjacent to Cape Cod AFS. Four of these are state-listed species of special concern. The remaining four are state-listed threatened species.

The pitch pine/scrub oak forest and pitch pine/scrub oak thicket habitat are locally abundant, but is an uncommon habitat type within Massachusetts. The eight state-listed Lepidoptera species rely heavily or are entirely dependent on these habitats for foraging and breeding. The Massachusetts Natural Heritage and Endangered Species Program has designated the MMR as a Priority Rare Species Habitat and Exemplary Natural Community due to the presence of suitable habitat for these state-listed species.

The Proposed Action and alternatives would not involve ground-disturbing activities, exterior construction, or changes to the power output of the SSPARS. Therefore, impacts to biological resources are not expected and are not further analyzed in this EA.

Cultural Resources. The Proposed Action and alternatives would not involve ground-disturbing activities; therefore, there would be no potential to affect prehistoric or historic archaeological resources, traditional cultural resources, or paleontological resources. The SSPARS facility at Cape Cod AFS has been determined eligible for inclusion in the National Register of Historic Places (National Register). A Programmatic Agreement (PA) between the Air Force, State Historic Preservation Officer, and the Advisory Council on Historic Preservation was established in 2000, which allowed for future modifications to the SSPARS facilities at Cape Cod AFS provided Historic American Engineering Record (HAER) Level III recordation was accomplished. HAER Level II recordation of the facility has been completed and was accepted by the National Park Service in July 2000. Impacts to cultural resources are not expected and are not further analyzed in this EA.

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2.0 ALTERNATIVES INCLUDING THE PROPOSED ACTION

2.1 INTRODUCTION

This chapter describes the Proposed Action, reasonable alternatives to the Proposed Action, and the No-Action Alternative. Other future actions in the vicinity of the EWR installation that could contribute to cumulative impacts when combined with proposed activities are also briefly described. Potential environmental impacts of the Proposed Action and alternatives are summarized at the end of this chapter. The Proposed Action is to replace outdated computer components and rehost computer software at the existing EWR installation at Cape Cod AFS. The replacement electronic hardware and computer software is required to sustain the current missile warning and space surveillance missions.

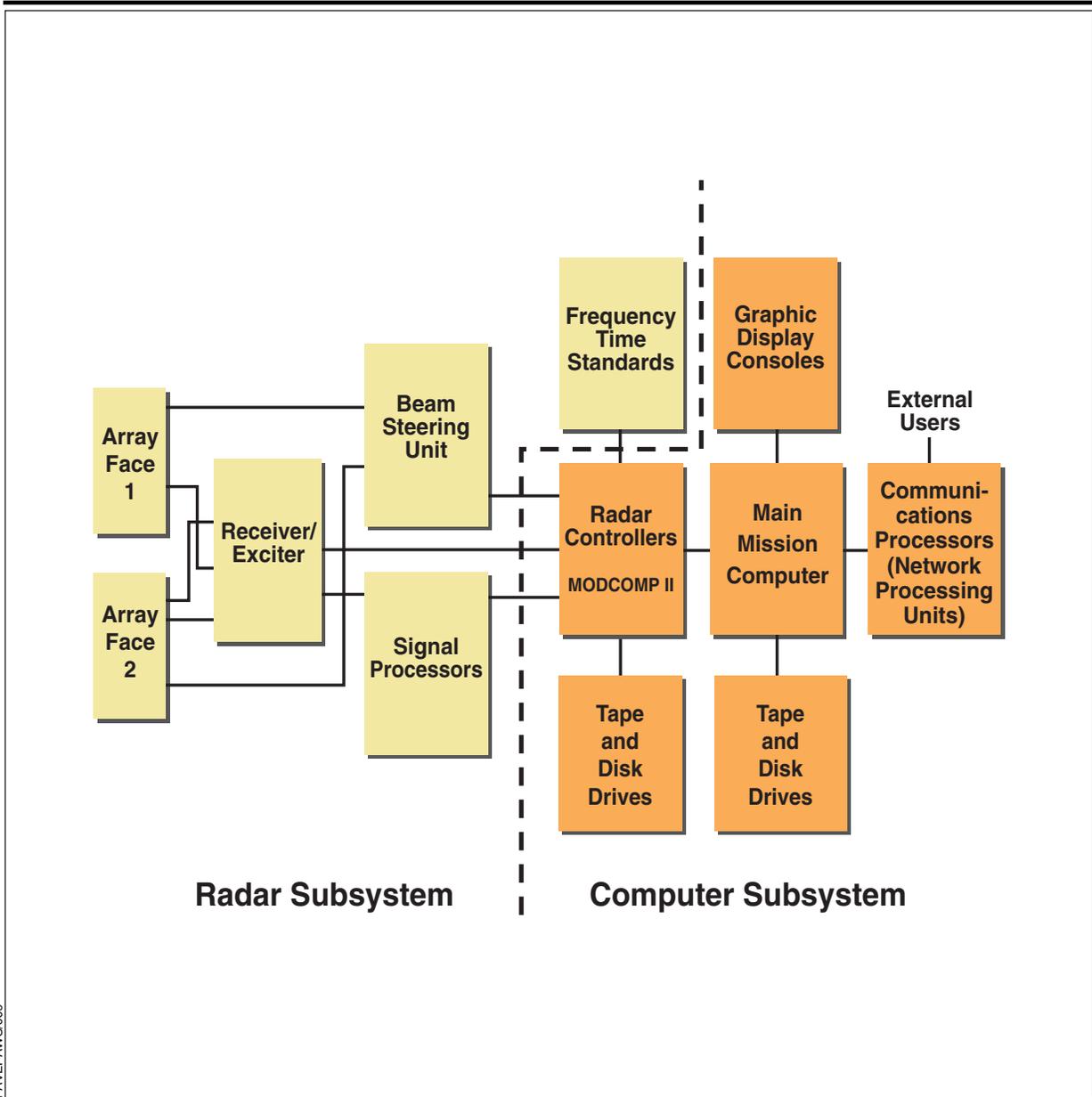
The Proposed Action, alternatives to the Proposed Action, and the No-Action Alternative are described briefly below and in detail in the following sections:

- **Proposed Action.** The Proposed Action would replace computers, computer monitors, computer keyboards, tape and disk drives, solid-state module test set, digital module test set, other related computer equipment, and rehost computer software at the existing SSPARS at Cape Cod AFS. Proposed replacement components would sustain the existing missile warning and space surveillance missions, and would not change the power output or characteristics of the RFE being emitted from the SSPARS.
- **Spare Components Alternative.** This alternative would require that equipment manufacturers reproduce and provide the necessary replacement “spare” parts to continue operating the SSPARS with existing equipment. Spare components would be distributed through the supply system.
- **No-Action Alternative.** Under the No-Action Alternative, the proposed EWR SLEP actions would not be implemented in the SSPARS at Cape Cod AFS.

2.2 DESCRIPTION OF PROPOSED ACTION

Under the Proposed Action, computers, computer monitors, computer keyboards, tape and disk drives, other related computer equipment, and computer software that were manufactured/designed in the 1970s and 1980s and are now obsolete would be replaced with new modern computer equipment and software would be rehosted. These computers and other related computer equipment are all situated in the radar’s computer subsystem (Figure 2.2-1).

The replacement computers, monitors, keyboards, and storage devices, as well as some of the replacement software, are expected to be general-purpose, vendor-supplied, off-the-shelf equipment.



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EXPLANATION

- No changes proposed
- Equipment proposed to be replaced

Solid-State Phased-Array Radar System Major Components

Figure 2.2-1

Proposed replacement components would not change the power output or the characteristics of the RFE being emitted from the SSPARS. The peak power from the radar is determined by the solid-state modules, which are not being replaced. Software algorithms that determine radar beam patterns, duty cycles, and pulse width are not being modified. Aspects of radar output (e.g., beam width, frequency, wavelength, average/peak power, and pulse width/duration) would remain unchanged by proposed EWR SLEP modifications.

Under the Proposed Action, the following computers, computer monitors, keyboards, storage devices, and other related computer equipment would be removed and replaced:

- Peripherals (e.g., tape drives, disk drives, printers)
- Communication processor
- Graphic display consoles (computer monitors)
- Main mission computers
- Radar controllers
- Test Sets (solid-state module test set and digital module test set).

Peripherals

Six tape drives, which are component parts of the main mission computer, and four tape drives, which are component parts of the radar controller, would be replaced. The general appearance of the main mission computer tape drives and the radar controller disk drives are shown in Figures 2.2-2 and 2.2-3, respectively. The tape drives support on-line history data recording, simulation, and data storage. Tape drive equipment is a long-term data storage system that allows changes in the computer software to be transported between locations. The tape drives also store mission software, simulation data, and mission data that must be maintained/archived for long periods.

Six disk drives, which are component parts of the main mission computer, and two disk drives, which are component parts of the radar controller, would be replaced. The general appearance of the radar controller disk drives and the main mission computer disk drives are shown in Figures 2.2-3 and 2.2-4, respectively. The disk drives support the storage of computer programs, permanent data, and checkpoint files, as well as provide space for the storage of real-time operational data. The disk drive (1) is a short-term data storage system used by each computer to perform day-to-day operations and (2) also provides long-term storage of computer program source codes.

Communication Processors

Three communication processors, known as network processing units, would be replaced (Figure 2.2-5). The network processing units send advanced data communication control protocol and computer format messages to external communication links, providing the interface between the main mission computer and the outside world. One of these units provides the interface between the off-line mission computer and a keyboard and monitor used as an interactive, time-share terminal for off-line processing of data and programs.



Figure 2.2-2. Tape Drives



Figure 2.2-3. Radar Controllers, Tape Drives, and Disk Drives



Figure 2.2-4. Disk Drives



Figure 2.2-5. Network Processing Units

Graphic Display Console

Five graphic display consoles (Figure 2.2-6) and associated printers would be replaced. The general appearance of the graphic display console is shown on Figure 2.2-6. The current graphic display console has a cathode ray tube display, lightpen, keyboard, audible alarm, and hardware panel for the electronic controls.



Figure 2.2-6. Graphic Display Console

The graphic display console is a raster-type display with a square viewing area of 14 inches by 14 inches. A raster display uses a group of closely spaced parallel lines to project images on a cathode ray tube. Radar operators use the graphic display consoles to make data inquiries and conduct real-time data analysis. The graphic display console displays mission and maintenance control tables and graphs and is capable of displaying vectors, alphanumeric characters, and special symbols.

Main Mission Computer

The main mission computer and line printers would be replaced. Software algorithms that determine radar beam patterns, duty cycles, and pulse width would not be modified. The main mission computer (Figure 2.2-7) is approximately 18 feet long, 6.5 feet high, and 4.5 feet wide. The general appearance of the main mission computer is shown in Figure 2.2-7. There are two main mission computers, one is online and the other is in standby mode.



Figure 2.2-7. Main Mission Computer and Printer

The main mission computer contains a large number of printed circuit boards that are interconnected with wiring harnesses. These computers generate a large amount of heat and are mechanically cooled using approximately 100 pounds of hydrochlorofluorocarbon (HCFC) refrigerant (i.e., Refrigerant R-401a). The main mission computers contain the mission software required for the operation, data processing, and communication tasks associated with the missile warning and space surveillance missions. The replacement computer equipment and computer software will be modern computer systems that use microprocessors.

Radar Controller

Two radar controllers (see Figure 2.2-3) would be replaced. One radar controller is online and the second is on standby. Each radar controller is a general-purpose computer. The radar controller sends commands and processing parameters for each radar action to the receiver-exciter in the radar subsystem, with an information copy to the signal processors. Target data received by the radar subsystem are returned to the computer subsystem through the radar controller. In addition, the radar controller monitors the cooling of the antenna elements.

Test Sets

Two pieces of off-line electronic test equipment are to be replaced. These include the solid-state module test set (Figure 2.2-8) and the digital module test set (Figure 2.2-9). The solid-state module test set is used to trouble shoot and test printed circuit boards on the solid-state modules on the radar antenna. The digital module test set is used to trouble shoot and test printed circuit boards found in the beam steering unit, receiver-exciter, and signal processors.



Figure 2.2-8. Solid-State Module Test Set

Timeline

In order to maintain the day-to-day operations of the SSPARS and minimize the risk to the ongoing mission, the replacement computer equipment and rehosting software would be completed and checked out before the existing equipment is removed. The computer equipment removal and replacement would require a work crew of up to 20 engineers and technicians for short periods of time (approximately 20 days) during an approximately 18-month period.



Figure 2.2-9. Digital Module Test Set

2.3 DESCRIPTION OF ALTERNATIVES

2.3.1 Spare Components Alternative

The Spare Components Alternative would require that equipment manufacturers reproduce and provide the necessary “spare” parts to continue operating the SSPARS facilities. Implementation of this alternative would require setting up new production lines involving retooling to meet requirements for sustaining the SSPARS equipment. These production lines would require research and development efforts to reestablish technology, and personnel training to make them operational. In addition, the production lines would be operated only to meet short-term production requirements for the SSPARS, as there would be no commercial market for the manufactured components. Therefore, the Government would be required to absorb the total cost of production.

2.4 NO-ACTION ALTERNATIVE

The No-Action Alternative involves not implementing the proposed EWR SLEP equipment replacement actions in the SSPARS at Cape Cod AFS. Current operations supporting the missile warning and space surveillance missions would continue until failure of irrecoverable system components occurred. The actual failure time is dependent upon the failure rate of computer components and the availability of spare parts. The No-Action Alternative would eventually result in the Air Force being unable to accomplish its missile warning and space surveillance missions, in that ballistic missile attacks launched from specific

areas would not be detected or characterized. The SSPARS would become inoperable until the failed component(s) could be fixed or remanufactured.

2.5 ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

2.5.1 Relocation Alternative

Under this alternative, the SSPARS would be relocated from Cape Cod AFS to another location. This alternative has been eliminated from consideration because it would not meet the purpose and need of the Proposed Action described previously, which is sustaining the existing SSPARS radar. Relocating old computer components would not address the radar's sustainment problems.

2.5.2 Deactivation Alternative

The Deactivation Alternative would involve shutting down the SSPARS and placing the installation under caretaker status. The Deactivation Alternative would result in the Air Force being unable to accomplish its missile warning and space surveillance missions. The personnel currently employed or stationed at the installation would be relocated and replaced with a caretaker staff of approximately ten individuals.

The Deactivation Alternative would result in no future use of the property. The installation would be placed under long-term caretaker status. Caretaker activities would consist of resource protection, grounds and building maintenance, and limited operation of existing utility systems. No other activities/missions would be performed on the property. The future levels of maintenance would be as follows:

- Maintenance of structures to limit deterioration
- Isolation or deactivation of on-site utility distribution lines
- Limited maintenance of roads to ensure access
- Limited grounds maintenance of open areas to eliminate fire and health and safety hazards.

This alternative has been eliminated from consideration based on the necessity to operate and maintain a reliable EWR system in support of the United States' national security defense.

2.5.3 Delay Alternative

Under this alternative, the Air Force would not implement the Proposed Action until after the Supplemental EIS (See paragraphs 1.2 and 3.5 for additional details) is completed. One of the main purposes of the Supplemental EIS is to assess potential environmental impacts from the RFE being emitted from the SSPARS. The projected completion date for the Supplemental EIS is 2005.

This alternative has been eliminated from consideration because it would not meet the purpose and need for the Proposed Action, which is sustaining the existing radar. Delaying the start of the Proposed Action until 2005 would unacceptably increase the risk that the SSPARS would become inoperable due to a lack of spare parts. The operational risk would be unacceptable even if the EWR SLEP were delayed only at one installation and not delayed at the other SSPARS sites. Whether the Proposed Action is implemented now or in 2005, the potential environmental impacts of RFE from the SSPARS would be the same because the Proposed Action would not change the power output of the radar or the characteristics of the RFE emitted.

2.6 COMPARISON OF ENVIRONMENTAL IMPACTS

This section presents a comparative analysis of the Proposed Action and alternatives. A detailed discussion of potential effects is presented in Chapter 4.0, Environmental Consequences. Neither the Proposed Action nor the alternatives are anticipated to have a significant impact on the environment.

Proposed Action

A temporary increase of approximately 20 employees (engineers, contractors, and technicians) would be required to remove the existing computer equipment and install the new replacement equipment. The temporary increase in employment is not expected to impact the region's employment. No permanent increase in population is expected. Storage, handling, and transportation of hazardous materials associated with EWR SLEP activities and operation of the SSPARS facility at Cape Cod AFS would be conducted in accordance with applicable regulations and established procedures. Solid and hazardous waste generation associated with Cape Cod AFS operations would not change from current conditions. Solid and hazardous wastes would continue to be generated and disposed of in accordance with applicable regulations and established procedures. Due to the limited number of temporary personnel that would be required during EWR SLEP activities, air emissions would be below de minimis thresholds. The RFE levels measured during previous surveys were below the applicable general public exposure limit and indicate that no known health hazards exist based on the low-intensity RFE resulting from the SSPARS emissions. Appendix B provides a list of studies regarding bioeffects of RFE. Replacing existing systems would not change the operational characteristics or the RFE emitted from the SSPARS. No disproportionately high and adverse impacts to low-income and minority populations have been identified.

Spare Components Alternative

No increases to employment or population are expected to occur under the Spare Components Alternative. Hazardous materials usage at the SSPARS facility at Cape Cod AFS would continue in accordance with applicable regulations and established procedures. Solid and hazardous waste generation associated with Cape Cod AFS operations would not change from current conditions. Solid and hazardous wastes would continue to be generated and disposed of in accordance with applicable regulations and established

procedures. The RFE exposure levels measured during previous surveys were below the applicable general public exposure limit and indicate that no known health hazards exist based on the low-intensity RFE resulting from the SSPARS emissions (see Appendix B). No disproportionately high and adverse impacts to low-income and minority populations have been identified.

No-Action Alternative

No increases to employment or population are expected to occur under the No-Action Alternative. Hazardous materials usage and solid and hazardous waste generation would continue to be managed in accordance with applicable regulations. The RFE levels measured during previous surveys were below the applicable general public exposure limit and indicate that no known health hazards exist based on the low-intensity RFE resulting from the SSPARS emissions. Once the SSPARS becomes inoperable, RFE would no longer be emitted until the failed part could be repaired or remanufactured. No disproportionately high and adverse impacts to low-income and minority populations have been identified.

3.0 AFFECTED ENVIRONMENT

This section describes the current environmental condition of Cape Cod AFS and the associated region of influence (ROI). The information provided serves as a baseline from which to identify and evaluate environmental changes resulting from implementation of the Proposed Action or alternatives.

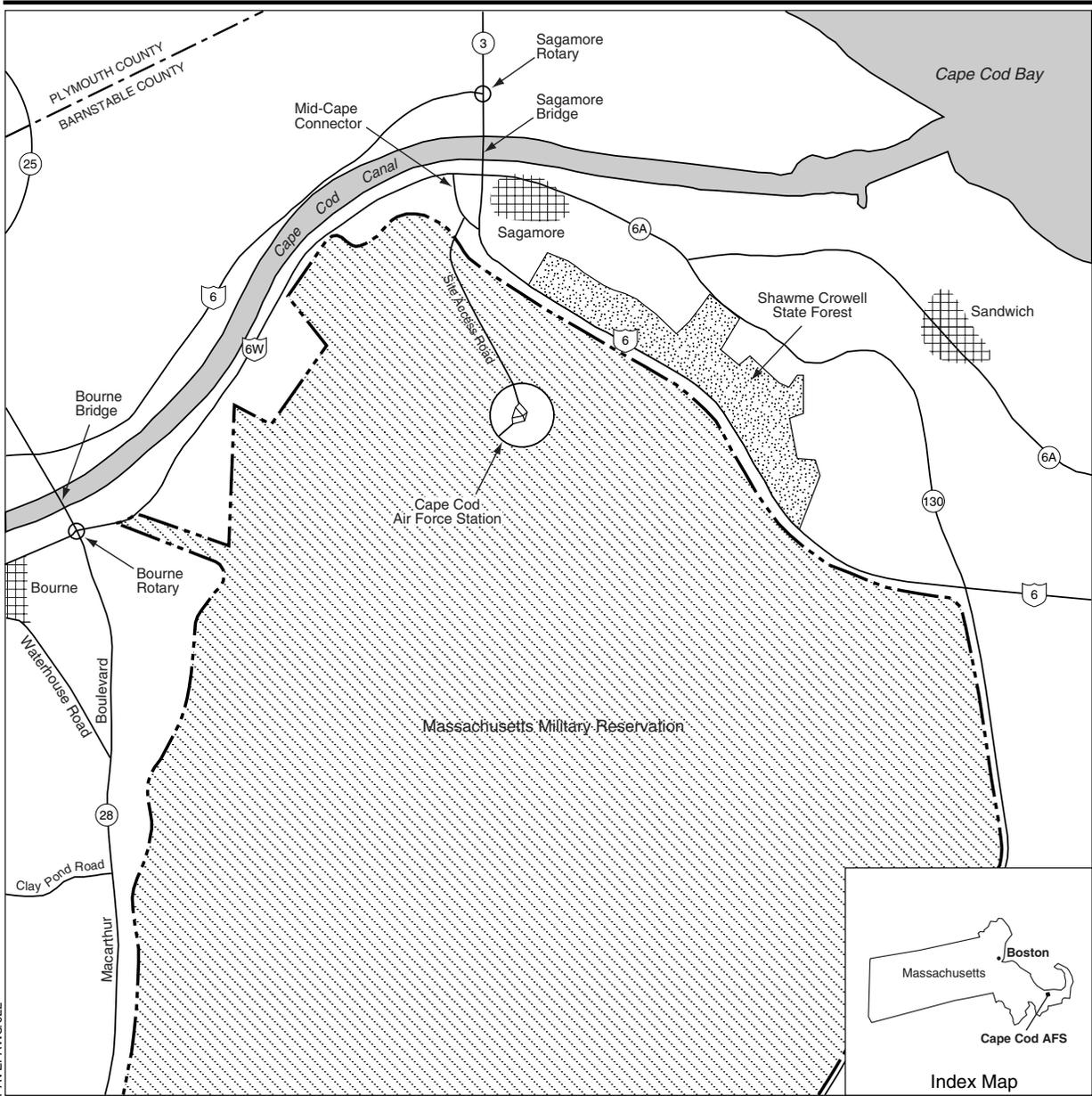
The affected environment is discussed in terms of seven resource areas: socioeconomics, hazardous materials management, solid and hazardous waste management, asbestos, lead-based paint, health and safety, air quality, and environmental justice. The ROI to be evaluated has been defined for each resource area potentially affected by the Proposed Action and alternatives. The ROI determines the geographical area to be addressed as the affected environment.

3.1 INTRODUCTION

Cape Cod AFS is situated atop Flat Rock Hill on Cape Cod, Massachusetts, within the north portion of the MMR (Figure 3.1-1). The site is operated by the 6th Space Warning Squadron. The installation occupies approximately 100 acres of leased land at an elevation of approximately 265 feet above mean sea level. The leased area includes 87 acres for the installation, 11.5 acres for the access road, and 2 acres for electrical transmission lines. Cape Cod AFS is within Barnstable County and is approximately 70 miles south of Boston, 3 miles east of Bourne, and 2 miles west of Sandwich (see Figure 3.1-1). The major features of Cape Cod AFS are shown on Figure 3.1-2.

The average annual temperature in the Cape Cod region is approximately 50° Fahrenheit (F). The coolest month of the year is January, with an average temperature of 30°F; the warmest month is July, with an average temperature of 71°F. Average annual rainfall is 48 inches, and average snowfall is approximately 37 inches. Prevailing winds are from the southwest from spring through fall (April through October) and from the northwest during the winter (December through February). Wind speeds generally range between 11 and 30 miles per hour (Commonwealth of Massachusetts, 1996).

EWR Installation Background. The land on which Cape Cod AFS is situated was initially acquired by the Commonwealth of Massachusetts in 1935 for Army National Guard Training (Camp Edwards). The SSPARS at Cape Cod AFS was the first of its type to be built and operated. Construction of the SSPARS was completed in 1978, and on October 1, 1978, the installation was activated. Cape Cod AFS provides missile warning and space surveillance for the east coast of North America.



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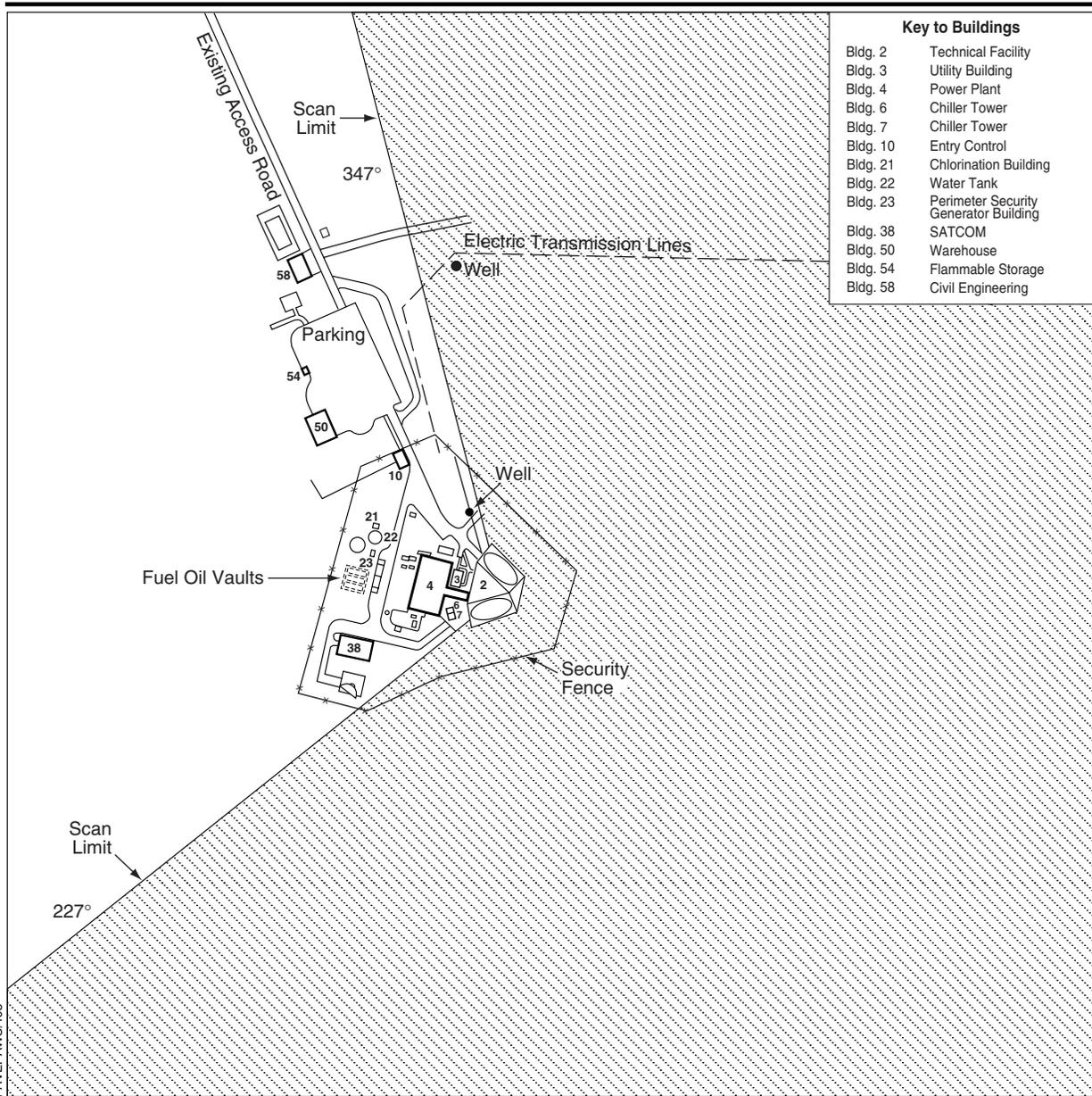
EXPLANATION

- Roads
- - - Massachusetts Military Reservation Boundary
- - - County Boundary
- (25) State Highway
- (6) U.S. Route
- [Hatched Box] Massachusetts Military Reservation
- [Dotted Box] State Forest

**Vicinity Map,
Cape Cod Air Force Station**



Figure 3.1-1



Major Features of Cape Cod AFS



Figure 3.1-2

3.2 LOCAL COMMUNITY

3.2.1 Socioeconomics

The ROI for socioeconomics includes Barnstable County and the towns of Sagamore, Sandwich, Bourne, Mashpee, and Falmouth.

The 1999 census data estimated population for Barnstable County at 212,519 (U.S. Bureau of the Census, 2000a). During the summer tourist season, the population of the county can increase to an estimated 500,000 (Cape Cod Commission, 1998b). The towns closest to Cape Cod AFS are Sandwich, Bourne, and Sagamore with populations of 19,587, 17,691, and 2,589, respectively (Cape Cod Commission, 1998b; U.S. Bureau of the Census, 2000c). The populations of Mashpee and Falmouth are 9,784 and 31,996, respectively (Commonwealth of Massachusetts, 2000a, 200b)

Cape Cod AFS is staffed by approximately 130 military and contractor personnel. The EWR mission is performed 24 hours a day, 365 days a year, through working shifts. The military services at MMR employ approximately 1,900 full-time military and civilian personnel. The largest employer on the MMR is the Massachusetts Air National Guard, with approximately 1,150 persons, followed by the Coast Guard, with approximately 475 persons (Massachusetts National Guard, 1999).

Public and private-sector employment in Barnstable County was estimated at 77,332 in 1996, with private-sector employment representing 85 percent of the total employment. Services, retail trade, and construction are the largest employment sectors with 34 percent, 30 percent, and 9 percent of the employment, respectively. Finance/insurance provides approximately 8 percent of the employment, and agriculture/forestry and Government-related jobs each provide approximately 4 percent of the total employment in Barnstable County (Cape Cod Commission, 1998b). The 1995 estimated median household income for Barnstable County was \$37,156 (U.S. Bureau of the Census, 2000f). For the town of Sandwich, the estimated median household income in 1989 was \$43,500 (Cape Cod Commission, 1998b). For the town of Bourne, the mean household income in 1989 was \$34,159 (Cape Cod Commission, 1998b). For the town of Sagamore, the median household income in 1989 was \$38,077 (U.S. Bureau of the Census, 2000d). For the town of Mashpee, the median household income in 1989 was \$34,524 (U.S. Bureau of the Census, 2001b). For the town of Falmouth, the median household income in 1989 was \$40,655 (U.S. Bureau of the Census, 2001a).

3.3 HAZARDOUS MATERIALS MANAGEMENT

The following sections describe the general federal and state (where existing) regulatory requirements concerning hazardous materials management at Cape Cod AFS. The ROI for hazardous materials management encompasses geographic areas that are exposed to the possibility of a hazardous materials release.

3.3.1 Hazardous Materials

Hazardous materials management activities at Air Force installations are governed by specific environmental regulations. For the purposes of the following discussion, the term hazardous materials mainly refers to those substances defined as hazardous by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S. Code (U.S.C.) Section 9601 et seq., as amended. In general, this includes substances that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to the public health, welfare, or the environment when released. Transportation of hazardous materials is regulated by the Department of Transportation regulations within 49 CFR.

A Spill Prevention Control and Countermeasures Plan (SPCCP) and an Oil and Hazardous Substance Pollution Contingency Plan have been prepared in accordance with Air Force Instruction (AFI) 32-4002, Hazardous Materials Emergency Planning and Response Program. The plans comply with U.S. EPA spill prevention, control, and countermeasures requirements; Emergency Planning and Community Right-to-Know Act (EPCRA); and Occupational Safety and Health Administration (OSHA) requirements. The plans provide guidance for the identification of possible hazardous material sources, the discovery and reporting of hazardous materials releases, and procedures to follow in the event a release occurs (ARCTEC Services, 1999e).

Hazardous materials commonly utilized at Cape Cod AFS for mission activities include adhesives; batteries; biocides; corrosives; ethylene glycol (antifreeze); diesel fuel; gasoline; paint; petroleum, oil, and lubricants (POL); solvents; biocides, and household products (Radian International, 1999). In addition, the main mission computers within the SSPARS building generate a large amount of heat and are mechanically cooled using approximately 100 pounds of the HCFC refrigerant R-401a. R-401a is an ozone-depleting substance, but it is not listed as a Class I or Class II ozone-depleting substance due to its low ozone-depleting potential. The installation does not vent R-401a to the atmosphere; it is reclaimed. The Tech Facility Chiller utilizes approximately 4,200 pounds, of R-134a, which is not an ozone-depleting substance.

Cape Cod AFS has a hazardous materials control program (HAZMART) to track and monitor incoming hazardous materials. HAZMART also serves as a point of issue, turn-in, and reissue for users of hazardous materials. HAZMART is situated within the loading dock area of Building 2.

Biocides utilized within the radar cooling system to prevent algae growth are stored in the water pump room on the first floor of the Technical Facility (Building 2). These biocides are environmentally safe and do not contain chromates or other heavy metals (ARCTEC Services, 1999e).

3.4 SOLID AND HAZARDOUS WASTE MANAGEMENT

The following sections describe the general federal and state (where existing) regulatory requirements concerning solid waste management, hazardous waste

management, asbestos, and lead-based paint at Cape Cod AFS. The ROI for solid and hazardous waste management encompasses geographic areas that generate or dispose of solid waste or are exposed to the possibility of a release of hazardous waste.

3.4.1 Solid Waste

Solid waste is defined as any discarded material (i.e., abandoned, recycled, inherently waste-like, or no longer suitable for its intended purpose) that is not specifically excluded in 40 CFR Part 261.4. This definition includes materials that are both solid and liquid (but contained).

Cape Cod AFS maintains a Solid and Hazardous Waste Management Plan that was prepared in accordance with AFI 32-7042, Solid and Hazardous Waste Compliance. Nonhazardous solid waste generated at Cape Cod AFS is collected by a licensed solid waste disposal contractor that transports the material to a permitted waste-to-energy incineration facility in Rochester, Massachusetts. Cape Cod AFS contributes approximately 40 tons of municipal solid waste annually that is incinerated in this energy recovery facility. Cape Cod AFS implements a solid waste recycling program for aluminum cans, paper, cardboard, ferrous metals, plastic, and glass. In 1999, approximately 7 tons of material was recycled rather than incinerated (ARCTEC Services, 1999c).

3.4.2 Hazardous Waste

The term hazardous waste refers to those wastes defined as hazardous by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. Sections 6901-6992. In general, this includes wastes that, because of their quantity, concentration, or physical, chemical, or infectious characteristics, may present substantial danger to the public health, welfare, or the environment when released. Hazardous waste is further defined in 40 CFR Part 261.3 as any solid waste that possesses any of the hazard characteristics of toxicity, ignitability, corrosivity, or reactivity.

Cape Cod AFS maintains a Solid and Hazardous Waste Management Plan in accordance with AFI 32-7042, Solid and Hazardous Waste Compliance; 310 CMR 30.00-30.91, State Hazardous Waste Regulations; 40 CFR Parts 261-265, Federal Hazardous Waste Regulations; and 29 CFR Part 1910, Occupational Safety and Health Standards.

Cape Cod AFS is considered a Small-Quantity Generator (SQG) of hazardous waste. The installation generates less than 1,000 kilograms (kg) of hazardous waste per month and can accumulate up to 6,000 kg of hazardous waste on site at any one time. As an SQG, Cape Cod AFS can store hazardous waste on site for up to 180 days (only if the amount stored is less than 6,000 kg) before shipping the waste to an off-site disposal location. The Defense Reutilization and Marketing Office (DRMO) in Groton, Connecticut, or Portsmouth, New Hampshire, acts as the principal agent for the procurement of an environmental services disposal company to transport and dispose of hazardous waste generated at Cape Cod AFS (ARCTEC Services, 1999c).

A separate building south of the power plant is used for 180-day storage of drums and containers of regulated hazardous wastes. Within the north side of Building 4 is one area that serves as the satellite accumulation point (SAP).

Hazardous and other regulated wastes generated at Cape Cod AFS include waste oil, waste diesel fuel, waste spill residues and absorbent, waste paint and paint thinners, and oil/water separator residues (Radian International, 1999).

Cape Cod AFS also has a recycling program that recycles oil filters, waste oil, antifreeze, lead acid batteries, and spent fluorescent light tubes (Radian International, 1999).

3.4.3 Asbestos

Asbestos-containing material (ACM) is regulated by the U.S. EPA and OSHA. Asbestos fiber emissions in the ambient air are regulated in accordance with Section 112 of the Clean Air Act (CAA), which established the National Emissions Standards for Hazardous Air Pollutants (NESHAP). The NESHAP regulations (40 CFR Part 61 Subpart M) address the demolition or renovation of buildings with ACM. The Asbestos Hazard Emergency Response Act (AHERA) (Public Law [P.L.] 99-519 and P.L. 101-637) and OSHA regulations cover worker protection for employees who work around or remediate ACM.

Renovation or demolition of buildings with ACM has a potential for releasing asbestos fibers into the air. Asbestos fibers could be released due to disturbance or damage from various building materials such as pipe and boiler insulation, acoustical ceilings, sprayed-on fireproofing, and other materials used for soundproofing or insulation.

The Massachusetts Department of Labor and Industry (MA L&I) develops and enforces ACM abatement emission standards according to Title 453 Code of Massachusetts Regulations (CMR), Chapter 6. All asbestos workers engaged in any asbestos abatement must be certified and licensed by MA L&I. Asbestos abatement includes the repair, enclosure, encapsulation, removal, disposal, inspection, and preparation of management plans for friable asbestos material.

Cape Cod AFS maintains an Asbestos Management and Operations Plan. This plan outlines the responsibilities for asbestos management, regulatory requirements, and identifies known locations of ACM. The operations section establishes procedures for asbestos abatement and interim measures to contain a friable ACM release (ARCTEC Services, 1999a).

No friable ACM has been identified in mission-essential areas. An ACM survey conducted in 1992 identified 35 locations where ACM was detected or presumed to exist. Cape Cod AFS conducted ACM surveys in 1997 and 1998 confirming that ACM is present in the facilities. Materials that tested positive for ACM include floor tile, floor tile mastic, pipe insulation, pipe joint compound, fire doors, and some heating, ventilation, and air conditioning (HVAC) vibration dampers (ARCTEC Services, 1999a).

3.4.4 Lead Based Paint

Human exposure to lead has been determined to be an adverse health risk by agencies such as OSHA and the U.S. EPA. Sources of exposure to lead are through contact with dust, soil, and paint. In 1973, the Consumer Product Safety Commission (CPSC) established a maximum lead content in paint of 0.5 percent by weight in a dry film of newly applied paint. In 1978, under the Consumer Product Safety Act (P.L. 101-608, as implemented by 16 CFR Part 1303), the CPSC lowered the allowable lead level in paint to 0.06 percent. The CPSC also restricted the use of lead-based paint in nonindustrial facilities.

To ensure that any threat to human health and the environment from lead-based paint has been identified, the Residential Lead-Based Paint Hazard Reduction Act (Title X), effective January 1, 1995, and Air Force policy require that a lead-based paint survey of high-priority facilities be conducted at Air Force bases. High priority facilities consist of facilities or portions of facilities frequented by children under the age of 7 years, and include military family housing, transient lodging facilities, DOD-maintained day care centers and elementary schools, and playgrounds.

The MDEP has detailed regulations for lead-based paint activities in Title 454 CMR, Chapter 22. The regulations cover abatement or disturbances of lead-based paint in residential (both private and commercial) structures. Specifically, the regulations identify the training, certification, and licensing requirements for personnel and businesses performing abatement and establishes the minimum requirements for containment enclosures and worker health and safety during abatement.

No high-priority facilities such as housing or childcare centers are present at Cape Cod AFS. The condition of painted surfaces at Cape Cod AFS is very good due to frequent maintenance. In accordance with OSHA, prior to initiating any renovation, demolition, or construction activity, a determination of the presence of lead-based paint is made; workers are then informed of the hazards and presence of any lead-based paint, if present (ARCTEC Services, 2000b).

3.5 HEALTH AND SAFETY

This section discusses the potential impacts of the SSPARS with regard to public health and safety. The following section discusses the existing RFE in the vicinity of Cape Cod AFS, other emitters of RFE at Cape Cod AFS, and RFE measurements taken at Cape Cod AFS and within the surrounding communities.

Exposure to RFE is controlled in accordance with national exposure standards (e.g., federal and voluntary exposure standards), which are set by experts in biophysics, medicine, engineering, and epidemiology, as set forth in the following documents:

- Institute of Electrical and Electronics Engineers (IEEE) C95.1-1999, IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 gigahertz (GHz), May 1999.
- DOD, Protection of DOD Personnel from Exposure to Radio Frequency Radiation and Military Exempt Lasers, DOD 6055.11, February 21, 1996.
- Air Force Occupational Safety and Health (AFOSH) Standard, Radio Frequency Radiation (RFR) Safety Program, AFOSH Standard 48-9, August 1, 1997.
- Federal Communications Commission (FCC), Office of Engineering and Technology (OET) Bulletin 65: Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, Edition 97-01, August 1997.

The IEEE International Committee for Electromagnetic Safety produces an RFE standard that has been adopted by the American National Standards Institute (ANSI) as an ANSI/IEEE standard. This voluntary standard is based on numerous sources of scientific information that are subject to rigorous review by experts in biophysics, medicine, electrical engineering, and epidemiology.

After reviewing the biological effects database, scientific committees concluded that the threshold for potential adverse biological effects was 4 watts/kilogram (W/kg) of absorbed RFE per unit mass of tissue. The standards-making organizations have adopted safety factors for RFE exposures in occupational and general public settings. These safety factors are set at 10 for occupational exposures and 50 for general public exposures, thereby reducing the adverse biological effects threshold to 0.4 and 0.08 W/kg, respectively. For ease of measurement, these limits are expressed in units of incident power density (milliwatts per square centimeter, or mW/cm²), which is the accepted RFE parameter used to quantify RFE exposure (Institute of Electrical and Electronics Engineers, 1999).

The general population exposure limit for the SSPARS is 0.28 mW/cm² averaged over a 30-minute period, while the occupational exposure limit is 1.4 mW/cm² averaged over a 6-minute period. These limits are based on the IEEE C95.1-1999 and FCC maximum permissible exposure of 420 MHz, which represents the most conservative exposure limit within the SSPARS frequency range.

The scientific community believes that the IEEE/ANSI standard is applicable to both continuous-wave and pulsed, phased-array emitters. However, a small number of individuals have questioned whether the standard is applicable to phased array systems. The Air Force has entered into a contract with the National Research Council to address this question.

Although the scientific evidence indicates that adverse health effects are limited primarily to thermal effects, some theories have been put forward that suggest low-level RFE may have biological effects. These theories and supporting research are reviewed by the IEEE and considered during their standard setting process. The Proposed Action and alternatives do not change the RFE characteristics of the SSPARS. It is recognized that health concerns have been raised by some individuals on Cape Cod dealing with the ongoing operation of the SSPARS. These concerns are being addressed by a Supplemental EIS to the original 1979 EIS. Included in that evaluation will be studies that specifically address the general concerns brought forth regarding low-level exposures to RFE as well as the SSPARS pulsed waveform generated by a phased-array, specifically.

3.5.1 Cape Cod Air Force Station Radiofrequency Energy Measurements

Ground level (3-6 feet) RFE measurements were completed around the SSPARS facility and throughout the surrounding communities in 1978 and 1986. In 1978, peak power density measurements, average power density measurements, and peak electric field measurements were completed in order to assess the potential exposure differences under both peak and average power conditions. The measurements from the 1978 survey are presented in Table 3.5-1 and their locations are shown on Figure 3.5-1. RFE measurements collected during the 1978 survey were below the applicable IEEE general public exposure limit.

In 1986, average power density measurements were completed in order to verify that the measurements taken in 1978 were still valid and representative of the potential RFE exposures from the radar. The measurements from the 1986 survey are presented in Table 3.5-2 and their locations are shown on Figure 3.5-2.

As with the 1978 measurements, these measurements were also below the applicable IEEE general public exposure limit; therefore, the 1978 measurements were validated and remained representative of the general public RFE exposures from the SSPARS.

3.5.2 Other Radiofrequency Energy Emitters

Other typical devices used to transmit RFE in the vicinity of Cape Cod AFS include AM/FM radio stations, radar, cellular/digital telephones, walkie-talkies, navigation equipment, and various systems designed to generate heat (e.g., microwave ovens). Although there has been a rapid expansion of telecommunications services, cellular telephones, and paging services, the power density of these sources is exceedingly small. For example, power densities at ground level beneath microwave relay towers are in the range of .0000016 mW/cm² to .000095 mW/cm². A 1998 FCC report concluded that it is extremely unlikely that a member of the general public could be exposed to RF levels in excess of the guidelines for a cellular station. Recent studies indicate that typical levels of RFE in urban environments are usually in the nanowatt range (1 nanowatt is 1 millionth of a milliwatt). It is expected that the background RFE at Cape Cod AFS, excluding RFE attributable to the SSPARS, would be less than

Table 3.5-1. Cape Cod AFS, 1978 Power Density Measurements

Test Location	Location	Distance from Radar (miles)	Average Power Density (mW/cm ²)	General Public Standard ^(a) (mW/cm ²)	Magnitude Below Standard
1	Rest Area, Route 6	0.6	0.000061	0.28	4,590
2	Shawme and Shaker House Roads	2.1	0.000027	0.28	10,370
3	Henry T. Wing School	2.1	<0.000001	0.28	>280,000
4	Dillingham and Knott Roads	2.4	0.00002	0.28	14,000
5	Sandwich High School	4.4	0.000001	0.28	280,000
6	Lakewood Hills Development (entrance)	4.6	<0.000001	0.28	>280,000
7	Knolltop and Greenhouse Roads	5.4	<0.000001	0.28	>280,000
8	Mashpee Police Department	7.3	<0.00001	0.28	>280,000
9	Mashpee Middle School	9.2	<0.000001	0.28	>280,000
10	Seabury Gold Club	13.8	<0.000001	0.28	>280,000
11	Sagamore Bridge	1.6	0.000051	0.28	5,490
12	Canalside Apartments	2.0	0.000016	0.28	17,500
13	Hoxie Elementary School	1.7	0.000001	0.28	280,000
14	Old Plymouth Road	2.8	0.000002	0.28	140,000
15	Hilltop Drive (Maiolini residence)	1.0	0.000003	0.28	93,333
16	Kieth Field	1.4	<0.000001	0.28	>280,000
17	Stone School (Otis AFB)	7.1	<0.000001	0.28	>280,000
18	Ashumet Development (Hatchville)	8.8	<0.000001	0.28	>280,000
19	Benthos Corporation	8.9	<0.000001	0.28	>280,000
20	North Falmouth Elementary School	9.0	<0.000001	0.28	>280,000
21	Falmouth High School	11.8	<0.000001	0.28	>280,000

Note: (a) General public standard from IEEE C95.1-1999. The standard used in 1978 was IEEE C95.1-1974 that cited 10 mW/cm² as the exposure limit.

AFB = Air Force Base
mW/cm² = milliwatts per square centimeter

Source: Electromagnetic Compatibility Analysis Center, 1978.

Table 3.5-2. Cape Cod AFS, 1986 Power Density Measurements

Test Location	Location	Distance from Radar (miles)	Average Power Density (mW/cm ²)	General Public Standard ^(a) (mW/cm ²)	Magnitude Below Standard
1	Cardinal Road (Christopher Hollow)	2.8	0.000026	0.28	10,769
2	Sandwich Fire Tower (86 feet above ground in view of the radar)	3.2	0.000139	0.28	2,014
3	Sandwich Public Library	2.3	<0.000001	0.28	>280,000
4	Crowley State Park (Les Perry's House)	1.2	0.000012	0.28	23,333
4a	Crowley State Park (Near Camp Site A-10)	1.2	0.00002	0.28	14,000
5	Route 130 and Greenway and Gibbs (Across from base gate)	3.5	<0.000001	0.28	>280,000
6	Corner of Friendly and Freedom Road (Near Snake Pond Area)	5	<0.000001	0.28	>280,000
7	Beach area (Snake Pond)	4.8	<0.000001	0.28	>280,000
8	Intersection of Route 130 before Central Road	7.4	<0.000001	0.28	>280,000
9	Near Mashpee Middle School on Lowell Road	8.4	<0.000001	0.28	>280,000
10	Lowell Road near Quessot Golf Course	8.8	<0.000001	0.28	>280,000
11	Nickelodeon Theatre on Route 151	7.8	<0.000001	0.28	>280,000
12	Otis Central Tower	5.9	0.000003	0.28	93,333
13	VA Cemetery near entrance on Route 151	5.6	<0.000001	0.28	>280,000
14	Scusett Beach Fishing Pier	1.9	0.000004	0.28	70,000
15	Henry Wing School (Sandwich)	2.1	<0.000001	0.28	>280,000

Note: (a) General public standard from IEEE C95.1-1999. The standard used in 1986 was IEEE C95.1-1974 that cited 10 mW/cm² as the exposure limit.

mW/cm² = milliwatts per square centimeter

Source: 1839th Installation Engineering Group, 1986.



EXPLANATION

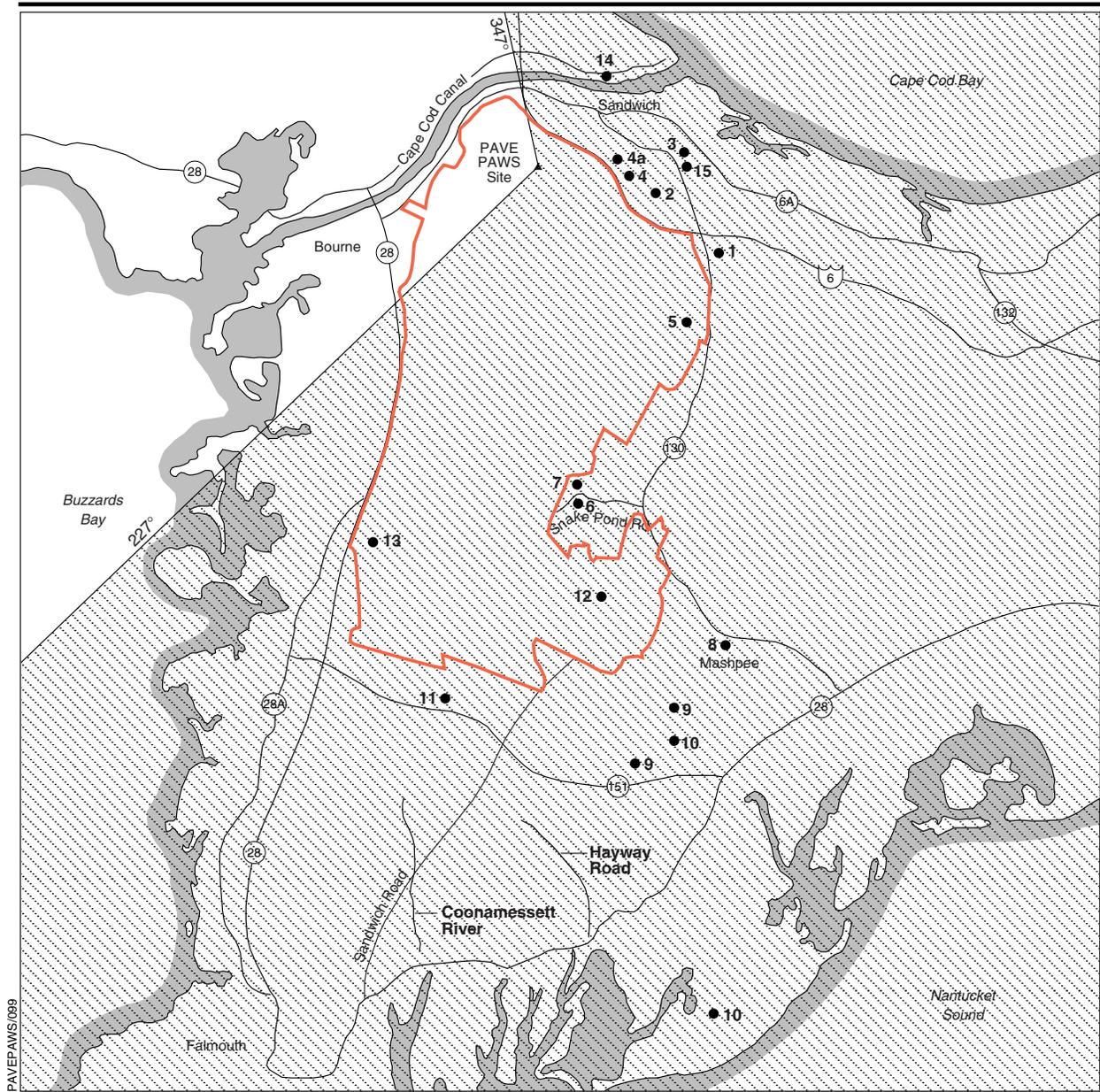
- MMR Boundary
- Power Density Measurement Location
- SSPARS Scan Area

**Cape Cod AFS, 1978
Power Density
Measurements at
Selected Locations**

Not to Scale

Source: Electromagnetic Compatibility Analysis Center, 1978.
Measurement locations correspond to those listed
in Table 3.5-1.

Figure 3.5-1



EXPLANATION

- MMR Boundary
- Power Density Measurement Location
- SSPARS Scan Area

**Cape Cod AFS, 1986
Power Density
Measurements at
Selected Locations**

Not to Scale

Source: 1839th Installation Engineering Group, 1986.
Measurement locations correspond to those listed
in Table 3.5-2.

Figure 3.5-2

the typical RFE in an urban area because of the lower concentration of RFE emitters outside urban areas. Other RFE emitters at Cape Cod AFS include the Defense Satellite Communications System (DSCS) and the proposed Milstar communications system (recently installed but not yet operational).

3.5.2.1 Defense Satellite Communications System.

In June 2000, the U.S. Air Force completed an RFE survey of the DSCS at Cape Cod AFS. The DSCS system is a 38-foot-wide aperture satellite dish used for military satellite communications. DSCS transmits in the frequency range from 7.9 to 8.4 GHz, which is much higher than the SSPARS frequencies. In order to transmit to satellites, DSCS must be pointed upward; therefore, the system is prohibited electrically from radiating with the antenna below 7°. Unlike the SSPARS, DSCS is a satellite communications antenna that uses narrow-beam transmission to geosynchronous satellites, not a sweeping beam over large scan areas. Also, DSCS is a continuous wave transmitter, not a pulsed emitter. The narrow beam width is due to the nature of satellite communications, which require a narrow antenna pattern for communication purposes. The DSCS satellite dish continuously points at 41.5° above the horizon to communicate with the geosynchronous satellite. The DSCS measurements completed in June 2000 are presented in Table 3.5-3, and the measurement locations are shown on Figure 3.5-3.

The measurements taken around the DSCS indicated that exposures were below the occupational exposure limits for the system, as specified in IEEE C95.1-1999. Accordingly, the highest measurement was obtained directly in front of the feedhorn (i.e., extension protruding from the aperture), which is the actual RF source for the aperture. This measurement was only obtained by using a man lift; therefore, this type of exposure is not possible at ground level. Furthermore, due to the operational angles that DSCS uses to communicate with the various satellites, no individuals living in the surrounding communities would be exposed to RFE levels in excess of the applicable IEEE safety standard.

3.5.2.2 Milstar Fixed Communications Control Station.

The Milstar communications system is designed as an inaccessible emitter by the Air Force, meaning the system is not normally accessible to personnel. Existing controls on the Milstar system, such as an interlock system, prevent maintenance personnel from inadvertent RFE exposure during maintenance activities.

The Milstar communications system at Cape Cod AFS would operate in a similar manner to DSCS; however, the operational angles that Milstar would use to communicate with satellites would be different ($41.5^\circ \pm$ the satellite's differential from the Earth's equator) than the DSCS. As a result, it is not possible for Milstar's main beam to impact the ground. The Milstar system transmits RFE at a frequency of 44 GHz. The 1839th Engineering Installation Group conducted a ground-level RFE evaluation of the Milstar antenna in 1989 (1839th Engineering Installation Group, 1989). These measurements were not conducted at Cape Cod AFS; however, these measurements are representative of the predicted

Table 3.5-3. 2000 DSCS RFE Measurements

Test Location	Antenna Position ^(a)	Antenna Output Power (dBm)	Power Density at Operating Power (mW/cm ²)	Controlled Environment Standard ^(b) (mW/cm ²)	Magnitude below Standard ^(b)
1	Primary Satellite	37.1	<0.01	10	>1000
2	Secondary Satellite	38.1	0.04	10	250
3	Secondary Satellite	38.1	0.15	10	66
4	Alternate 1	55	6.20	10	1
5	Alternate 1	55	2.20	10	4
6	Alternate 1	55	0.40	10	25
7	Alternate 1	55	0.25	10	40
8	Alternate 1	55	0.05	10	200
9	Alternate 1	55	0.0875	10	114
10	Alternate 2	55	0.237	10	42

Notes: The above azimuths and elevations are based on the alignment of the DSCS with its appropriate satellites from Cape Cod AFS.

(a) Primary-azimuth 154.08° and elevation 38.9°; secondary-azimuth 105.55° and elevation 9.75°; alternate 1-azimuth 215.82° and elevation 7.49°; alternate 2-azimuth 296.7° and elevation 7.49°.

(b) The measurements taken in June 2000 represent occupational exposures, not general public exposures; therefore, the IEEE C95.1-1999 controlled environment exposure limit was used.

° = degree

dB = decibel

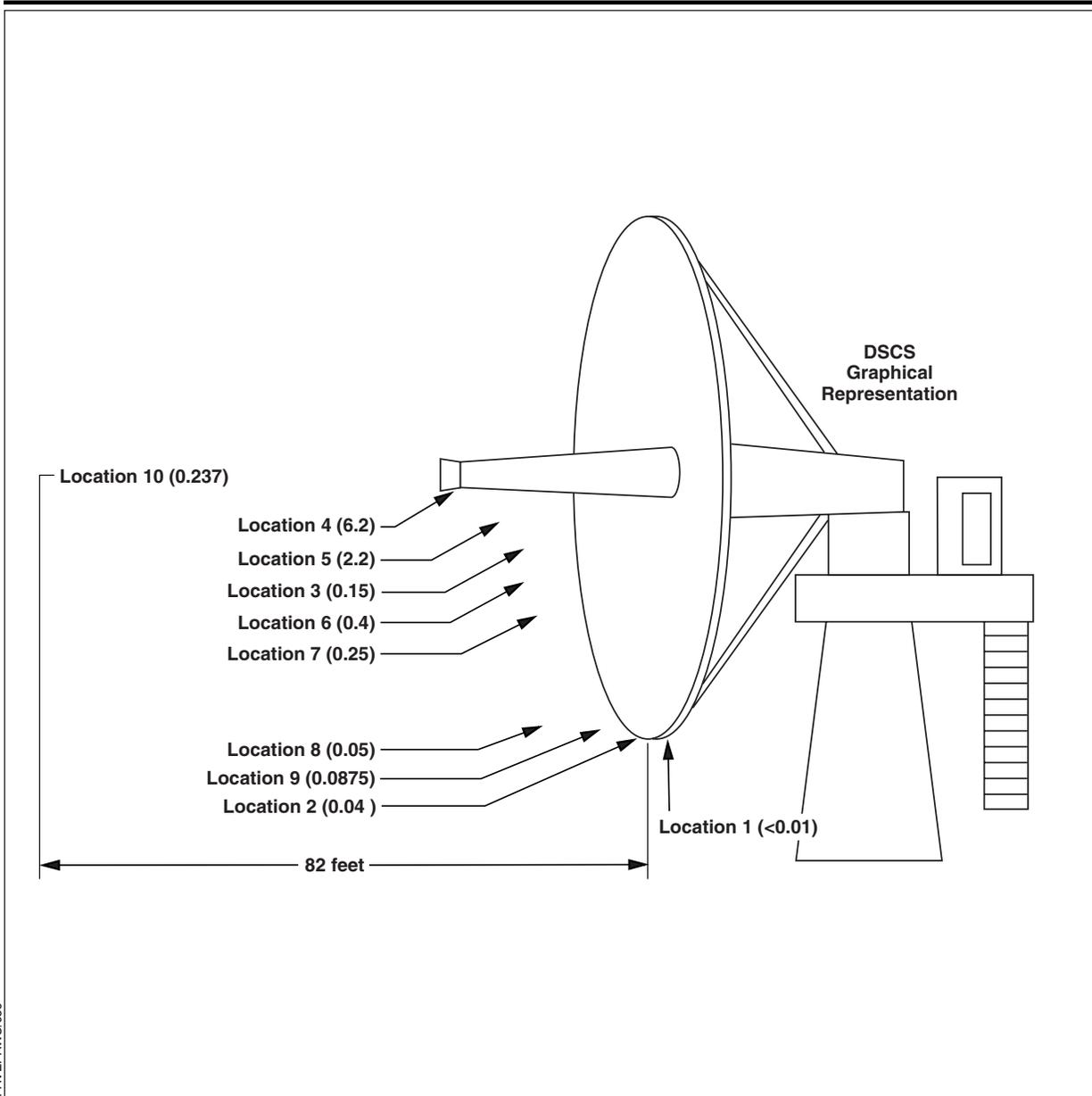
dBm = dB referenced to 1 milliwatt

mW/cm² = milliwatts per square centimeter

Source: 738th Engineering Installation Squadron, 2000.

measurements of the Milstar communications system at Cape Cod AFS. Measurements were taken at six different distances, ranging from the radome edge to 600 feet from the Milstar antenna. These measurement locations evaluated the main beam and were selected based on power density calculations and distance from the antenna. The Milstar measurements are presented in Table 3.5-4. An EA addressing the installation and operation of a Milstar fixed-communication control station at Cape Cod AFS was completed in April 2002; the EA resulted in an FONSI (U.S. Air Force, 2002).

These measurements represent occupational exposures; therefore, they were compared to the controlled environment standard. No measurements exceeded or significantly approached the IEEE controlled environment exposure limit of 5 mW/cm². No individuals living in the surrounding communities would be exposed to RFE levels in excess of the applicable IEEE safety standard; the Milstar system does not produce significant sidelobe RFE patterns that would approach the IEEE uncontrolled environment limit of 1 mW/cm². This system has not yet been activated at Cape Cod AFS.



PAVEPAWS/086

EXPLANATION

DSCS Defense Satellite Communications System
 mW/cm² milliwatts per square centimeter

DSCS Measurement Locations

Note: Power density levels are shown in mW/cm².
 Source: 738th Engineering Installation Squadron, 2000.

Figure 3.5-3

Table 3.5-4. 1989 Milstar RFE Measurements

Location	Distance (feet)	Average Power Density (mW/cm ²)	Controlled Environment Standard (mW/cm ²)	General Public Standard (mW/cm ²)	Magnitude Below Controlled Environment Standard
1	600	0.046	5	1	108
2	327	0.265	5	1	18
3	184	0.461	5	1	10
4	75	0.472	5	1	10
5	27	0.450	5	1	11
6	Radome Edge	0.839	5	1	6

mW/cm² = milliwatts per square centimeter

Source: 1839th Engineering Installation Group, 1989.

3.6 AIR QUALITY

Air quality is described in terms of the concentrations of various pollutants in a given area of the atmosphere, and is generally expressed in terms of parts per million (ppm), milligrams per cubic meter (mg/m³), or micrograms per meter (µg/m). The lower overall concentration of a specific pollutant (whether from natural sources or man-made), the better the air quality in that area. The significance of a pollutant concentration is determined by comparison to federal, state, and/or local air quality standards.

The ROI for air quality includes the geographical airshed in which the emissions would occur. This broad area encompasses both direct, immediate impacts due to criteria pollutants that generally disperse within a few miles of the emissions source, and indirect, delayed impacts due to precursor actions (primarily ozone precursors) that can delay impacts for several hours.

Air quality is regulated under 40 CFR Parts 50-99. The National Ambient Air Quality Standards (NAAQS) (40 CFR Part 50) have been designed to protect public health and welfare, and represent maximum ambient concentrations that are allowable in a given area. Ambient air in these regulations is defined as “that portion of the atmosphere, external to buildings, to which the general public has access” (40 CFR Part 50.1). The NAAQS addresses seven pollutants, termed criteria pollutants. These criteria pollutants include carbon monoxide (CO), lead, nitrogen oxides (NO_x), ozone, particulate matter equal to or less than 10 microns in diameter (PM₁₀), particulate matter equal to or less than 2.5 microns in diameter (PM_{2.5}), and sulfur dioxide (SO₂).

Areas that violate the NAAQS are designated as “nonattainment” areas for the relevant pollutant(s). Areas that meet the NAAQS are designated as “attainment” areas. Those areas for which measurements were not taken are termed “unclassifiable” and are assumed to be in attainment. Nonattainment areas that attain the NAAQS and are redesignated as being in attainment are required to be addressed in the State Implementation Plan (SIP) to provide for

monitoring of the air quality and maintenance of the attainment status for at least 10 years. These areas are described as “maintenance” areas.

Federal actions are required to conform to any applicable SIP (approved or promulgated under Section 110 of the CAA). If the action is to take place in a nonattainment or maintenance area, it is subject to a General Conformity determination, as indicated in 40 CFR Part 51. This determination can take one of three forms: (1) If the action meets certain criteria, it may be specifically exempted. Most exemptions cover administrative-type actions; however, recurring activities, emergencies, and certain research and development activities are also exempted; (2) if the action is determined to emit pollutants below specified de minimis thresholds and the potential emission levels are not regionally significant (less than 10 percent of the region’s emissions for a particular pollutant), the action can be assumed to conform to the SIP; and (3) for actions that do not fall under either of these two categories, a complete conformity determination must be made. Specifics of this process are listed in 40 CFR Part 51, Subpart W.

Massachusetts has established state Ambient Air Quality Standards (AAQS). Emissions of air pollutants from operations in Massachusetts are limited to the more restrictive standard (federal or state). The NAAQS and the Massachusetts AAQS are presented in Table 3.6-1.

Table 3.6-1. National and Massachusetts Ambient Air Quality Standards

Pollutant	Average Period	NAAQS		MAAQS	
		Primary ($\mu\text{g}/\text{m}^3$)	NAAQS Secondary	Primary ($\mu\text{g}/\text{m}^3$)	MAAQS Secondary
Nitrogen Dioxide	Annual ^(a)	100	same	100	same
Sulfur Dioxide	Annual ^(a)	80	----	80	----
	24-hour ^(b)	365	----	365	----
	3-hour ^(b)	----	1,300	----	1,300
PM ₁₀	Annual ^(d)	50	----	50	----
	24-hour ^(c)	150	----	150	----
Carbon	8-hour ^(b)	10,000	same	10,000	same
Monoxide	1-hour ^(b)	40,000	same	40,000	same
Ozone	1-hour ^(c)	235	same	235	same
Lead	3-month ^(a)	1.5	----	1.5	----

- Notes: (a) Not to be exceeded.
 (b) Not to be exceeded more than once per year
 (c) Not to be exceeded more than 1 day per year over 3 years.
 (d) Not to be exceeded by the arithmetic average of the annual arithmetic averages from 3 successive years.
 (e) Modeled impact level from a facility undergoing PSD review below, which it is not necessary to undergo PSD increment consumption.
 $\mu\text{g}/\text{m}^3$ = micrograms per cubic meter
 NAAQS = National Ambient Air Quality Standards
 PM₁₀ = particulate matter equal to or less than 10 microns in diameter

Source: 40 CFR Parts 50 and 310 CMR 6.00

Cape Cod AFS is situated within the Southeastern Massachusetts Air Quality Control Region which is classified as serious nonattainment for ozone and attainment or unclassified for all other NAAQS.

Table 3.6-2 provides the attainment designations for the Cape Cod AFS ROI.

Table 3.6-2. Attainment Status for National Ambient Air Quality Standards

Pollutant	Attainment Status Of Cape Cod AFS
Ozone	Nonattainment
Carbon Monoxide	Attainment
Fine Particulates (PM ₁₀)	Attainment
Sulfur Dioxide	Attainment
Nitrogen Dioxide	Attainment
Lead	Attainment

PM₁₀ = particulate matter equal to or less than 10 microns in diameter

Source: ARCTEC Services, 2000e

3.7 ENVIRONMENTAL JUSTICE

3.7.1 Background

Executive Order (EO) 12898, Environmental Justice, was issued by the President on February 11, 1994. Objectives of the EO, as it pertains to this EA, include identification of low-income and minority populations where proposed federal actions have disproportionately high and adverse human health and environmental effects. Accompanying EO 12898 was a Presidential Transmittal Memorandum that referenced existing federal statutes and regulations to be used in conjunction with EO 12898. The memorandum addressed the use of the policies and procedures of NEPA. Specifically, the memorandum indicates that, "Each Federal agency shall analyze the environmental effects, including human health, economic and social effects, of Federal actions, including effects on minority communities and low-income communities, when such analysis is required by the NEPA 42 U.S.C. Section 4321 et. seq." Although an environmental justice analysis is not mandated by NEPA, DOD has directed that NEPA will be used as the primary mechanism to implement the provisions of EO 12898. The Air Force environmental impact analysis process (EIAP), as described in 32 CFR Part 989 is the preferred method to ensure compliance with EO 12898.

3.7.2 Demographic Analysis

Although EO 12898 provides no guidelines on how to determine concentrations of low-income or minority populations, the demographic analysis provides information on the approximate locations of low-income and minority populations in the area potentially affected by the implementation of the Air Force EWR SLEP action at Cape Cod AFS. The ROI for the environmental justice analysis includes Barnstable and Plymouth counties.

The 1990 Census of Population and Housing reports numbers of both minority and poverty residents. Poverty status (used in this EA to define low-income

status) is reported as the number of families with income below poverty level (\$12,764 for a family of four in 1989, as reported in the 1990 Census of Population and Housing). Minority populations included in the census are identified as Black; American Indian, Eskimo, or Aleut; Asian or Pacific Islander; Hispanic; or Other. Data required to perform the environmental justice demographic analysis are not yet available for the 2000 Census; therefore, the 1990 Census statistics have been used for the environmental justice analysis within this document.

Based upon the 1990 Census of Population and Housing, Barnstable County had a population of 186,605 persons. Of this total, 13,796 persons, or 8 percent, were low-income; and 8,805 persons, or 5 percent, were minority (U.S. Bureau of the Census, 1991). Plymouth County had a population of 435,276 persons. Of this total, 27,853 persons, or 7 percent, were low income; and 33,153 persons, or 8 percent, were minority (U.S. Bureau of the Census, 1991).

4.0 ENVIRONMENTAL CONSEQUENCES

4.1 INTRODUCTION

This section discusses the potential environmental consequences associated with the Proposed Action and alternatives. To provide the context in which potential environmental impacts may occur, discussions of potential changes to the local communities, including population and employment are included in this EA. In addition, issues related to current and future management of hazardous materials, hazardous waste and solid waste, air quality, and health and safety are discussed. An environmental justice analysis was conducted to examine potential disproportionately high and adverse impacts to low-income and minority populations.

Cumulative impacts result from “the incremental impact of actions when added to other past, present, and reasonable foreseeable future actions regardless of what agency undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time” (Council on Environmental Quality, 1978). Section 4.11 summarizes other future projects planned at or in the vicinity of Cape Cod AFS. Cumulative impacts are addressed within each resource section.

4.2 LOCAL COMMUNITY

4.2.1 Socioeconomics

The potential effects of the Proposed Action and alternatives on the employment and population within the ROI are presented in this section. The effects were assessed by estimating the increase or decrease in employment and population that would result from the implementation of the Proposed Action and alternatives.

4.2.1.1 Proposed Action

Employment

A temporary increase of approximately 20 employees (engineers, contractors, and technicians) would be required to remove the existing computer equipment and install the new replacement equipment. Employees from outside the area are expected to stay in the towns of Sandwich, Bourne, Mashpee, or Falmouth where temporary lodging is available. It is expected that the removal and replacement of the computer equipment would be phased over 18 months (in four separate stages). The duration of each stage is not expected to be greater than 20 workdays. These temporary increases in employment are insignificant and are not expected to impact the region’s employment.

Population

No permanent increases in population are expected; therefore, no significant impacts are anticipated.

Mitigation Measures

No adverse impacts to employment and population are anticipated; therefore, no mitigation measures would be required.

4.2.1.2 Spare Components Alternative

Employment

No increases to employment within the ROI are expected to occur under the Spare Components Alternative; therefore, no significant impacts are anticipated.

Population

No increases in population within the ROI are expected to occur under the Spare Components Alternative; therefore, no significant impacts are anticipated.

Mitigation Measures

No adverse impacts to employment and population are anticipated; therefore, no mitigation measures would be required.

4.2.1.3 No-Action Alternative

Employment

The No-Action Alternative involves not implementing the proposed EWR SLEP equipment replacement actions in the SSPARS at Cape Cod AFS. The SSPARS would become inoperable until the failed component(s) could be fixed or remanufactured. No increases to employment within the ROI are expected to occur under the No-Action Alternative; therefore, no significant impacts are anticipated.

Population

No increases in population within the ROI are expected to occur under the No-Action Alternative; therefore, no significant impacts are anticipated.

Mitigation Measures

No adverse impacts to employment and population are anticipated; therefore, no mitigation measures would be required.

4.3 HAZARDOUS MATERIALS MANAGEMENT

4.3.1 Proposed Action

Hazardous Materials. EWR SLEP would not change the types and quantity of hazardous materials routinely used on Cape Cod AFS, with one exception. The existing main mission computer uses approximately 100 pounds of the refrigerant R-401a, a HCFC, whereas the replacement computer does not. Replacing the main mission computer would eliminate the need to store and use R-401a to support the radar. During the replacement of the main mission computer, the HCFC will be recovered in accordance with applicable regulations. The installation of EWR SLEP computer components may involve small quantities of hazardous materials such as cleaners and paints. These materials would be managed in accordance with existing base procedures, which comply with federal and state regulations.

Mitigation Measures

Because Cape Cod AFS would continue to comply with applicable federal, state, and local regulations regarding the storage and handling of hazardous materials, activities under the Proposed Action would not result in adverse impacts. No mitigation measures would be required.

4.3.2 Spare Components Alternative

Hazardous Materials. Under the Spare Components Alternative, hazardous materials usage at Cape Cod AFS would continue in accordance with applicable regulations and established procedures. Operations would continue under the existing SPCCP. No significant impacts are anticipated.

Mitigation Measures

Because Cape Cod AFS would continue to comply with applicable federal, state, and local regulations regarding the use, storage, and handling of hazardous materials, activities under the Spare Components Alternative would not result in adverse impacts. No mitigation measures would be required.

4.3.3 No-Action Alternative

Hazardous Materials. Under the No-Action Alternative, hazardous materials usage at Cape Cod AFS would continue in accordance with applicable regulations and established procedures. Operations would continue under the existing SPCCP. No significant impacts are anticipated.

Mitigation Measures

Because Cape Cod AFS would continue to comply with applicable federal, state, and local regulations regarding the storage and handling of hazardous materials, the No-Action Alternative would not result in adverse impacts. No mitigation measures would be required.

4.4 SOLID AND HAZARDOUS WASTE

4.4.1 Proposed Action

Solid Waste. Solid waste generation associated with Cape Cod AFS operations would not change from current conditions. Solid waste would continue to be generated and disposed of in accordance with applicable regulations and established procedures.

During EWR SLEP activities, electronic hardware would be replaced to sustain the current mission. Typically, equipment that is no longer of use to the Government is auctioned or sold for scrap through the DRMO in Groton, Connecticut, or Portsmouth, New Hampshire. In the event that the Air Force is not able to sell or recycle the equipment, the materials would be disposed of in a landfill. Prior to being sold, recycled, or disposed of, the equipment would be inspected for possible hazardous substances or exotic metals. The total amount of material to be replaced during EWR SLEP activities is estimated to be less than 5 tons. No significant impacts are anticipated.

Hazardous Waste. Hazardous waste generation associated with Cape Cod AFS routine operations would not change from current conditions. Hazardous waste would continue to be generated and disposed of in accordance with applicable regulations and established procedures. Under the Proposed Action, hazardous waste could be generated if minor interior renovation activities were to occur. The construction contractor would be responsible for following applicable regulations for the management of hazardous waste. Any spills would be cleaned up by the construction contractor. The construction contractor would be responsible for the proper disposal of any hazardous waste (including renovation debris) generated on the property in accordance with applicable regulations. No significant impacts are anticipated.

Asbestos. Under the Proposed Action, no facility demolition activities would occur. Some minor interior renovations (raised floor and wall modifications) may occur to better utilize space within the facility due to the decrease in size of the proposed replacement equipment. An ACM inspection would be required prior to implementing renovation activities. Abatement activities, if required, would be conducted in accordance with applicable federal and state regulations to minimize potential risk to human health and the environment. Debris that contains ACM would be disposed of in a landfill permitted to accept this type of material. No significant impacts are anticipated.

Lead-Based Paint. Under the Proposed Action, no facility demolition activities would occur. Some minor interior renovations (raised floor and wall modifications) may occur to better utilize space within the facility due to the decrease in size of the proposed replacement equipment. A lead-based paint inspection would be required prior to conducting renovation activities. Renovation activities would be conducted in accordance with applicable federal and state regulations to minimize potential risks to human health and the environment. Any lead-based paint waste would be disposed of in a landfill permitted to accept this type of material. No significant impacts are anticipated.

Mitigation Measures

Because Cape Cod AFS would continue to comply with applicable federal, state, and local regulations regarding the storage, handling, and disposal of solid and hazardous waste, activities under the Proposed Action would not result in adverse impacts. No mitigation measures would be required.

4.4.2 Spare Components Alternative

Solid Waste. Under the Spare Components Alternative, solid waste generation associated with Cape Cod AFS operations would not change from current conditions. Solid waste would continue to be generated and disposed of in accordance with applicable regulations and established procedures. No significant impacts are anticipated.

Hazardous Waste. Under the Spare Components Alternative, hazardous waste generation associated with Cape Cod AFS operations would not change from current conditions. Hazardous waste would continue to be generated and disposed of in accordance with applicable regulations and established procedures. Operations would continue under the existing SPCCP. No significant impacts are anticipated.

Asbestos. Under the Spare Components Alternative, no demolition or renovation activities would occur. Management of ACM would continue to be conducted in accordance with Air Force policy to minimize risk to human health and the environment. No significant impacts are anticipated.

Lead-Based Paint. Under the Spare Components Alternative, no demolition or renovation activities would occur. Management of any lead-based paint in these facilities would continue to be accomplished to minimize risk to human health and the environment. No significant impacts are anticipated.

Mitigation Measures

Because Cape Cod AFS would continue to comply with applicable federal, state, and local regulations regarding the storage, handling, and disposal of solid and hazardous waste, activities under the Spare Components Alternative would not result in adverse impacts. No mitigation measures would be required.

4.4.3 No-Action Alternative

Solid Waste. Under the No-Action Alternative, solid waste generation associated with Cape Cod AFS operations would not change from current conditions. Solid waste would continue to be generated and disposed of in accordance with applicable regulations and established procedures. No significant impacts are anticipated.

Hazardous Waste. Under the No-Action Alternative, hazardous waste generation associated with Cape Cod AFS operations would not change from current conditions. Hazardous waste would continue to be generated and

disposed of in accordance with applicable regulations and established procedures. Operations would continue under the existing SPCCP. No significant impacts are anticipated.

Asbestos. Under the No-Action Alternative, no demolition or renovation activities would occur. Management of ACM would continue to be conducted in accordance with Air Force policy to minimize risk to human health and the environment. No significant impacts are anticipated.

Lead-Based Paint. Under the No-Action Alternative, no demolition or renovation activities would occur. Management of any lead-based paint in these facilities would continue to be accomplished to minimize risk to human health and the environment. No significant impacts are anticipated.

Mitigation Measures

Because Cape Cod AFS would continue to comply with applicable federal, state, and local regulations regarding the storage, handling, and disposal of solid and hazardous waste, the No-Action Alternative would not result in adverse impacts. No mitigation measures would be required.

4.5 HEALTH AND SAFETY

4.5.1 Proposed Action

Under the Proposed Action, replacing existing computer systems would not change the characteristics of the RFE emitted from the SSPARS.

Measurements collected during RFE surveys at Cape Cod AFS (Electromagnetic Compatibility Analysis Center, 1978; 1839th Installation Engineering Group, 1986) were below the applicable IEEE general public exposure limit. The RFE exposure levels measured during the surveys indicate that no known health hazards exist based on the low-intensity RFE resulting from the SSPARS emissions. RFE measurements outside the Cape Cod AFS boundary were well below the established limit. None of the RFE measurements outside the boundaries of Cape Cod AFS could produce an SAR greater than the 0.08 W/kg level established by IEEE, FCC, and other regulatory agencies.

The impact of RFE from the SSPARS and other existing and proposed RFE emitters would not adversely impact the health and safety of workers at the installation or individuals living in the surrounding communities. No RFE measurements were above applicable safety limits, nor are they expected to occur as a result of activities proposed under the Proposed Action (Electromagnetic Compatibility Analysis Center, 1978; 1839th Installation Engineering Group, 1986; and 738 Engineering Installation Squadron, 2000). Therefore, based on the available data (see Appendix B), no adverse health effects would be associated with the RFE emissions from the SSPARS.

The Air Force would continue to operate the SSPARS and other RFE emitters at the site in accordance with AFOSH Standard 48-9, RFR Safety Program, which includes implementation of appropriate administrative controls to prevent personnel exposure to RFE. No significant impacts are anticipated.

Mitigation Measures

The Air Force would continue to operate the SSPARS and other RFE emitters at the site in accordance with applicable safety standards to minimize and prevent exposure to RFE. Because applicable RFE exposure safety limits would not be exceeded, no adverse impacts are anticipated; therefore, no mitigation measures would be required.

4.5.2 Spare Components Alternative

Potential effects to health and safety from implementation of the Spare Components Alternative would be the same as described under the Proposed Action. Replacing existing systems would not change the characteristics or the RFE emitted from the SSPARS. No significant impacts are anticipated.

Mitigation Measures

Because applicable RFE exposure safety limits would not be exceeded, no impacts are anticipated and no mitigation measures would be required.

4.5.3 No-Action Alternative

Potential effects to health and safety from implementation of the No-Action Alternative would be similar to that described under the Proposed Action. Because SLEP activities would not be implemented, the SSPARS would eventually become inoperable until the failed component(s) could be fixed or remanufactured. Once the SSPARS becomes inoperable, RFE would no longer be emitted from the radar. No significant impacts are anticipated.

Mitigation Measures

Because no environmental impacts are anticipated, no mitigation measures would be required.

4.6 AIR QUALITY

4.6.1 Proposed Action

No changes to the power output of the SSPARS, support facilities, or personnel operating and supporting the site would occur; therefore, no increases in air emissions from stationary sources are anticipated.

Temporary particulate matter emissions from increased traffic would be expected from the work crews required to remove the existing computer equipment and install the new replacement equipment. Approximately 20 personnel would be

required to complete the computer modifications. It is expected that approximately four work stages would be required over an 18-month period for the removal and replacement of computer equipment, and that the duration of each task would not be greater than 20 workdays. In addition, some increased truck traffic would occur during the delivery of new computer components and for shipment of the computer equipment that is removed. Temporary increases in vehicle traffic from these deliveries would be minimal.

The temporary increase in particulate emissions is not expected to impact the existing air quality within the region. Due to the limited number of temporary personnel that would be required during equipment removal and replacement activities, air emissions would be below de minimis thresholds established in the U.S. EPA's conformity rule for general federal actions (40 CFE Part 51). Therefore, the Proposed Action would conform to the applicable implementation plan for attainment of the NAAQS and a conformity determination is not required. The results of emission calculations from EWR SLEP activities compared with applicable de minimis thresholds is provided in Appendix A. No significant impacts on air quality resulting from implementation of the Proposed Action are anticipated.

Mitigation Measures

Because no adverse impacts have been identified, no mitigation measures would be required.

4.6.2 Spare Components Alternative

Under this alternative, the equipment manufacturers would reproduce and provide necessary spare parts to continue operating the SSPARS. Therefore, no impacts on air quality resulting from implementation of the Spare Components Alternative are anticipated.

Mitigation Measures

Because no adverse impacts have been identified, no mitigation measures would be required.

4.6.3 No-Action Alternative

Under the No-Action Alternative, air emissions associated with SSPARS operations would not change from current conditions. No significant impacts are anticipated.

Mitigation Measures

Because no adverse impacts have been identified, no mitigation measures would be required.

4.7 ENVIRONMENTAL JUSTICE

The Community of Comparison (COC), or ROI, for the environmental justice analysis is defined as Barnstable and Plymouth counties.

In developing statistics for the 1990 Census of Population and Housing, the U.S. Department of Commerce, Bureau of the Census, has identified small subdivisions, called census tracts, which are used to group statistical census data. In order to determine whether disproportionate impacts to low-income or minority populations would result from the Proposed Action or alternatives, census data for each census tract were analyzed to determine if these census tracts contain a disproportionate percentage of low-income and/or minority residents. This is calculated by comparing the percentage of low-income residents and the percentage of minority residents in each census tract with the corresponding percentages in the COC (Tables 4.7-1 and 4.7-2). Figure 4.7-1 depicts Cape Cod AFS and the census tracts within Barnstable and Plymouth counties. Disproportionate census tracts are identified on this figure. Then the census tracts were analyzed to determine whether they underlie impact footprints for resources analyzed in this EA. For the environmental justice analysis, impact footprints are defined as the area of projected adverse impacts for a resource based on environmental analysis of a proposed activity. The results of the environmental justice analysis are discussed below.

4.7.1 Proposed Action

Based on the analysis conducted for this EA, it was determined that activities associated with the implementation of the Proposed Action would not have adverse impacts on any of the resources analyzed in this EA, including local community resources (i.e., socioeconomics [employment, income, population], hazardous materials management, solid and hazardous waste management, and health and safety). Because no adverse impacts have been identified for any of these resources, there are no impact footprints to overlie on census tracts. No disproportionately high and adverse impacts to low-income and minority populations would be expected, and no further analysis is necessary.

4.7.2 Spare Components Alternative

The environmental justice analysis for the Spare Components Alternative is the same as discussed under the Proposed Action.

4.7.3 No-Action Alternative

The environmental justice analysis for the No-Action Alternative is the same as discussed under the Proposed Action.

Table 4.7-1. Census Tracts in Barnstable County
Page 1 of 2

Geographic Area	Percent Minority	Disproportionately High ^(a)	Percent Low Income ^(b)	Disproportionately High ^(a)
United States	16.08	--	13.51	--
Massachusetts	12.04	--	8.93	--
Barnstable County	4.72	--	7.54	--
Census Tracts in Barnstable County				
101	3.87	No	14.43	Yes
102	2.52	No	10.33	Yes
103	2.42	No	8.60	Yes
104	0.59	No	7.31	No
105	0.61	No	2.98	No
106	1.93	No	4.81	No
107	0.89	No	5.98	No
108	0.23	No	4.17	No
109	3.09	No	6.37	No
110	8.51	Yes	5.19	No
111	1.48	No	5.80	No
112	1.42	No	5.67	No
113	1.10	No	9.48	Yes
114	0.87	No	5.59	No
115	4.66	No	11.39	Yes
116	1.74	No	13.22	Yes
117	4.29	No	14.46	Yes
118	2.30	No	5.67	No
120	2.51	No	11.51	Yes
121	5.05	Yes	10.09	Yes
122	2.75	No	2.32	No
123	8.88	Yes	25.81	Yes
124	16.62	Yes	17.05	Yes
125	11.25	Yes	12.49	Yes
126	13.74	Yes	11.17	Yes
127	4.05	No	6.03	No
128	3.67	No	5.38	No
129	2.88	No	2.64	No
130	9.43	Yes	7.07	No
131	5.19	Yes	1.71	No
132	3.20	No	4.00	No
133	3.94	No	5.75	No
134	2.24	No	4.19	No
135	1.31	No	3.29	No
136	3.92	No	6.15	No
137	4.20	No	10.00	Yes
138	1.72	No	8.33	Yes
139	4.30	No	6.06	No
140	4.47	No	6.75	No
141	6.05	Yes	0.44	No
143	1.78	No	6.99	No
144	6.46	Yes	7.82	Yes
145	7.56	Yes	10.79	Yes
146	10.71	Yes	8.69	Yes

Table 4.7-1. Census Tracts in Barnstable County
Page 2 of 2

Geographic Area	Percent Minority	Disproportionately High ^(a)	Percent Low Income ^(b)	Disproportionately High ^(a)
147	8.45	Yes	10.42	Yes
148	4.97	Yes	8.88	Yes
149	4.26	No	6.49	No
149.99	0.00	No	(c)	(c)
150	16.26	Yes	7.72	Yes
151	8.01	Yes	5.86	No
152	3.10	No	9.50	Yes

- Note: (a) A census tract is deemed to have a disproportionately high number of minority and/or low-income populations if the census tract's percentage is higher than the Barnstable County percentage or at least 50 percent.
 (b) Low income is defined as below the poverty level (\$12,764 for a family of four in 1989), as reported in the 1990 Census of Population and Housing.
 (c) No population tabulated for the census tract for this category; unable to determine if census tract is disproportionate.

Source: U.S. Bureau of the Census, 1991.

Table 4.7-2. Census Tracts in Plymouth County

Page 1 of 2

Geographic Area	Percent Minority	Disproportionately High ^(a)	Percent Low Income ^(b)	Disproportionately High ^(a)
United States	16.08	--	13.51	--
Massachusetts	12.04	--	8.93	--
Plymouth County	7.62	--	6.57	--
Census Tracts in Plymouth County				
5001.01	3.65	No	5.21	No
5001.02	2.69	No	9.67	Yes
5011.01	3.07	No	3.10	No
5011.02	2.09	No	3.04	No
5012.01	1.06	No	2.72	No
5012.02	2.69	No	1.84	No
5021.01	1.88	No	5.33	No
5021.02	2.79	No	12.29	Yes
5022	3.19	No	4.42	No
5031.01	2.29	No	1.53	No
5031.02	0.99	No	1.58	No
5041.01	0.69	No	1.23	No
5041.02	2.03	No	2.06	No
5051.01	4.82	No	5.64	No
5051.02	1.35	No	2.63	No
5052	3.54	No	2.99	No
5061.01	2.23	No	1.81	No
5061.02	3.63	No	3.59	No
5062.01	(c)	(c)	(c)	(c)
5062.02	0.25	No	3.37	No
5062.03	2.59	No	5.76	No
5062.04	2.70	No	3.85	No
5071.01	1.88	No	0.79	No
5081.01	1.88	No	3.07	No
5081.02	2.24	No	5.39	No
5082	0.65	No	3.97	No
5091	1.63	No	5.06	No
5101	13.13	Yes	3.03	No
5102	13.86	Yes	9.66	Yes
5103	35.51	Yes	20.76	Yes
5104	42.94	Yes	24.20	Yes
5105.01	16.72	Yes	7.55	Yes
5105.02	19.85	Yes	14.72	Yes
5105.03	16.85	Yes	10.36	Yes
5106	2.41	No	2.36	No
5107	14.94	Yes	7.36	Yes
5108	42.06	Yes	21.94	Yes
5109	56.12	Yes	33.33	Yes
5110	31.40	Yes	29.01	Yes
5111	11.53	Yes	4.84	No
5112	16.55	Yes	16.33	Yes
5113.01	19.57	Yes	10.02	Yes
5113.02	22.81	Yes	6.11	No
5114	35.42	Yes	26.26	Yes
5115	31.62	Yes	19.05	Yes

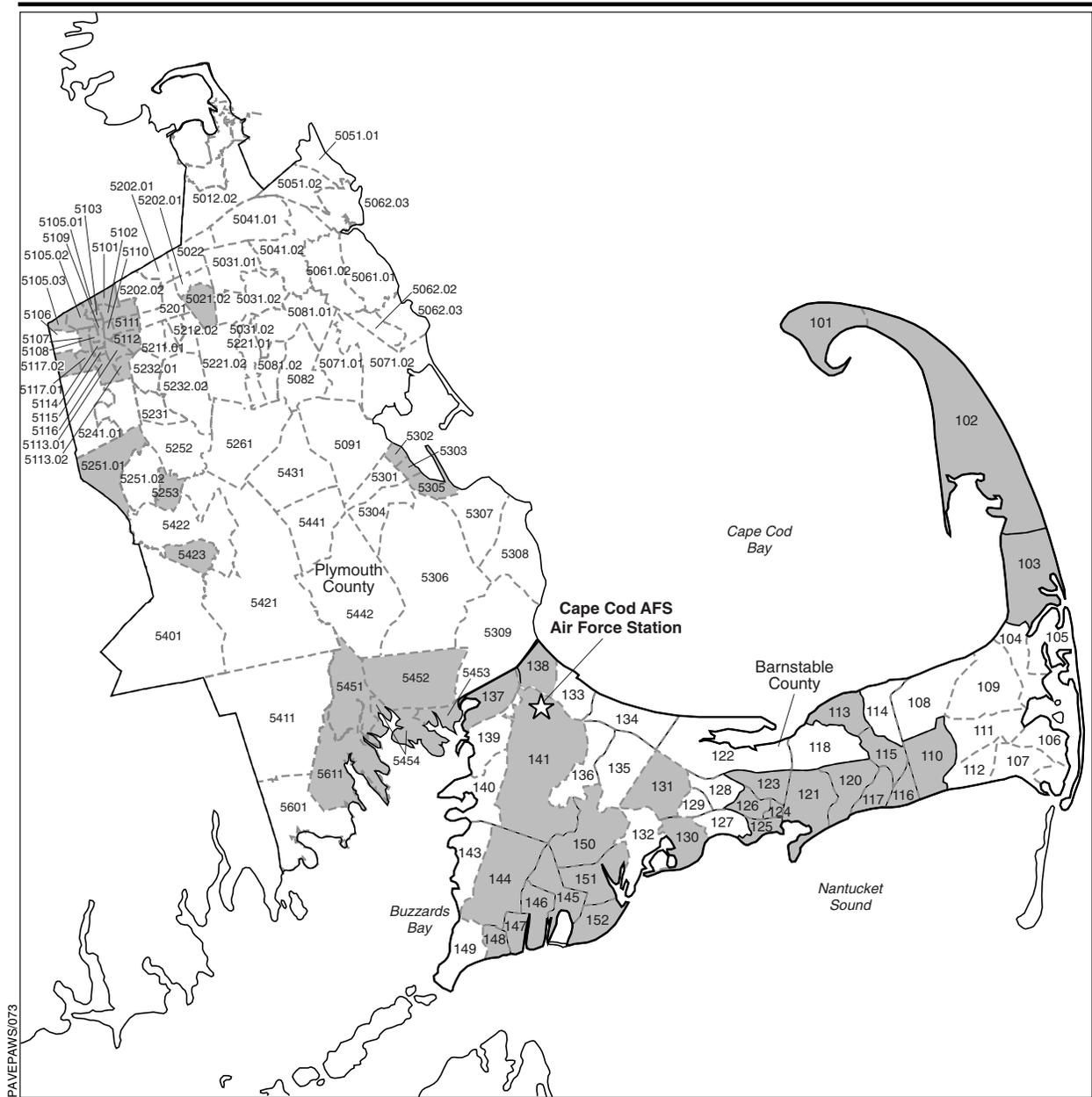
Table 4.7-2. Census Tracts in Plymouth County

Page 2 of 2

Geographic Area	Percent Minority	Disproportionately High ^(a)	Percent Low Income ^(b)	Disproportionately High ^(a)
5116	24.04	Yes	19.72	Yes
5117.01	7.73	Yes	3.52	No
5117.02	8.09	Yes	6.11	No
5201	1.37	No	4.65	No
5202.01	0.95	No	3.84	No
5202.02	2.60	No	5.04	No
5211.01	1.19	No	3.15	No
5211.02	1.75	No	6.45	No
5212.01	3.04	No	11.09	Yes
5212.02	2.67	No	3.68	No
5221.01	6.46	No	2.54	No
5221.02	1.56	No	2.17	No
5231	1.34	No	7.00	Yes
5232.01	2.63	No	3.28	No
5232.02	1.96	No	2.91	No
5241.01	0.42	No	4.35	No
5241.02	3.60	No	5.63	No
5251.01	4.57	No	7.51	Yes
5251.02	6.65	No	4.06	No
5252	3.64	No	2.74	No
5253	38.80	Yes	7.84	Yes
5261	1.53	No	3.80	No
5301	5.15	No	6.45	No
5302	3.59	No	12.87	Yes
5303	4.88	No	7.85	Yes
5304	3.07	No	2.87	No
5305	8.04	Yes	7.96	Yes
5306	5.03	No	1.91	No
5307	6.79	No	4.07	No
5071.02	0.63	No	2.48	No
5309	2.41	No	5.30	No
5401	1.48	No	3.15	No
5411	4.06	No	3.04	No
5421	3.68	No	2.16	No
5422	1.82	No	5.29	No
5423	3.58	No	8.76	Yes
5431	1.51	No	2.60	No
5441	4.93	No	4.52	No
5442	4.48	No	5.59	No
5451	8.38	Yes	5.98	No
5452	13.20	Yes	8.16	Yes
5453	15.34	Yes	12.04	Yes
5454	8.27	Yes	10.21	Yes
5601	3.57	No	4.58	No
5611	11.32	Yes	5.50	No

- Note: (a) A census tract is deemed to have a disproportionately high number of minority and/or low-income populations if the census tract's percentage is higher than the Plymouth County percentage or at least 50 percent.
 (b) Low income is defined as below the poverty level (\$12,764 for a family of four in 1989), as reported in the 1990 Census of Population and Housing.
 (c) No population tabulated for the census tract for this category; unable to determine if census tract is disproportionate.

Source: U.S. Bureau of the Census, 1991.



EXPLANATION

- County Boundary
- - - Census Tract Boundary
- Disproportionate Census Tract

101 Census Tract Designation

Disproportionate Census Tracts Within the ROI



Figure 4.7-1

4.8 UNAVOIDABLE ADVERSE ENVIRONMENTAL EFFECTS

There would be no unavoidable adverse environmental effects from implementation of the Proposed Action or alternatives. Significant operational impacts due to the loss of the radar's capabilities (i.e., missile warning and space surveillance) would occur from implementation of the No-Action Alternative.

4.9 COMPATIBILITY OF THE PROPOSED ACTION WITH OBJECTIVES OF FEDERAL, REGIONAL, STATE, AND LOCAL LAND USE PLANS AND POLICIES

The Proposed Action promotes the Air Force's intention to support mission readiness by operating an early warning system to detect ICBM and SLBM raids against North America and to conduct space surveillance to maintain positional data on objects in near-Earth orbits. In addition, the Air Force maintains appropriate RFE safety measures to ensure a safe, secure environment in which to operate the SSPARS.

4.10 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY

The Proposed Action and alternatives would not affect the long-term productivity of the environment because no significant environmental impacts are anticipated and natural resources would not be depleted.

4.11 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Implementation of the Proposed Action and alternatives would not result in an irreversible or irretrievable commitment of resources.

4.12 CUMULATIVE ENVIRONMENTAL CONSEQUENCES

Cumulative impacts result from "the incremental impact of actions when added to other past, present, and reasonably foreseeable future actions regardless of what agency undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time" (Council on Environmental Quality, 1978). No significant cumulative impacts are anticipated as a result of implementing EWR SLEP activities at Cape Cod AFS.

SLEP replacement equipment, computer components, and rehosting software would not change the power output or characteristics of the RFE being emitted from the radar.

Based upon public concern regarding potential effects of operating the SSPARS, a separate environmental impact statement is being prepared that supplements the EIS prepared in 1979. The supplemental EIS will address the potential impacts of ongoing SSPARS operations, and will include on-going studies such as the Wave Form Characterization study, National Research Council study, Armed Forces Epidemiological Board study, and the PAVE PAWS Public Health Steering Group study.

An EA, Threatened and Endangered Species and Fire Management EA, is being prepared to evaluate implementation of the Operational Component Plan of the Cape Cod AFS Integrated Natural Resources Management Plan. The Operational Component Plan is to improve ecological management, reduce organic hazardous fuel loads, and provide training through prescribed burns and/or mechanical clearing. Implementing the Operational Concept Plans is not related to the proposed SLEP action. Based on the alternatives described in the EA, no cumulative impacts are anticipated when compared with proposed SLEP actions.

Other actions in the vicinity of the EWR installation were evaluated to determine whether cumulative environmental impacts could result from implementation of the Proposed Action or alternatives in conjunction with other past, present, or reasonably foreseeable future actions.

The measurements conducted around the DSCS (738th Engineering Installation Squadron, 2000) indicated that exposures were below the occupational exposure limits for the system, as specified in IEEE C95.1-1999. Accordingly, the highest measurement was obtained directly in front of the feedhorn (i.e., extension protruding from the aperture), which is the actual RFE source for the aperture. This measurement was only obtained by using a man lift; therefore, this exposure is not possible at ground level. Furthermore, due to the operational angles that DSCS uses to communicate with the various satellites, the potential impact of sidelobe energy within surrounding communities is unlikely, and impact of the main beam is not possible.

Two other actions have been identified that will be analyzed as they relate to cumulative impacts. These actions include:

- Potential deployment of the Ground-based Midcourse Defense (GMD) (formerly referred to as the National Missile Defense [NMD]), which would include radar upgrades at Cape Cod AFS to support the Upgraded EWR (UEWR)
- Deployment of a Milstar fixed-communication control station.

If a decision is made by the President to deploy GMD, the UEWR could be one of the two main sources of missile launch and tracking information. The existing tracking system at Cape Cod AFS could be modified with new computer system hardware and mission software to provide more efficient and accurate acquiring, identifying, and tracking ability, and to be able to effectively communicate with other GMD elements. The UEWR could search for different types of missiles, distinguish hostile objects (e.g., warheads) from other objects, and provide these data to other GMD elements using an improved communications system. At the time of the preparation of this EA, the GMD and UEWR radar requirements have not been defined. If any future proposed actions involving radar (resulting from a decision to deploy GMD) fall outside of the parameters described in this or any other NEPA analyses, they would receive supplemental NEPA analysis and documentation as necessary.

The Air Force installed a Milstar fixed communication control station at Cape Cod AFS in 2002. The Milstar antenna support shelter is approximately 20 feet by 16 feet in size and 9 feet high. The Milstar antenna is a 90-inch-diameter parabolic dish with receive/transmit capability. A white spherical radome, approximately 10 feet across by 10 feet high, encloses the antenna for weather protection. The Milstar communications system has not yet been activated at Cape Cod AFS; however, its overall contribution to the general RFE environment would not adversely impact the health and safety of the surrounding communities. An EA addressing the installation and operation of the Milstar fixed-communication control station at Cape Cod AFS was completed in April 2002; the EA resulted in a Finding of No Significant Impact (FONSI) (U.S. Air Force, 2002a). No cumulative impacts are anticipated.

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5.0 CONSULTATION AND COORDINATION

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8.0 BIBLIOGRAPHY

- 6th Space Warning Squadron, 2000. 6th Space Warning Squadron Fact Sheet.
- 738th Engineering Installation Squadron, 2000. Engineering Report – Electromagnetic Radiation Hazard Survey: AN/GSC-52 Terminal, Cape Cod AFS, MA, 20 –21 June 2000, July.
- 1839th Engineering Installation Group, 1982a. Electromagnetic Radiation Hazard (EMRH) Survey of AN/FPS-115 Radar, Cape Cod AFS, MA. 22 Feb – 1 Mar 1982, April.
- 1839th Engineering Installation Group, 1982b. Radio Frequency Radiation (RFR) Survey for the AN/FPS-115 PAVE PAWS Radar, Cape Cod AFS MA, 16 Feb – 6 Mar 1982, April.
- 1839th Engineering Installation Group, 1986. Radio Frequency Radiation (RFR) Survey for the AN/FPS –115 PAVE PAWS Radar, 18-30 Sep 86, October.
- 1839th Engineering Installation Group, 1989. 1839 EIG, Engineering Report - MILSTAR Electromagnetic Radiation Hazard Survey, Sudbury, Massachusetts, December.
- 1839th Engineering Installation Group, 1992. Engineering Report – Radio Frequency Radiation Hazard Survey: AN/FPS – 123 PAVE PAWS Radar, Cape Cod AFS, MA 20 – 21 April 92, May.
- Advisory Council on Historic Preservation, 2000. Programmatic Agreement Regarding the Dismantlement of PAVE PAWS Facilities, May.
- Air Force Occupational Safety and Health Standard, 1997. Radiofrequency Radiation (RFR) Safety Program. AFOSH Standard 48-9, August 1.
- Air Force Space Command, 2000. Strategic Master Plan for FY2000 and Beyond, February.
- ARCTEC Services, 1999a. Asbestos Management and Operations Plan, Cape Cod Air Station, Massachusetts, November.
- ARCTEC Services, 1999b. Pollution Prevention Plan, Cape Cod Air Station, Massachusetts, November.
- ARCTEC Services, 1999c. Solid and Hazardous Waste Management Plan, Cape Cod Air Station, Massachusetts, November.
- ARCTEC Services, 1999d. Integrated Natural Resources Management Plan, November.
- ARCTEC Services, 1999e. Spill Prevention Control and Countermeasures Plan (SPCCP) and Oil and Hazardous Substance Pollution Contingency Plan (OHSPC), November.
- ARCTEC Services, 2000a. Cape Cod Air Force Station Storage Tank Compliance Action Plan, Final Report, July.
- ARCTEC Services, 2000b. Final Toxic Substances Compliance Action Plan, August.
- ARCTEC Services, 2000c. Integrated Pest Management Plan.
- ARCTEC Services, 2000d. Final Water Quality Compliance Action Plan, July.
- ARCTEC Services, 2000e. Final Air Quality Compliance Action Plan, August.

- ARCTEC Services, 2000f. Cultural Resources Management Plan, Cape Cod Air Force Station, Massachusetts, September.
- Argonne National Laboratory, 1996a. Historic Properties of the Cold War Era, 21st Space Wing, September.
- Argonne National Laboratory, 1996b. Biodiversity Survey of Clear Air Station, Alaska, December.
- Argonne National Laboratory, 1998a. Cultural resources Management Plan, Cape Cod Air Station, Massachusetts, October.
- Argonne National Laboratory, 1998b. Historic Properties of the Cold War, Cape Cod Air Station, Massachusetts, June.
- Aspen Analytical, 1998. Polychlorinated Biphenyls (PCBs) Sample Results, December.
- Camp Edwards Environmental Protection Office, 1943. Camp Edwards, Otis Air National Guard Base Aerial Photo.
- Camp Edwards Environmental Protection Office, 1986. Camp Edwards, Otis Air National Guard Base Aerial Photo.
- Camp Edwards Environmental Protection Office, 2000a. Common Plant Species of Camp Edwards.
- Camp Edwards Environmental Protection Office, 2000b. State and Watch Listed Species on Camp Edwards/MMR.
- Camp Edwards Environmental Protection Office, 2000c. Characteristics of Pitch Pine/Scrub Oak Barrens.
- Cape Cod Air Force Station, 1999a. Feasibility Analysis Report: Cape Cod AS, Massachusetts, USAF Utility Privatization, Chapters 6 and 8 (Electrical and Water Systems), December.
- Cape Cod Air Force Station, 1999b. Hazmat Pharmacy Operations and Material Safety Data Sheet Database, November.
- Cape Cod Air Force Station, 1999c. Spill Prevention Control and Countermeasures Plan (SPCC) and Oil and Hazardous Substance Pollution Contingency Plan (OHSPC), November.
- Cape Cod Air Force Station, 1999d. Water Sampling Data for April.
- Cape Cod Air Force Station, 2000a. Utility Consumption Reports for Cape Cod Air Force Station, April 1999 – April 2000.
- Cape Cod Air Force Station, 2000b. Comprehensive Planning Framework, September.
- Cape Cod Commission, 1996a. Cape Cod Regional Policy Plan, November.
- Cape Cod Commission, 1996b. Regional Policy Plan, Functional Classification Map of Cape Cod Highways, November.
- Cape Cod Commission, 1996c. Regional Policy Plan, Cape Cod Water Resources Classification Map I, November.

Cape Cod Commission, 1996d. Regional Policy Plan, Cape Cod Significant Natural Resource Areas Map, November.

Cape Cod Commission, 1998a. Massachusetts Military Reservation Master Plan Final Report, September.

Cape Cod Commission, 1998b. Cape Trends, Demographic and Economic Characteristics and Trends, Barnstable County- Cape Cod, 5th Edition.

Cape Cod Commission, 1999. Town of Sandwich Zoning Map, June.

CH2MHill, 2000. Installation Restoration Program, Massachusetts Military Reservation, Community Involvement Plan Update, March.

Commonwealth of Massachusetts, 1996. Draft Environmental Impact Statement/Environmental Impact Report EOE No. 5834, Massachusetts Military Reservation Facilities Upgrade, November.

Commonwealth of Massachusetts, 2000a. Employment and Wages in Bourne.

Commonwealth of Massachusetts, 2000b. Laborforce, Employment, and Unemployment in Bourne.

Commonwealth of Massachusetts, 2000c. At a Glance Report for Bourne, April.

Commonwealth of Massachusetts, 2000d. At a Glance Report for Mashpee, September.

Commonwealth of Massachusetts, 2000e. At a Glance Report for Sandwich, September.

Commonwealth of Massachusetts, 2001a. At a Glance Report for Falmouth, February.

Commonwealth of Massachusetts, 2001b. At a Glance Report for Mashpee, February.

Commonwealth of Massachusetts, 2001c. Employment and Wages in Falmouth

Commonwealth of Massachusetts, 2001d. Employment and Wages in Mashpee.

Code of Federal Regulations, 1999. 32 CFR Part 989. National Defense, Department of the Air Force, Environmental Impact Analysis Process (EIAP), July.

Council on Environmental Quality, 1978. Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act.

Department of the Army, 1981. Cape Cod AFS Permit No. DACA51-4-81-475 regarding use of Camp Edwards property.

Department of Defense, 1996. Protection of DOD Personnel from Exposure to Radio Frequency Radiation and Military Exempt Lasers. DOD 6055.11, February 21.

Earth Tech, Inc., 1998. Regional Water Supply Study and Development of Massachusetts Military Reservation and Upper Cape Cod, Massachusetts, November.

Earth Tech Inc., 2000. Final Technical Report: Wastewater Discharge Study and Oil/Water Separator Removal, Cape Cod Air Station, MA.

Electromagnetic Compatibility Analysis Center, 1978. PAVE PAWS Radiation Measurements at Otis AFB, June.

- Erdreich, L., Ph.D.; Gandhi, O., Sc.D.; Lai, H. Ph.D.; Ziskin, M., 1999a. Initial Report on the Environmental Health Assessment of the PAVE PAWS, March.
- Erdreich, L., Ph.D.; Gandhi, O., Sc.D.; Lai, H. Ph.D.; Ziskin, M., 1999b. Assessment of Public Health Concerns Associated with PAVE PAWS Radar Installations, November.
- Federal Communications Commission, 1997. OET Bulletin 65: Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields. Edition 97-01, August.
- Hankin, N.N., 1977. Environmental Impact Analysis Project PAVE PAWS – Otis AFB, Massachusetts, December.
- Institute of Electrical and Electronics Engineers, 1999. IEEE Standard Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields 3 kHz to 300 GHz. C95.1-1999, May.
- IT Corporation, 1999. Final Endangered Lepidoptera Study, Cape Cod Air Station, Sagamore, Massachusetts, September.
- James M. Montgomery Consulting Engineers, Inc., 1991. Environmental Management Analysis Program for the Massachusetts Military Reservation, October.
- Macomber, G.M, 1996. Archaeological Investigations at the Cape Cod Air Force Station in Bourne, Massachusetts, August.
- Massachusetts Air National Guard, 1996. Air Installation Compatible Use Zone Study, Otis Air National Guard Base, January.
- Massachusetts Department of Environmental Protection, 1994. Letter to Cape Cod AFS regarding a fuel release site and continued mitigation actions, June.
- Massachusetts Department of Environmental Protection, 1999. National and Massachusetts Ambient Air Quality Standards and PSD Significance Levels, May.
- Massachusetts Department of Environmental Protection, 2000. 1999 Public Water System Annual Statistical Report for Community Public Water Systems and Non-Transient Non-Community Public Water Systems, January.
- Massachusetts Department of Public Health. 2000a. Cape Cod Massachusetts Reports and Investigations Relating to Pave Paws Radar Installations, March.
- Massachusetts Department of Public Health, 2000b. Medical Waste Regulation, 105 CMR 480.00, November.
- Massachusetts Military Reservation, 2000a. Army National Guard Training Site, Camp Edwards, Myths and Facts.
- Massachusetts Military Reservation, 2000b. IRP Mission and Goals, MMR/IRP History.
- Massachusetts Military Reservation, 2000c. MMR Site Description.
- Massachusetts National Guard, 1999. Draft Master Plan/Area-Wide Environmental Impact Report, August.

- Massachusetts Natural Heritage and Endangered Species Program Division of Fisheries and Wildlife, 1998. Biological Survey of the Cape Cod Air Force Station, Bourne, Massachusetts, Draft Final Report, June.
- MITRE Corporation, 2000. MITRE Technical Report, RF Power Density Exposure at Ground Level for the PAVE PAWS Radar at Cape Cod – Questions and Answers, August.
- MITRE Warning and Intelligence Sensors, 1989. PAVE PAWS Description, May.
- National Park Service, 2000. Historic American Engineering Record, HAER No. MA-151, Photographs, Written Historical and Descriptive Date, July.
- Radian International, 1999. Cape Cod Air Station, External Environmental Compliance Assessment and Management Program (ECAMP), Preliminary ECAMP Report, May.
- Sages, H., 2000. Personal communication regarding the energy emitting systems operating between 420 and 450 MHz within a 100 mile radius around Cape Cod, October
- Sandwich, 1999. Town of Sandwich Annual Town Report, December.
- Sandwich Local Planning Committee, 1996. Sandwich Local Comprehensive Plan (A Master Plan), April.
- State of Massachusetts, 1977. Massachusetts Coastal Zone Management Plan, Chapter 5, Massachusetts Coastal Regions and an Atlas of Resources, June.
- The Natural Heritage Network, 2000. The Massachusetts Natural Heritage and Endangered Species Program.
- U.S. Air Force, no date. MILSTAR Technical Order, TO 31R2-2FRC181-61, General Information.
- U.S. Air Force, no date. Logistical Sustainment Picture for EWRs briefing, unclassified.
- U.S. Air Force, 1976. Environmental Assessment, Phased Array Warning System, PAVE PAWS, Otis AFB, Massachusetts, March.
- U.S. Air Force, 1979. Final Environmental Impact Statement, Operation of the PAVE PAWS Radar System at Otis Air Force Base, Massachusetts, May.
- U.S. Air Force, 1982. PAVE PAWS RF Radiation Hazard Profile Drawing for Cape Cod MEW, November.
- U.S. Air Force, 1995. Radiofrequency Radiation Management –Cape Cod Air Station, November.
- U.S. Air Force, 1999. Technical Manual, System Operator Manual, AN/FPS-123 PAVE PAWS, Technical Order 31P6-2FPS123-131, March.
- U.S. Air Force, 2000a. Memorandum requesting the Advisory Council on Historic Preservation participation in the finalization of the Programmatic Agreement, March.
- U.S. Air Force, 2000b. Memorandum Regarding the Programmatic Agreement (PA) for Precision Acquisition Entry Phased Array Warning System (PAVE PAWS), May.
- U.S. Air Force, 2000c. Cape Cod Air Force Station, Real Property Accountable Record, February.
- U.S. Air Force, 2000d. 6 SWS Hazardous Waste Generation, July.

- U.S. Air Force, 2000e. 1999 Air Emissions Inventory, Final, Cape Cod Air Force Station, Massachusetts, February.
- U.S. Air Force, 2000f. Memorandum requesting the Advisory Council on Historic Preservation participation in the finalization of the Programmatic Agreement, March.
- U.S. Air Force, 2000g. Handouts from seminar conducted at the Massachusetts Military Reservation regarding consultation protocols with Native American organizations, November.
- U.S. Air Force, 2000h. Data on power and radiation emitted from the PAVE PAWS, DSCS, and repeater at Cape Cod AFS, September.
- U.S. Air Force, 2002a. Environmental Assessment, Installation of Milstar Fixed Communications Control Station at Cape Cod AFS, Massachusetts, April.
- U.S. Air Force, 2002b. Threatened and Endangered Species and Fire Management Environmental Assessment, Cape Cod AFS, MA.
- U.S. Army Space and Missile Defense Command, 2000a. National Missile Defense (NMD) Deployment Coordinating Final Environmental Impact Statement, January.
- U.S. Army Space and Missile Defense Command, 2000b. Upgraded Early Warning Radar Supplement to the National Missile Defense (NMD) Deployment Draft Environmental Impact Statement, January.
- U.S. Army Space and Missile Defense Command, 2000c. National Missile Defense (NMD) Deployment Final Environmental Impact Statement, June.
- U.S. Army Space and Missile Defense Command, 2000d. National Missile Defense Deployment Final Environmental Impact Statement, July.
- U.S. Army Space and Missile Defense Command, 2001. Coordinating Draft Environmental Assessment, Ground-based Midcourse Defense (GMD) Validation of Deployment Concept (VDC), January.
- U.S. Bureau of the Census, 1990. Plymouth County Census Tracts, April.
- U.S. Bureau of the Census, 1991. 1990 Census of Population and Housing, Department of Commerce, Washington DC.
- U.S. Bureau of the Census, 1998. Barnstable County General profile.
- U.S. Bureau of the Census, 1999. County Population Estimates, July.
Website: census.gov/population/estimates/county.
- U.S. Bureau of the Census, 2000a. County Population Estimates for July 1, 1999.
- U.S. Bureau of the Census, 2000b. General Population and Housing Characteristics: 1990, Sagamore CDP, Massachusetts.
- U.S. Bureau of the Census, 2000c. Income and Poverty Status in 1989: 1990, Bourne CDP, Massachusetts.
- U.S. Bureau of the Census, 2000d. Income and Poverty Status in 1989: 1990, Sagamore CDP, Massachusetts.

- U.S. Bureau of the Census, 2000e. Income and Poverty Status in 1989: 1990, Sandwich CDP, Massachusetts.
- U.S. Bureau of the Census, 2000f. Model-Based Income and Poverty Estimates for Barnstable County, Massachusetts in 1995.
- U.S. Bureau of the Census, 2001a. Income and Poverty Status in 1989:1990, Falmouth town, Barnstable County Massachusetts.
- U.S. Bureau of the Census, 2001b. Income and Poverty Status in 1989:1990, Mashpee town, Barnstable County Massachusetts.
- U.S. Department of Agriculture, Soil Conservation Service, 1993. Soil Survey of Barnstable County, Massachusetts, March.
- U.S. Environmental Protection Agency, 1992. A Citizen's Guide to Radon.
- U. S. Environmental Protection Agency, 1999. Massachusetts EPA Map of Radon Zones, August.
- U.S. Fish and Wildlife Service, 2000. Correspondence Regarding the Proposed Modernization of Cape Cod Air Force Station, Massachusetts, December.
- U.S. Geological Survey, 1972. Sandwich, Massachusetts Quadrangle 1:25,000 Scale Map.
- U.S. Geological Survey, 1979. Pocasset, Massachusetts Quadrangle 1:25,000 Scale Map.
- U.S. Geological Survey, 1979. Sagamore, Massachusetts 1:25,000 Scale Map.
- U.S. Geological Survey, 1986. New Bedford, Massachusetts, 1:100,000-Scale, Planimetric Map.
- Weitze, K., 1999. PAVE PAWS Beale Air Force Base Historic Evaluation and Context, February.

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APPENDIX A

EWR SLEP EMISSIONS CALCULATIONS

APPENDIX A

EWR SLEP EMISSIONS CALCULATIONS

Table 1. De Minimis Threshold in Nonattainment Areas (tons per year)

Pollutant	Degree of Nonattainment Level	De Minimis ^(b)
Ozone (VOCs and NO _x)	Moderate	100
	Serious^(a)	50
	Severe	25
	Extreme	10
VOCs	Marginal	50
NO _x	Marginal	100
Carbon Monoxide	All	100
Particulate Matter	Moderate	100
	Serious	70
SO ₂ or NO ₂	All	100
Lead	All	25

Notes: (a) Cape Cod AFS is in an area that is classified as serious nonattainment for ozone.

(b) Number in bold reflects de minimis threshold used in this analysis.

NO₂ = nitrogen dioxide

NO_x = nitrogen oxides

SO₂ = sulfur dioxide

VOC = volatile organic compound

Table 2. Emissions from Proposed Action at Cape Cod AFS, Massachusetts

Pollutant	VOCs	NO _x
Emission (lbs/year)	22.54	34.74
Emission (tons/year)	0.01	0.02
De Minimis (tons/year)	50.00	50.00
Percent of De Minimis (%)	0.02%	0.03%

No_x = nitrogen oxides

VOC = volatile organic compound

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APPENDIX B

RADIOFREQUENCY ENERGY/MICROWAVE BIOEFFECT STUDIES

APPENDIX B

RADIOFREQUENCY ENERGY/MICROWAVE BIOEFFECT STUDIES

- Appleton, B. and G.C. McCrossan, 1972. Microwave Lens Effects in Humans. Arch. Ophthalmol. 88: 259-262.
- Appleton, B., 1973. *Results of Clinical Surveys for Microwave Clinical Ocular Effects*. U.S. DHEW, Publ. No. (FDA) 73-8031. Rockville, Maryland: U.S. Department of Health, Education, and Welfare, Bureau of Radiological Health.
- Appleton, B., S. Hirsch, R.O. Kinion, M. Souls, G.C. McCrossan, and R.N. Neidlinger, 1975. *Microwave Lens Effects in Humans. II. Results of 5-Year Survey*. Arch. Ophthalmol. 93: 257-258.
- Armstrong et al., 1994. "Association Between Exposure to Pulsed Electromagnetic Fields and Cancer in Electric Utility Workers in Quebec Canada and France. Am J Epidemiol, 140-9 (805-820).
- Aschengrau, A. and D. Ozonoff, 1992. *Upper Cape Cancer Incidence Study*. Final Report. Boston, Maryland: Massachusetts Department of Public Health: January 9.
- Assembly of Life Sciences, National Research Council, 1979. Panel on the Extent of Radiation from the PAVE PAWS Radar System. *Analysis of The Exposure Levels and Potential Biologic Effects of the PAVE PAWS Radar System*. National Academy of Sciences, Washington DC.
- Baranski, S. and P. Czernski, 1976. *Biological Effects of Microwaves*. Stroudsburg, Dowden, Hutchinson and Ross, pp. 234.
- Barron, C.I and A.A. Baraff, 1958. *Medical Considerations of Exposure to Microwaves (Radar)*. J.A.M.A., 168: 1194-1199.
- Bawin, S.M. and Adey, W.R., 1975. 147 & 450 MHz (CW and AM-16 Hz) Exposure on Ca⁺⁺ Efflux in Chick Brain Tissue. Ann NY Acad Sci, 247:74-81.
- Bawin and Adey; Sheppard and Adey, Lin-Lui and Adey, 1982. 147 & 450 MHz (AM-16 Hz) Exposure to Cat Brain, Chick Brain, and Rat Synaptosome Samples and Analysis of Ca⁺⁺ Efflux. Bioelectromagnetics, 3:309-322.
- Bioelectromagnetics, 2001. Suppl 5:S120-31 Electric and Magnetic Field Exposure and Brain Cancer: A Review. Kheifets L.I. Electric Power Research Institute, Palo Alto, California, USA.
- Birenbaum, L., I.T. Kaplan, W. Metlay, S.W. Rosenthal, H. Schmidt, and M.M. Zaret, 1969. *Effect of Microwaves on the Rabbit Eye*. J. Microwave Power, 4: pp. 242-243.
- Bortkiewicz, A., M. Zmyslony, C. Palczynski, E. Gadzicka, and S. Szmigielski, 1995. *Dysregulation of Autonomic Control of Cardiac Function in Workers at AM Broadcasting Stations (0.738 – 1.503 MHz)*. Electro-Magnetobiol. 14: 177-191.
- Brillouin, L., 1960. *Wave Propagation and Group Velocity*, Academic Press, New York.

- Burdeshaw, J.A., and S. Schaffer, 1977. *Factors Associated with the Incidence of Congenital Anomalies: A Localized Investigation*. Final Report, Report No. XXIII, 24 May 1973-31 March 1976, Contract No. 68-02-0791, EPA 600\1-77-016, March.
- Carpenter, R.L., and C.A. Van Ummersen, 1968. *The Action of Microwave Radiation of the Eye*. J. Microwave Power, 3: 3-19.
- Carpenter, R.L., 1969. Experimental Microwave Cataract: A Review. In: *Cleary, S.F., ed. Biological Effects and Health Implications of Microwave Radiation*, Symposium Proceeding, Richmond, Virginia, pp. 76-81.
- Cember, H., 1996. *Introduction to Health Physics*. 3rd Ed. New York: McGraw-Hill.
- Chou, C.K. and R. Galambos, 1979. *Middle-ear Structures Contribute Little to Auditory Perception of Microwaves*. Journal of Microwave Power and Electromagnetic Energy. 14: 321-326.
- Chou, C.K., A.W. Guy, and R. Galambos, 1982. *Auditory Perception of Radiofrequency Electromagnetic Fields*. Journal of Acoustical Society of America. 71 (6): 1321-1334.
- Chou, C.K., K.C. Yee, and A.W. Guy, 1985. *Auditory Response in Rats Exposed to 2450 MHz Electromagnetic Fields in a Circularly Polarized Waveguide*. Bioelectromagnetics 6: 323-326.
- Cleary, S.F., 1977. *Biological Effects of Microwave and Radiofrequency Radiation*. CRCcrit. Rev. Environ. Control, 2: 121-166.
- Cleary, S.F., 1978. Survey of Microwave and Radiofrequency Biological Effects and Mechanisms. In: Taylor, L.S. and Cheung, Y.A., ed. *Proceedings of a Workshop Held at the University of Maryland, College Park, Maryland, 15-17 June*, U.S. Department of Health, Education, and Welfare, pp. 1-33 (HEW Publication [FDA] 78-8055).
- Cleveland, Jr., R., D.M. Sylvar, and J.L. Ulcek, 1997. *Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields*. OET Bulletin 65, Ed. 97-01. Standards Development Branch, Allocations and Standards Division, Office of Engineering and Technology, Federal Communications Commission, Washington, DC.
- Cogan, D.G., S.J. Frecker, M. Lubin, D.D. Donaldson, and H. Hardy, 1955. *Cataracts and Ultra-high Frequency Radiation*. Arch. Ind. Health, 18: 299-302.
- Cohen, B.H., A.M. Lilienfeld, S. Kramer, and L.C. Hyman, 1977. Parental Factors in Down's Syndromes Results of the Second Baltimore Case – Control Study. In: *E.G. Hook and I.H. Porter (eds.), Population Genetics – Studies in Humans*, Academic Press, New York, pp. 301-352.
- Czerski, P. and S. Szmigielski, 1974. Microwave Bioeffects. In: *Proceedings of the Fifth European Microwave Conference*, pp. 348-354, Hamburg, September.
- D'Andrea, J.A. and B.L. Cobb, 1987. *High Peak Power Microwave Pulses at 1.3 GHz: Effects on Fixed Interval and Reaction Time Performance in Rats*. Pensacola Naval Air Station, Florida: Naval Aerospace Research Laboratory; December Report No. NAMRL-1337.

- D'Andrea, J.A., B.L. Cobb, and J.O. DeLorge, 1989. *Lack of Behavioral in the Rhesus Monkey: High Peak Microwave Pulses at 1.3 GHz*. Bioelectromagnetics 10: 65-76.
- D'Andrea, J.A., J. Knepton, B.L. Cobb, B.J. Klauenberg, J.H. Merritt, and D.N. Erwin, 1989. *High Peak Power Microwave Pulses at 2.37 GHz: No-Effect on Vigilance Performance in Monkeys*. Pensacola NAS, FL: Naval Aerospace Medical Research Laboratory; 1989 February Report No. NAMRL-1348; and Brooks AFB, Texas: U.S. Air Force School of Aerospace Medicine. Report No. USAFSAM-TR-89-21.
- D'Andrea, J.A., B.L. Cobb, and J.C. Knepton, 1992. *Behavioral Effects of High Peak Power Microwave Pulses: Head Exposure at 1.3 GHz*. Pensacola Naval Air Station, Florida: Naval Aerospace Medical Research Laboratory; August Report No. NAMRL-1372.
- D'Andrea, J.A., A. Thomas, and D.J. Hatcher, 1994. *Rhesus Monkey Behavior during Exposure to High Peak Power 5.6 GHz Microwave Pulses*. Bioelectromagnetics 15: 163-176.
- Djordjević, Z., A. Kolak, M. Stojkovic, N. Rankovic, and P. Ristic, 1979. *A Study of the Health Status of Radar Workers*. Aviat. Space Environ. Med. 50: 396-398.
- Donnellan, M.; McKenzie, D.R.; and French, P.W., 1997. "Effects of Exposure to Electromagnetic Radiation at 835 MHz on Growth, Morphology and Secretory Characteristics of a Mast Cell Analogue, RBL-2H3". Cent. Immunol., St. Vincent's Hosp., Victoria Street, Darlinghurst, Sydney, Australia. Cell Biology International 21 (7). 427-439.
- Durney, C.H., C.C. Johnson, P.W. Barber, H. Massoudi, M.F. Iskander, J.L. Lords, D.K. Ryser, S.J. Allen, and J.C. Mitchell, 1978. *Radiofrequency Dosimetry Handbook*. (2nd ed.), Brooks Air Force Base, Texas, 141 pp. (Report No. SAM-TR-78-22).
- Durney, C.H., M.F. Iskander, H. Massoudi, S.J. Allen, and J.C. Mitchell, 1980. *Radiofrequency Radiation Dosimetry Handbook* (3rd ed.), Brooks Air Force Base, Texas, 136 pp. (Report No. SAM-TR-80-32).
- Dutta, S.K.; Verma, M.; and Blackman, C.F., 1994. *Frequency Dependent Alterations in Enolase Activity in Escherichia Coli Caused by Exposure to Electric and Magnetic Fields*. Bioelectromagnetics, 15 (5) 377-383. 147 Mhz carrier modulated at low frequency. 0.05 W/kg.
- Edelwejn, Z., R.L. Elser, E. Klimková-Dewtschová, B. Tengroth, 1974. Occupational Exposure and Public Health Aspects of Microwave Radiation. pp. 330-331. In: P. Czerski, E.D. *Biologic Effects and Health Hazards of Microwave Radiation*. Proceedings of an International Symposium, Warsaw: Polish Medical Publishers.
- Everett, S.J., W.A. Edson, L.N. Heynick, S.R. Pierce, R.A. Shephard, and T.H. Walklet, 1983. *Southwest PAVE PAWS Radar System: Environmental Assessment*. Report USAFSAM-TR-83-13. Brooks Air Force Base, Texas: USAF School of Aerospace Medicine; March.
- Farrell, J.M.; Litovitz, T.L.; Penafiel, M.; Montrose, C.J.; Doinov, P.; Barber, M.; Brown, K.M.; and Litovitz, T.A., 1997. "The Effect of Pulsed and Sinusoidal Magnetic Fields on the Morphology of Developing Chick Embryos". Vitreous State Laboratory, Catholic University of America, Washington, DC, USA. Bioelectromagnetics; 18(6):431-8.

- Ferri, E.S. and G.J. Hagan, 1976. *Chronic Low-level Exposure of Rabbits to Microwaves*, Rockville, U.S. Department of Health, Education, and Welfare, pp. 129-142 (USDHEW Publication [FDA] 70-8010).
- Feychting, M.; Pedersen, N.L.; Svedberg, P.; Floderus, B.; and Gatz, M., 1998. "Dementia and Occupational Exposure to Magnetic Fields". Institute of Environmental Medicine, The Karolinska Institute, Stockholm, Sweden. *Scand J Work Environ Health*, Feb; 24(1): 46-53.
- Foster, K.R. and E.D. Finch, 1974. *Microwave Hearing: Evidence for Thermoelastic Auditory Stimulation by Pulsed Microwaves*. *Science* 185:156-158.
- French, P.W.; Donnellan, M.; and McKenzie, D.R., 1997. "Electromagnetic Radiation at 835 MHz Changes the Morphology and Inhibits Proliferation of a Human Astrocytoma Cell Line." Centre Immunology, St. Vincent's Hosp., Victoria Street, Darlinghurst, Sydney, Australia. *Bioelectrochemistry and Bioenergetics* 43 (1), 13-18.
- Frey, A.H., 1961. *Auditory System Response to RF Energy*. *Aerospace Medicine*. 32:1140-1142.
- Frey, A.H., 1962. *Human Auditory System Response to modulated Electromagnetic Energy*. *Journal of Applied Physics*. 17: 689-692.
- Frey, A.H., 1963. *Some Effects on Human Subjects of Ultra-High Frequency Radiation*. *American Journal of Med. Electron*. 2:28-31.
- Gailey, P.C., 1999. "Membrane Potential and Time Requirements for Detection of Weak Signals by Voltage-gated Ion Channels". *Bioelectromagnetics; Suppl* 4:102-9.
- Galvin, M.J., M.J. Ortner, and D.I. McRee, 1982. *Studies on Acute in vivo Exposure of Rats to 2450 MHz Microwave Radiation*. III. Biochemical and Haematologic Effects. *Radiat. Res.*, 90:558-563.
- Gandhi, C.R., 1997. Alterations in Alpha-Adrenergic and Muscarinic Cholinergic Receptor Binding in Rat Brain Following Non-ionizing Radiation. *Radiat Res*, 109(1): 90-99.
- Gandhi, C.R., 1989. Microwave Induced Stimulation of 32 PI Incorporation into Phosphoinositides of Rat Brain Synaptosomes. *Radiat Environ Biophys*, 28: 223-234.
- Goldsmith, J.R., 1996. *Epidemiological Studies of Radiofrequency Radiation: Current Status and Areas of Concern*. *Scientific Total Environment*. 180:3-8.
- Gordon, Z.V., 1970. Occupational Health Aspects of Radiofrequency Electromagnetic Radiation. In: *Ergonomics and Physical Environmental Factors*. Geneva, International Labour Office, pp. 159-174 (Occupational Safety and Health Series No. 21).
- Gordon, Z.V., 1976. [*Problems of Industrial Hygiene and the Biological Effects of Electromagnetic Super-high Frequency Fields*]. Moscow, Medicina (In Russian) (English Translation in NASA Rep. TT-F-633).

- Guy, A.W., 1971. *Analysis of Electromagnetic Fields Induced in Biological Tissues by Thermographic Studies on Equivalent Phantom Models*. IEEE Trans. Microwave Theory Tech. MTT-19: 205-214.
- Guy, A.W., 1974. Quantitation of Induced Electromagnetic Patterns in Tissue and Associated Biologic Effects. In: *Czerski, P., Ostrowski, K., Shore, M.L., Silverman, Ch., Suess, M.J., and Waldeskog, B., ed. Biologic Effects and Health Hazards of Microwave Radiation*, Warsaw, Polish Medical Publishers, p. 203-216.
- Guy, A.W. and C.K. Chou, 1982. *Effects of High-intensity Microwave Pulse Exposure of Rat Brain*. Radio Science 17(5S): 169-178.
- Guy, A.W., C.K. Chou, L.L. Kunz, J. Crowley, and J. Krupp, 1985. *Effects of Long-term Low-level Radiofrequency Radiation Exposure on Rats. Volume 9. Summary*. Brooks Air Force Base, Texas, USAF School of Aerospace Medicine (USAFSAM-TR-85-11).
- Hendler, E., J.D. Hardy, and D. Murgatroyd, 1963. Skin Heating and Temperature Sensation Produced by Infrared and Microwave Irradiation. In: *C.M. Herzfeld (ed.), Temperature. ITS Measurement and Control in Science and Industry, Vol. 3, Part 3*, J.D. Hardy (ed.), Biology of Medicine, Reinhold, Pub. Corp., New York, pp. 211-230.
- Hendler, E., 1968. Cutaneous Receptor Response to Microwave Irradiation. In: *J.D. Hardy (ed.), Thermal Problems in Aerospace Medicine*, Unwin Bros. Ltd., Surrey, U.K., pp. 149-161.
- Hermann, D.M. and K.A. Hossman, 1997. *Neurological Effects of Microwave Exposure Related to Mobile Communication*. J. Neurol. Sci. 152: 1-14.
- Heynick, L. and P. Polson, 1996. *Radiofrequency Radiation and Teratogenesis: A Comprehensive Review of the Literature Pertinent to Air Force Operations*. OEHL Directorate, Radiofrequency Radiation Division, Brooks Air Force Base, Texas, (AL/OE-TR-1996-0036).
- Heynick, L. and P. Polson, 1996. *Human Exposure to Radiofrequency Radiation: A Review Pertinent to Air Force Operations*. OEHL Directorate, Radiofrequency Radiation Division, Brooks Air Force Base, Texas, (AL/OE-TR-1996-0035).
- Hille, B., 1992. *Ionic Channels of Excitable Membranes*, Sidaer Associates, Inc., Massachusetts.
- Hirsch, F.G. and J.T. Parker, 1952. *Bilateral Lenticular Opacities Occurring in a Technician Operating a Microwave Generator*. Arch. Ind. Hyg. Occup. Med. 6: 512-517.
- International Commission on Non-Ionizing Radiation Protection, 1998. *Guidelines for Limiting Exposure to Time-Varying Electric, Magnetic, and Electromagnetic Fields (up to 300 GHz)*. Health Physics 74: 494-522.
- Jauchem, J.R., 1996. *Exposure to Extremely-low-Frequency Electromagnetic Fields and Radiofrequency Radiation: Cardiovascular Effects in Humans*. International Arch Occupational Environmental Health, Vol. 70, pp. 9-21.

- Jauchem, J.R., 1998. *Health Effects of Microwave Exposures: A Review of the Recent (1995-1998) Literature*. Journal of Microwave Power and Electromagnetic Energy. Vol. 33, No. 4, pp. 263-274.
- Jauchem, J.R., 2000. Potential cognitive/behavioural and cardiovascular effects of low-level microwave exposures in humans. In: *Countering the Directed Energy Threat: Are Closed Cockpits the Ultimate Answer?* (Proceedings of a Human Factors and Medicine Panel Symposium, 20-26 April 1999, Antalya, Turkey). NATO Research and Technology Agency Publication No. RTO-MP-30 AC/323(HFM)TP/10, pp. 3-1 to 3-13, January.
- Jenrow, K.A.; Smith, C.H.; and Liboff, A.R., 1996. "Weak Extremely-low-frequency Magnetic Field-induced Regeneration Anomalies in the Planarian *Dugesia Tigrina*". Department of Physics, Oakland University, Rochester, Michigan, USA. *Bioelectromagnetics*; 17(6):467-74.
- Johnson, C.C. and A.W. Guy, 1972 *Non-ionizing Electromagnetic Wave Effects in Biological Materials and Systems*. Proc. IEEE, 60: 692-718.
- Johnson, C.C., C.H. Durney, P.W. Barber, H. Massoudi, S.T. Allen, and T.C. Mitchell, 1976. *Radiofrequency Radiation Dosimetry Handbook*. (1st ed.), Salt Lake City, University of Utah, 125 pp. (Report SAM-TR-76-35).
- Johnson, R.B., D. Spackman, J. Crowley, D. Thompson, C.K. Chou, L.L. Kunz, and A.W. Guy, 1983. *Effects of Long-term Low-level Radiofrequency Radiation Exposure on Rats. Volume 4. Open-field Behavior and Corticosterone*. Brooks AFB, Texas, USAF School of Aerospace Medicine (USAFSAM-TR-83-42).
- Justesen, D.R., E.R. Adair, J.C. Stevens, and V. Bruce-Wolfe, 1982. *A Comparative Study of Human Sensory Thresholds: 2450 MHz Microwaves vs. Far-Infrared Radiation*. *Bioelectromagnetics*, Vol. 3, No. 1, pp. 117-125.
- Kalnins, T., R. Krizbergs, and A. Romancuks, 1996. *Measurement of the Intensity of Electromagnetic Radiation from the Skundra Radio Location Station, Latvia*. *Scientific Total Environment*. 180: 51-56.
- Kurz, G.H. and R.B. Einaugler, 1968. *Cataract Secondary to Microwave Radiation*. *Amer. J. Ophthalmol.* 66: 866-869.
- Lai, W.; and Singh, N.P., 1995. *Acute Low-intensity Microwave Exposure Increases DNA Single-strand Breaks in Rat Brain Cells*. *Bioelectromagnetics*; 16 (3):207-10. 2450 megahertz at 1.2 W/kg showed increases.
- Lai, H. and Singh, N.P., 1997. *Acute Exposure to a 60 Hz Magnetic Field Increases DNA Strand Breaks in Rat Brain Cells*. *Bioelectromagnetics*; 18 (2): 156-65.
- Lai, H. and Singh, N.P., 1997. *Melatonin and a Spin-trap Compound Block Radiofrequency Electromagnetic Radiation-induced DNA Strand Breaks in Rat Brain Cells*. *Bioelectromagnetics*; 18(6): 446-54.

- Larsen, A.I., 1991. *Congenital Malformations and Exposure to High-Frequency Electromagnetic Radiation Among Danish Physiotherapists*. Scand. J. Work Environ. Health 17: 318-323.
- Lary, J.M. and D.L. Conover, 1987. *Teratogenic Effects of Radiofrequency Radiation*. IEEE Eng. Med. Biol. Mag., March: 42-46.
- Liburdy, R.P., 1979. *Radiofrequency Radiation Alters the Immune System: Modification of T- and B-lymphocyte Levels and Cell-mediated Immunocompetence by Hyperthermic Radiation*. Radiat. Res., 77: 34-46.
- Liburdy, R.P., 1980. *Radiofrequency Radiation Alters the Immune System*. II. Modulation of in vivo Lymphocyte Circulation. Radiat. Res., 83: 63-73.
- Lotz, W.G. and S.M. Michaelson, 1978. *Temperature and Corticosterone Relationship in Microwave-Exposed Rats*. J. Appl. Physiol.: Respirat. Environ. Exercise Physiol., 44: 438-445.
- Lotz, W.G. and R.P. Podgorski, 1982. *Temperature and Adrenocortical Responses in Rhesus Monkeys Exposed to Microwaves*. J. Appl. Physiol.: Respirat. Environ. Exercise Physiol., 53: 1565-1571.
- Malowicki, E., 1981. *Radar Frequency Radiation*. Report RADC-TR-81-347, Griffiss Air Force Base, New York: Rome Air Development Center.
- Marha, I., J. Musil, and H. Tuha, 1971. *Electromagnetic Fields and the Living Environment*, San Francisco, San Francisco Press, 134 pp.
- McLees, B.D. and E.D. Finch, 1973. *Analysis of Reported Physiologic Effects of Microwave Radiation*. Adv. Biol. Med. Phys., 14:163-223.
- Michaelson, S.M., 1971. *The Tri-Service Program – A Tribute to George M. Knauf*, USAF (MC) IEEE Trans. Microwave Theory Tech., MTT-19: pp. 131-146.
- Michaelson, S.M., 1973. Thermal Effects of Single and Repeated Exposures to Microwaves – A Review. In: *Czerski, P., Ostrowski, K., Shore, M.L., Silverman, Ch., Suess, M.J., and Waldeskog, B., ed. Biologic Effects and Health Hazards of Microwave Radiation*, Warsaw, Polish Medical Publishers, p. 1.
- Mitchell, J.C., 1975. *Electromagnetic Interference of Cardiac Pacemakers*. AGARD Lecture Series No. 78. Radiation Hazards. Brussels, Belgium: NATO, Advisory Group for Aerospace Research and Development.
- National Council on Radiation Protection and Measurements (NCRP), 1986. *Biological Effects and Exposure Criteria for Radiofrequency Electromagnetic Fields*. NCRP Report No. 86, USA.
- Olsen, R.G. and Lin, J.C., 1981. "Microwave Pulse-induced Acoustic Resonances in Spherical Head Models", IEEE Trans. Microwave Theory Tech., vol. 29, pages 1114-1114.

- Ouellet-Hellstrom, R.O. and Stewart, W.F., 1993. *Miscarriages Among Female Physical Therapists Who Report Using Radio- and Microwave-Frequency Electromagnetic Radiation*. Am. J. Epidemiol. 138: 775-786.
- Oughstun, K.E., 1995. "Noninstantaneous, Finite Rise-time Effects on the Precursor Field Formation in Linear Dispersive Pulse Propagation". J. Opt. Soc. Am. A, vol. 12, pages 1715-1729.
- Peacock, P.B., J.W. Simpson, C.A. Alford, and F. Saunders, 1971. *Congenital Anomalies in Alabama*. J. Med. Assoc. Ala., Vol. 41, No. 1, pp. 42-50.
- Peacock, P.B., S.R. Williams, and E. Nash, 1973. *Relationship Between the Incidence of Congenital Anomalies in the Use of Radar in Military Bases*. Final Report, Report No. III, Project No. 3118, November 1973, Contract No. 68-02-0791 Submitted by Southern Research Institute to EPA (unpublished).
- Pleshko, P. and Palocz, I., 1969. "Experimental Observation of the Sommerfeld and Brillouin Precursors in the Microwave Domain", Phys. Rev. Lett. vol. 22, pages 1201-1204.
- Puranen, L. and K. Jokela, 1996. *Radiation Hazard Assessment of Pulsed Microwave Radars*. Journal of Microwave Power and Electromagnetic Energy, Vol. 31, No. 3, pp. 165-177.
- Rayman, R.B., 1995. The Electromagnetic Spectrum and Chemical Hazards. In: *Rbak, J., Rayman, R.B., and From, P. (eds.) Occupational Health in Aviation: Maintenance and Support Personnel*, pp. 117-165. Academic Press, San Diego.
- Richardson, A.W., T.D. Duane, and H.M. Hines, 1948. *Experimental Lenticular Opacities Produced by Microwave Irradiation*. Arch. Phys. Med. 29: 765-769.
- Roberti, B., G.H. Heebels, J.C.M. Hendricx, A.H.A.M. DeGreef, and O.L. Wolthius, 1975. *Preliminary Investigations on the Effects of Low-level Microwave Radiation on Spontaneous Motor Activity in Rats*. Ann. New York Acad. Sci., 247: 417-424.
- Roberts, N.J., Jr., 1979. *Temperature and Host Defense*. Microbiol. Rev., 43: 241-259.
- Roberts, N.J. and S.M. Michaelson, 1985. *Epidemiological Studies of Human Exposures to Radiofrequency Radiation*. Int. Arch. Occup. Environ. Med. 56: 169-178.
- Röschke, J. and K. Mann, 1997. *No Short-term Effects of Digital Mobile Radio Telephone on the Awake Human Electroencephalogram*. Bioelectromagnetics 18: 172-176.
- Sadchikova, M.N., 1974. Clinical Manifestations of Reactions to Microwave Irradiation Various Occupational Groups. In: *Czerski, P., Ostrowski, K., Shore, M.L., Silverman, C.H., Swess, M.J., and Waldeskog, B., ed. Biologic Effects and Health Hazards of Microwave Radiation*, Warsaw, Polish Medical Publishers, pp. 273-280.
- Sandyk, R., 1997. Speech Impairment in Parkinson's Disease is Improved by Transcranial Application of Electromagnetic Fields. Int. J. Neurosci, Nov; 92 (1-2): 63-72.

- Sandyk, R., 1997. *Treatment with Electromagnetic Fields Improves Dual-task Performance (talking while walking) in Multiple Sclerosis*. Int. J. Neurosci 1997 Nov; 92 (1-2):95-102.
- Savitz, D.A.; Liao, D.; Sastre, A.; Kleckner, R.C.; and Kavet, R., 1999. *Magnetic Field Exposure and Cardiovascular Disease Mortality Among Electric Utility Workers*. Department of Epidemiology, School of Public Health, University of North Carolina, Chapel Hill, USA. Am J Epidemiol. Dec 1;150(11):1258-9.
- Scholl, D.M. and S.J. Allen, 1979. *Skilled Visual Motor Performance by Monkeys in a 1.2 GHz Microwave Field*. Radio Sci., 14: (6S): 247-252.
- Shacklett, D.E., T.J. Tredici, and D.L. Epstein, 1975. *Evaluation of Possible Microwave-induced Lens Changes in the U.S. Air Force*. Aviat., Environ. Med. 46: 1403-1406.
- Shimkovich, T.S. and V.G. Shilyaev, 1959. *Cataracts of Both Eyes Which Developed as a Result of Repeated, Short Exposure to an Electromagnetic Field of High Density*. Vestn. Ophthalmol. 72: 12-16.
- Sigler, A.T., A.M. Lilienfeld, B.H. Cohen, J.E. and Westlake, 1965. *Radiation Exposure in Parents of Children with Mongolism (Down's Syndrome)* Bull. Johns Hopkins Hospital, Vol. 117, pp. 374-395.
- Smialowicz, R.J., C.M. Weil, P. Marsh, M.M. Riddle, R.R. Rodgers, and B.F. Rehnberg, 1981. *Biological Effects of Long-term Exposure of Rats to 970 MHz Radiofrequency Radiation*. Bioelectromagnetics, 2: 279-284.
- Smialowicz, R.J., 1984. Haematologic and Immunologic Effects. In: *Elder, J.A. and Cahill, D.F., ed. Biological Effects of Radiofrequency Radiation*. Research Triangle Park, North Carolina, Health Effect Research Laboratory, U.S. Environmental Protection Agency, pp. 5-13 to 5-28 (EPA 600/8-83-026F).
- Smialowicz, R.J., M.M. Riddle, P.L. Brugnotti, J.M. Sperrazza, and J.B. Kinn, 1979. Evaluation of Lymphocyte Function in Mice Exposed to 2450 MHz (CW) Microwaves. In: *Stuchly, S.S., ed. Electromagnetic Fields in Biological Systems*. Edmonton, Canada, International Microwave Power Institute, pp. 122-152.
- Smialowicz, R.J., J.B. Kinn., and J.A. Elder, 1979. *Perinatal Exposure of Rats to 2450 MHz CW Microwave Radiation: Effects on Lymphocytes*. Radio Sci., 14: 147-153.
- Smialowicz, R.J., J.S. Ali, E. Berman, S.J. Bursian, J.B. Kinn, C.G. Liddle, L.W. Reiter, and C.M. Weil, 1981. *Chronic Exposure of Rats to 100 MHz (CW) Radiofrequency Radiation: Assessment of Biological Effects*. Radiat. Res., 86: 488-505.
- Smialowicz, R.J., C.M. Weil, J.B. Kinn, and J.A. Elder, 1982. *Exposure of Rats to 425 MHz (CW) Radiofrequency Radiation: Effects on Lymphocytes*. J. Microwave Power, 17: 211-221.

- Smith, R.R., 1988. "Dispersive Pulse Propagation: First Experiments", DNA-TR-88-262.
- Schlagel, C.J., K. Sulek, H.S. Ho, W.M. Leach, A. Ahmed, and J.N. Woody, 1980. Biological Effects of Microwave Exposure. II. *Studies on the Mechanisms Controlling Susceptibility to Microwave-induced Increases in Complement Receptor-positive Spleen Cells*. Bioelectromagnetics, 1: 405-414.
- Schlagel, C.J. and A. Ahmed, 1982. *Evidence for Genetic Control of Microwave-induced Augmentation of Complement Receptor-bearing B-lymphocytes*. J. Immunol., 129(4): 1530-1533.
- Sobel, E. et al., 1995. "Occupations with Exposure to Electromagnetic Fields: A Possible Risk Factor for Alzheimers Disease. Am J Epidemiol, Sep 1;142(5):515-24.
- Staczek, J.; Marino, A.A.; Gilleland, L.B.; Pizarro A.; and Gilleland H.E., 1998. Low-frequency Electromagnetic Fields Alter the Replication Cycle of MS2 Bacteriophage. Curr Microbiol, May; 36(5):298-301.
- Stratton, J.A., 1941. *Electromagnetic Theory*, McGraw Hill, Inc., New York.
- Taskinen, H., P. Kyyronen, and K. Hemminki, 1990. *Effects of Ultrasound, Shortwaves, and Physical Exertion on Pregnancy Outcome in Physiotherapists*. J. Epidemiol. Community Health 44: 196-201.
- Thomas, J.R., E.D. Finch, D.W. Fulk, and L.S. Birch, 1975. *Effects of Low-level Microwave Radiation on Behavioral Baselines*. Ann. New York Acad. Sci., 247: 425-432.
- Tjagin, N.W., 1971. [*Clinical Aspects of Super-high Frequency Irradiation*]. Leningrad, Medicina, pp. 174. (In Russian).
- Toler, J., V. Popovic, S. Bonasera, P. Popovic, C. Honeycutt, and D. Sgoutas, 1988. *Long-term Study of 435 MHz Radiofrequency Radiation on Blood-borne End Points in Cannulated Rats*. Part II. Methods, Results, and Summary. Journal of Microwave Power and Electromagnetic Energy 23: 105-136.
- Tolgskaya, M.S., Z.V. Gordon, and E.A. Labanova, 1962. Morphologic Changes in Experimental Animals Exposed to Pulsed and Continuous SHF. In: *Biological Action of Ultra-high Frequencies*, Washington D.C., Office of Technical Services, U.S. Department of Commerce (Joint Publications Research Service Department JPRS-12471).
- Tolgskaya, M.S. and Z.V. Gordon, 1973. *Pathological Effects of Radio Waves*, New York. B. Haigh, Trans. Consultants Bureau.
- Walters, T.J., P.A. Mason, C.J. Sherry, C. Steffen, and J.H. Merritt, 1995. *No Detectable Bioeffects Following Acute Exposure to High Peak Power Ultra-wide Band Electromagnetic Radiation in Rats*. Aviat. Space Environ. Med. 66: 562-567.
- Wicktor-Jedrzejczak, W., A. Ahmed, P. Czerski, W.M. Leach, and K.W. Sell, 1977. *Immune Response of Mice to 2450 MHz Radiation: Overview of Immunology and Empirical Studies of Lymphoid Splenic Cells*. Radio Sci., 12(S): 209-219.

Wicktor-Jedrzejczak, W., A. Ahmed, P. Czerski, W.M. Leach, and K.W. Sell, 1977. *Microwaves Induce an Increase in the Frequency of Complement Receptor-bearing Lymphoid Spleen Cells in Mice*. J. Immunol., 118: 1499-1502.

Wicktor-Jedrzejczak, W., A. Ahmed, P. Czerski, W.M. Leach, and K.W. Sell, 1980. *Effect of Microwaves (2450 MHz) on the Immune System in Mice: Studies of Nucleic Acid and Protein Synthesis*. Bioelectromagnetics, 1: 161-170.

Williams, R.J. and E.D. Finch, 1974. *Examination of the Cornea Following Exposure to Microwave Radiation*. Aerospace Med. 45:393-396.

Weiter, J.J., E.D. Finch, W. Shultz, and V. Frattali, 1975. *Ascorbic Acid Charged In-Cultured Rabbit Lenses After Microwave Irradiation*. Ann. N.Y. Acad. Sci., 47: 175-181.

Wong, L.S., J.H. Merrit, and J.L. Keil, 1985. *Effects of 20 MHz Radiofrequency Radiation on Rat Haematology, Splenic Function, and Serum Chemistry*. Radiat. Res., 103: 186-195.

World Health Organization, 1981. *Environmental Health Criteria 16: Radiofrequency and Microwaves*.

World Health Organization, 1993. *Environmental Health Criteria 137: Electromagnetic Fields (300 Hz to 300 GHz)*.

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APPENDIX C
PUBLIC COMMENTS AND RESPONSES

**CAPE COD AFS, EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
RESPONSE TO COMMENTS**

Richard A. Albanese, MD
August 5, 2002

Comment No.	Comment	Response
1	<p>Please improve safety practice. As components of the computer subsystem are replaced, I believe it would be proper safety practice to verify that the radar system output has not been modified.</p> <p>In addition to monitoring signals interior to the system, I recommend use of a single sensor placed external to the system on the Cape Cod PAVE PAWS property. I believe that it would be good practice to record signal envelope statistics (rise time, fall time, pulse width, inter-pulse interval, etc.) and to record within-signal time domain structure. Records should be kept of radiated signals before, during and after the computer upgrade. I refer you to my own research articles to develop an understanding of the suggested parameters.</p>	<p>In the months leading up to the onset of the SLEP upgrades, the Air Force will give further consideration to what, if any, measurements of the radar output should be taken before, during, and after the equipment upgrades. An engineering analysis (see Appendix D) indicated that the Proposed Action would not increase the power output of the radar or change the characteristics of the radar's radio frequency energy (RFE). However, the Air Force is aware of concerns that modifications to the radar output could occur during or after the SLEP upgrade process.</p>
2	<p>Please improve medical communication. On page 2-11 the following is found: The RFE levels measured during surveys were below the applicable general public exposure limit and indicate that no known health hazards exist based on the low-intensity RFE resulting from the SSPARS emissions." A similar statement is found on page 4-6: "the RFE levels measured during the surveys indicate that no known health hazards exist resulting from the SSPARS emission."</p> <p>The phrase "no known health hazard exist" has a reassuring tone when quickly read, but is deeply ambiguous and very misleading. This phrase is inappropriate medical language in many contexts, and particularly in the context of PAVE PAWS. The phrase has no consistent meaning.</p> <p>What is meant by the phrase "no known health hazards exist?"</p> <p>There are no phased array medical data sets. Since the phased array radiation of PAVE PAWS has not been tested, one can say</p>	<p>Based on current, scientifically peer-reviewed bioeffects research, no known detrimental medical conditions have been reported to occur at the RFE levels measured around the radar.</p> <p>The overwhelming majority of those scientists versed in the area who have expressed an opinion on this matter believe that the IEEE/ANSI standard and the bioeffects studies used to establish the standard are applicable to both continuous-wave and pulsed, phased-array emitters. The Air Force is aware that a small number of individuals have questioned whether the IEEE/ANSI standard is applicable to phased array systems. The Air Force has entered into a contract with the National Research Council to address this question.</p>

**CAPE COD AFS, EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
RESPONSE TO COMMENTS**

Richard A. Albanese, MD
August 5, 2002

Comment No.	Comment	Response
	<p>that "no known health hazards exist" simply because there have been no studies that are absolutely known to apply. But this can certainly no be taken as reassuring.</p> <p>One may find a way to extrapolate from non-phased radiation medical data sets to phased array radiation to make a statement concerning health hazards. Is that the writers have done? How do the writers argue that extrapolation is appropriate? How accurate is the extrapolation?</p> <p>Or, are the writers stating that they accept the national guideline and interpret it to mean that all exposures of any kind of radiation with power density below the guideline levels do not influence human disease rates? How does this acceptance make scientific sense in the absence of phased array data?</p> <p>Instead of a statement "no known health hazards exist" which has no unambiguous self-evident interpretation, what citizens need and a public health official would like to provide, is a statement like the following:</p> <p>"The five leading causes of death in the United States have been studied in their relationship to radiation exposure. None of the normal disease rates are statistically elevated by exposure to radiation. In fact, all radiation exposed animals and persons had disease rates that fall within 5% of the normal rate, for the leading five causes of death."</p> <p>It saddens me greatly that such a statement as the one above is not available today. Without the ability to make such a statement, this EA has little or no medical or public health value, in my opinion. My references for this opinion are health studies in the field of ionizing radiation and health studies concerning dioxins.</p>	

**CAPE COD AFS, EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
RESPONSE TO COMMENTS**

Richard A. Albanese, MD
August 5, 2002

Comment No.	Comment	Response
3	<p>A quality Environmental Impact Statement is needed. I believe that the PAVE PAWS system should remain in operation to meet military requirements while the needed health data are acquired.</p> <p>However, I am very uncomfortable with the use of the Environmental Assessment rather than an Environmental Impact Statement. In the absence of any phased array radiation data and in the absence of trustworthy disease rate data estimates, and given the National Academy of Sciences activities concerning phased arrays, a finding of no significant impact (FONSI) is without substance.</p> <p>I am concerned about issuing a FONSI when the National Academy of Sciences is examining the question of whether or not phased array data sets are still needed. The contradiction is evident. Will the National Academy work be prejudiced by this legal determination? Will follow on Air Force work be prejudiced by this legal determination? These are unknowns which are of grave concern to me.</p> <p>I recommend simply continuing operation of PAVE PAWS on the basis of military necessity, and striving to obtain needed data in the context of an Environmental Impact Statement. If the FONSI must be issued for some reason, I believe that the Air Force should pledge to obtain the needed disease rate data. We must defend the nation with excellence and discipline as a top priority and concurrently address health impacts of this defense on active duty personnel and collaterally exposed civilians with comparable excellence and discipline.</p> <p>A realistic plan to get solid disease rate data in a timely matter (three years) is needed. The current planned health study is not adequate to this task because it is not properly designed.</p>	<p>An Environmental Assessment (EA) is the proper level of environmental analysis for the Proposed Action. The Proposed Action will replace computer hardware and rehost software but will not change the power output or characteristics of the RFE being emitted from the radar. The relevant determination in the EA being whether the impact, if any, of replacing computer hardware and rehosting software is environmentally significant. The EA did not indicate that the Proposed Action would have any significant impact to the environment. Therefore, a Finding of No Significant Impact (FONSI) is appropriate.</p> <p>To address community concerns regarding the ongoing operation of the radar, the Air Force is preparing a Supplemental Environmental Impact Statement (EIS) to the 1979 EIS. The Supplemental EIS will include, among other study results, the results from the National Research Council study. Conduct of an EA for the Proposed Action in no way diminishes planned Air Force efforts to respond to those in the community who are concerned about potential health effects from the ongoing operation of the radar.</p>

**CAPE COD AFS, EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
RESPONSE TO COMMENTS**

Richard A. Albanese, MD
August 5, 2002

Comment No.	Comment	Response
4	<p>Refer to natural environmental levels. It is important to put exposure levels into perspective. For example, at Crowley State Park (near camp site A-10) the observed average power density is 0.023 microwatts per square centimeter. The IEEE C95.1-1999 standard permits 280 microwatts per square centimeter. Thus the human exposure is 14,000 times below the guideline.</p> <p>On the other hand, natural background levels of radiation in this frequency band have power densities of one millionth of one microwatt per square centimeter (0.000001 microwatt per square centimeter), so the human exposure is 20,000 times above background.</p>	<p>Referring to the established health and safety standard, that is the IEEE/ANSI standard, is the appropriate comparison in a discussion of the radar's potential health and safety effects. A comparison to natural background levels contributes little probative information in an analysis of potential health effects.</p>
5	<p>Summary. Please consider monitoring system output as the computer changes are made, to insure no field change. Please improve the quality of medical communication, and perform a quality environmental impact statement. Please refer all measurements not only to the national guideline but to natural background levels.</p>	<p>The Air Force has responded to the points made in comment number 5 in its responses to comments 1 through 4.</p>

**CAPE COD AFS, EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
RESPONSE TO COMMENTS**

Richard Judge
August 15, 2002

Comment No.	Comment	Response
1	The EA must be withdrawn and a new full EIS needs to be done for the Cape Cod PAVE PAWS immediately as requested by Sen. Kennedy.	<p>An Environmental Assessment (EA) is the proper level of environmental analysis for the Proposed Action. The Proposed Action will replace computer hardware and rehost software but will not change the power output or characteristics of the RFE being emitted from the radar. The relevant determination in the EA being whether the impact, if any, of replacing computer hardware and rehosting software is environmentally significant. The EA did not indicate that the Proposed Action would have any significant impact to the environment. Therefore, a Finding of No Significant Impact (FONSI) is appropriate.</p> <p>To address community concerns regarding the ongoing operation of the radar, the Air Force is preparing a Supplemental Environmental Impact Statement (EIS) to the 1979 EIS. The Supplemental EIS will include, among other study results, the results from the National Research Council study. Conduct of an EA for the Proposed Action in no way diminishes planned Air Force efforts to respond to those in the community who are concerned about potential health effects from the ongoing operation of the radar.</p>

**CAPE COD AFS, EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
RESPONSE TO COMMENTS**

Sharon Judge
August 15, 2002

Comment No.	Comment	Response
1	It is not acceptable to the affected Cape Cod public to downgrade from an official legal Environmental Impact Statement (EIS) in progress to a less thorough Environmental Assessment (EA) as the stated purpose of an EA is to determine if an EIS is warranted.	<p>An Environmental Assessment (EA) is the proper level of environmental analysis for the Proposed Action. The Proposed Action will replace computer hardware and rehost software but will not change the power output or characteristics of the RFE being emitted from the radar. The relevant determination in the EA being whether the impact, if any, of replacing computer hardware and rehosting software is environmentally significant. The EA did not indicate that the Proposed Action would have any significant impact to the environment. Therefore, a Finding of No Significant Impact (FONSI) is appropriate.</p> <p>To address community concerns regarding the ongoing operation of the radar, the Air Force is preparing a Supplemental Environmental Impact Statement (EIS) to the 1979 EIS. The Supplemental EIS will include, among other study results, the results from the National Research Council study. Conduct of an EA for the Proposed Action in no way diminishes planned Air Force efforts to respond to those in the community who are concerned about potential health effects from the operation of the radar.</p>
2	There has been no mention in the draft EA about the unusual findings in the preliminary Air Force waveform characterization measurement effort. Strong surface waves were detected out in Cape Cod communities and there was also a highly irregular shut off pattern of the beam during each pulse envelope. I am concerned that the designers and operators of the PAVE PAWS facility do not know where the beam is out in the community when it is shutting off.	The waveform characterization study is ongoing and is outside the scope of this EA. This EA analyzes the replacement of computer hardware and the rehosting of software. Ongoing operation of the radar will be addressed in a Supplemental EIS which will include the results of the waveform characterization study. Comments about the ongoing operation of the radar or about ongoing studies are more relevant to the upcoming Supplemental EIS than to this EA.

**CAPE COD AFS, EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
RESPONSE TO COMMENTS**

Sharon Judge
August 15, 2002

3	The EIS has the same deficiencies as the NMD EIS and Appendix H including the omission of telling the public that non-phased data was being used to assert the safety of PAVE PAWS, a phased array warning system.	The overwhelming majority of those scientists versed in the area who have expressed an opinion on this matter believe that the IEEE/ANSI standard and the bioeffects studies used to establish the standard are applicable to both continuous-wave and pulsed, phased-array emitters. The Air Force is aware that a small number of individuals have questioned whether the IEEE/ANSI standard is applicable to phased array systems. The Air Force has entered into a contract with the National Research Council to address this question.
4	Important information such as this has not been disclosed to the public in the EIS process or now downgraded EA process. The minutes of the Air Force's "out briefing" of March 7 has not been made available on the web as have other similar meetings in the past.	The out-briefing on March 7, 2002, which was open to the public, dealt with the ongoing waveform characterization study (WCS). The Air Force is in the process of trying to recreate the transcript or meeting minutes. When completed, the transcript or minutes will be posted on the Internet.
5	We have repeatedly requested new Scoping meetings for the SLEP EIS so that the public can be adequately informed and properly participate in the EIS process.	Scoping meetings are not required for an EA.
6	The Air Force's Final "Preliminary Measurements of the PAVE PAWS Radar, Phase II – Single and Double Dipole Field Measurements & Phase III – Spectrum Background Analysis by the Kirtland, AFB Team contain no useful time-domain waveform characterization information for the community.	Comments on the adequacy of the ongoing WCS are outside the scope of the EA. The results of the study will be included in the Supplemental EIS.

**CAPE COD AFS, EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
RESPONSE TO COMMENTS**

Ron Cronin
August 20, 2002

Comment No.	Comment	Response
1	<p>Submission of letters regarding radiofrequency measurements of the SSPARS. April 7, 2001, PAVE PAWS Radiation Output Study July 24, 2002, Ground Wave Observation – Kirkland Air Force Team Behavior Inquiry August 9, 2002, Firefighters/University PAVE PAWS Radar Study – Cape Cod</p>	<p>Letters provide comments and information regarding the ongoing WCS. Comments on the study are outside the scope of the EA. The results of the WCS will be included in the Supplemental EIS.</p> <p>The July 24, 2002 letter also requests the Air Force withdraw support and approval of the Environmental Assessment (EA). The Air Force has concluded that an EA is the proper level of environmental analysis for the Proposed Action. The Proposed Action will replace computer hardware and rehost software but will not change the power output or characteristics of the RFE being emitted from the radar. The relevant determination in the EA being whether the impact, if any, of replacing computer hardware and rehosting software is environmentally significant. The EA did not indicate that the Proposed Action would have any significant impact to the environment. Therefore, a Finding of No Significant Impact (FONSI) is appropriate</p>

**CAPE COD AFS, EARLY WARNING RADAR SERVICE LIFE EXTENSION PROGRAM
RESPONSE TO COMMENTS**

David Dow
August 13, 2002

Comment No.	Comment	Response
1	Oppose breaking out the Milstar Fixed Communication Station as a separate EA or simply doing a supplement to the 1979 EIS as a way to address the results from the currently ongoing studies for characterizing the phased array signal and epidemiologic studies of its potential health effects. A new EIS is needed to address long standing public concern that were left unanswered in the 1979 EIS.	<p>An Environmental Assessment (EA) is the proper level of environmental analysis for the Proposed Action. The Proposed Action will replace computer hardware and rehost software but will not change the power output or characteristics of the RFE being emitted from the radar. The relevant determination in the EA being whether the impact, if any, of replacing computer hardware and rehosting software is environmentally significant. The EA did not indicate that the Proposed Action would have any significant impact to the environment. Therefore, a Finding of No Significant Impact (FONSI) is appropriate.</p> <p>To address community concerns regarding the ongoing operation of the radar, the Air Force is preparing a Supplemental Environmental Impact Statement (EIS) to the 1979 EIS. The Supplemental EIS will include, among other study results, the results from the National Research Council study. Conduct of an EA for the Proposed Action in no way diminishes planned Air Force efforts to respond to those in the community who are concerned about potential health effects from the ongoing operation of the radar.</p>

5 August 2002

Mr. Robert Novak
HQ AFSPC/CEVP
150 Vandenberg Street
Suite 1105
Peterson AFB, CO 80914-2370

1. I write this letter as a private citizen addressing the Draft Environmental Assessment for the Early Warning Radar Service Life Extension Program. Cape Cod Air Force Station (AFS), Massachusetts.
2. **Please improve safety practice.** As components of the computer subsystem are replaced, I believe it would be proper safety practice to verify that the radar system output has not been modified.

In addition to monitoring signals interior to the system, I recommend use of a single sensor placed external to the system on the Cape Cod PAVE PAWS property. I believe that it would be good practice to record signal envelope statistics (rise time, fall time, pulse width, interpulse interval, etc.) and to record within-signal time domain structure. Records should be kept of radiated signals before, during and after the computer upgrade. I refer you to my own research articles to develop an understanding of the suggested parameters.

3. **Please improve medical communication.** On page 2-11 the following is found: "The RFE levels measured during surveys were below the applicable general public exposure limit and indicate that no known health hazards exist based on the low-intensity RFE resulting from the SSPARS emissions." A similar statement is found on page 4-6: "The RFE levels measured during the surveys indicate that no known health hazards exist resulting from the SSPARS emission."

The phrase "no known health hazards exist" has a reassuring tone when quickly read, but is deeply ambiguous and very misleading. This phrase is inappropriate medical language in many contexts, and particularly in the context of PAVE PAWS. The phrase has no consistent meaning.

What is meant by the phrase "no known health hazards exist"?

There are no phased array medical data sets. Since the phased array radiation of PAVE PAWS has not been tested, one can say that "no known health hazards exist" simply because there have been no studies that are absolutely known to apply. But this can certainly not be taken as reassuring.

One may find a way to extrapolate from non-phased radiation medical data sets to phased array radiation to make a statement concerning health hazards. Is that what the writers have

done? How do the writers argue that extrapolation is appropriate? How accurate is the extrapolation?

Or, are the writers stating that they accept the national guideline and interpret it to mean that all exposures of any kind of radiation with power density below the guideline levels do not influence human disease rates? How does this acceptance make scientific sense in the absence of phased array data?

Instead of a statement "no known health hazards exist" which has no unambiguous self-evident interpretation, what citizens need and a public health official would like to provide, is a statement like the following:

"The five leading causes of death in the United States have been studied in their relationship to radiation exposure. None of the normal disease rates are statistically elevated by exposure to radiation. In fact, all radiation exposed animals and persons had disease rates that fall within 5% of the normal rate, for the leading five causes of death."

It saddens me greatly that such a statement as the one above is not available today. Without the ability to make such a statement, this EA has little or no medical or public health value, in my opinion. My references for this opinion are health studies in the field of ionizing radiation and health studies concerning dioxins.

4. A quality Environmental Impact Statement is needed. I believe that the PAVE PAWS system should remain in operation to meet military requirements while the needed health data are acquired.

However, I am very uncomfortable with the use of the Environmental Assessment rather than an Environmental Impact Statement. In the absence of any phased array radiation data and in the absence of trustworthy disease rate data estimates, and given the National Academy of Sciences activities concerning phased arrays, a finding of no significant impact (FONSI) is without substance.

I am concerned about issuing a FONSI when the National Academy of Sciences is examining the question of whether or not phased array data sets are needed. The contradiction is evident. Will the National Academy work be prejudiced by this legal determination? Will follow-on Air Force work be prejudiced by this legal determination? These are unknowns which are of grave concern to me.

I recommend simply continuing operation of PAVE PAWS on the basis of military necessity, and striving to obtain needed data in the context of an Environmental Impact Statement. If the FONSI must be issued for some reason, I believe that the Air Force should pledge to obtain the needed disease rate data. We must defend the nation with excellence and discipline as a top priority and concurrently address health impacts of this defense on active

duty personnel and collaterally exposed civilians with comparable excellence and discipline.

A realistic plan to get solid disease rate data in a timely manner (three years) is needed. The current planned health study is not adequate to this task because it is not properly designed.

5. **Refer to natural environmental levels.** It is important to put exposure levels into perspective. For example, at Crowley State Park (near camp site A-10) the observed average power density is 0.02 microwatts per square centimeter. The IEEE C95.1-1999 standard permits 280 microwatts per square centimeter. Thus the human exposure is 14,000 times below the guideline.

On the other hand, natural background levels of radiation in this frequency band have power densities of one millionth of one microwatt per square centimeter (0.000001 microwatt per square centimeter), so the human exposure is 20,000 times above background.

6. **Summary.** Please consider monitoring system output as the computer changes are made, to insure no field change. Please improve the quality of medical communication, and perform a quality environmental impact statement. Please refer all measurements not only to the national guideline but to natural background levels.

This letter is provided by me as a private citizen and does not necessarily represent the opinion of any component of the Department of Defense.

Richard A. Albanese, MD
Richard A. Albanese, MD

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Copy to: Senator John Kerry (care of Ms. Kate Rhudy)

August 15, 2002

Mr. Robert Novak
HQ AFSPC/CEVP
150 Vandenburg Street
Suite 1105,
Peterson AFB, CO 80914-2370
Facsimilie: (719) 554-3849

RE: Draft Environmental Assessment (EA), July 2002 For Early Warning Radar Service
Life Extension Program Cape Cod Air Force Station (AFS) Massachusetts

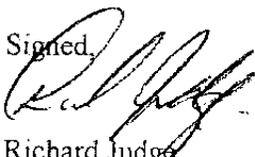
Please accept these comments on the EA. I am protesting this EA and draft FONSI and
refuse to comment on the EA's validity because I do not want my comments to be taken
as an approval of this document.

This EA must be withdrawn and a new full EIS needs to be done for the Cape Cod PAVE
PAWS immediately as requested by Sen. Kennedy.

I am attaching two letters to the Editor I wrote that appeared in the August 12, 2002
edition of the Cape Cod Times titled, "Include public in full PAVE PAWS evaluation,"
And a letter that ran in the August 9th edition of the Cape Codder titled, "PAVE PAWS:
Avoiding the truth, exposing our troops." Please include my comments and these
attachments in the Final EA so as to properly point-out and begin the documentation of
how US Air force officials intentionally misled elected officials through their aids and
ran over the American public through interference and manipulation of a public process.

Also attached to be entered into the official EA, the Upper Cape Codder, Thursday
August 15, 2002 Guest Commentary, titled "PAVE PAWS Avoiding the truth, exposing
our troops," June 20, 2002 and "Open Letter to the People of Cape Cod" from General
Lance W. Lord, US Air Force, announcing change from a full EIS to an EA; Letter from
David Dow/Sierra Club - comments on EA; Friday July 26, 2002 article in Cape Cod
Times titled; "National Research Council Panel Suggests Radar Analysis."

Signed,


Richard Judge
[REDACTED]
[REDACTED]

Member, Impact Area Review Team, MA Military Reservation
Member, Governor Appointed Community Advisory Council, MA Military Reservation

cc. Mass. Federal Delegation



CAPE COD TIMES

The Cape and Islands' Daily Newspaper

New England Newspaper Association's Daily Newspaper of the Year

MY VIEW

Include public in full PAVE PAWS evaluation

By RICHARD JUDGE

Recently a small group of Air Force managers went to Washington, D.C. to convince our Senators and Congressman that a computer upgrade of the PAVE PAWS radar facility in Sandwich has to be done immediately due to its age. These managers asked the legislative aides to give them permission to circumvent a public process previously pledged in an Environmental Impact Statement (EIS) and to do a less thorough Environmental Assessment (EA).

These managers also want the public to accept a supplement to an old 1979 PAVE PAWS EIS. This would keep health information currently being gathered from being properly disclosed to officials who need to make decisions on this machine today (the "Supplement" will not be completed until 2005 at the earliest according to Air Force statements).

This attempt to exclude public input and to avoid due process, including a

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before August 15th,
the close of the EA
comment period.

public hearing, must be corrected and the process must be made whole again before August 15th, the close of the EA comment period.

An Environmental Assessment (EA) is generally performed first to determine whether or not an Environmental Impact Statement (EIS) is needed. The draft EA already available at www.pavepaws.org recommends a

finding of no significant impact, a result which permits legal avoidance of a new EIS, and allows immediate permanent changes to PAVE PAWS.

Through their previous pledge responding to Senator Kennedy's request for a new EIS, Air Force leaders had declared that an EIS is needed. Now they are contradicting themselves. The Air Force has instead made the decision to do a supplement to the 1979 EIS. This would attach a very small amount of modern data to an outmoded document, and will deny Cape Codders the procedural protections of the EIS as defined in the National Environmental Policy Act.

Further, can we expect the proposed supplement to the 1979 EIS to have real scientific quality when it follows a public Air Force announcement that no significant impact exists?

There is another way that makes more sense. The Code of Federal Regulations (40 CFR 1506.11) outlines emergency procedures that would allow certain aspects of PAVE PAWS to

be upgraded to protect its current military mission only. With no EA on the books, a thorough EIS can then be done in full accord with National Environmental Policy Act procedures designed to protect the public health interest.

PAVE PAWS creates a unique phased array radiation field to serve its mission. Our soldiers are using and are exposed to new phased array radiation machines on shipboard and in the field every day. Yet there has never been any study of phased-array radiation medical effects.

Senator Kerry, Senator Kennedy and Congressman Delahunt must insist that the Air Force re-commit to a full, site-specific EIS to insure that phased array systems are not damaging U.S. soldiers or Cape Codders.

Richard Judge of Sandwich is a member of the Community Advisory Council for the Massachusetts Military Reservation and a member of the Impact Area Review Team.

The Cape Codder

PAVE PAWS: Avoiding the truth, exposing our troops

By Richard Judge

Recently, a small group of Air Force managers went to Washington, D.C. to convince our senators and congressmen that a computer upgrade of the PAVE PAWS radar facility has to be done immediately due to its age.

These managers asked the legislative aides to give them permission to circumvent a public process previously pledged the public in an Environmental Impact Statement, and to do a less-thorough environmental assessment.

These managers also want the public to accept a supplement to an old 1979 PAVE PAWS evaluation. This would keep health information currently being gathered from being properly disclosed to officials who need to make decisions on this machine today (the "supplement")

Other Voices

will not be completed until 2005 at the earliest, according to Air Force statements).

This attempt to exclude public input and to avoid due process, including a public hearing, must be corrected; and the process must be made whole again - with the help of our federal representatives - before Aug. 15.

Although the environmental assessment process may sound to most of us like EIEIO, it is in fact a legal attempt by these few Air Force managers to do an end run around procedural laws set up to inform the public and medical community. An environmental assessment is generally performed first to determine whether an Environmental Impact Statement is needed. The draft EA already available at www.pavepaws.org recommends a finding of no significant impact, a result which permits legal avoidance of a new EIS, and allows immediate permanent changes to PAVE PAWS. Through their previous pledge responding to Senator Kennedy's request for a new EIS, Air Force leaders had declared that an EIS is needed. Now they are contradicting themselves by recommending a finding of no significant impact and declaring that they will not be doing a new EIS as requested.

The Air Force has instead made the decision to do a supplement to a 1979 EIS. This would attach a very small amount of modern data to an outmoded document, and will deny Cape Codders the procedural protections of the EIS as defined in the National Environmental Policy Act. Further, can we expect the proposed supplement to the 1979 EIS to have real scientific quality when it follows a public Air Force

announcement that no significant impact exists? Will it really be possible for the conclusion of the EA to be reversed by the supplement? Will we get solid answers soon to questions about our daily exposure to signal phasing and ground wave formation?

In short, major permanent changes will be made to this machine and the 80-acre site by the U.S. Missile Defense Agency, U.S. Army (Miltstar System) and the U.S. Air Force without providing the public or our representatives proper health data in order to make informed decisions regarding PAVE PAW's future on Cape Cod. There is another way that makes more sense. The Code of Federal Regulations outlines emergency procedures that would allow certain aspects of PAVE PAWS to be upgraded to protect its current military mission only. With no EA on the books, a thorough EIS can then be done in full accordance to National Environmental Policy Act procedures designed to protect the public health interest. PAVE PAWS creates a unique phased-array radiation field to serve its mission. Our sailors and soldiers are exposed to new phased array radiation machines on shipboard and in the field every day.

Yet, as Cape Codders, we now know there has never been any study of phased-array radiation medical effects. In this context of an unknown radiation field, the finding of no significant impact in the current EA certainly makes absolutely no sense at all. And one can see the importance of gathering proper data here on Cape Cod that will hopefully produce the kind of information that will protect the fighting men and women who protect us. Now that Senator Kerry, Senator Kennedy and Congressman Delahunt are aware, they must insist that the Air Force re-commit to a full, site-specific EIS to ensure that phased-array systems are not damaging soldiers or Cape Codders.

I ask that our federal delegation back up my request that the General Accounting Office become involved with this issue to provide a study that is independent of Air Force managers who may not properly balance military mission needs with personnel health and public safety.

This small group of Air Force managers may be willing to put soldiers and Cape Codders at risk with less-than-adequate scientific work on phased-array radiation. But I believe Senator Kerry, Senator Kennedy and Congressman Delahunt will not allow this to happen.

Richard Judge, of Sandwich, is a member of the governor-appointed Community Advisory Council and the Impact Area Review Team, Massachusetts Military Reservation.

EDITORIAL PAGE

EDITORIAL PAGE

PAVE PAWS: Avoiding the truth, exposing our troops

By Richard Judge

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Guest Commentary

These managers also want the public to accept a supplement to an old 1979 PAVE PAWS evaluation. This would keep health information currently being gathered from

being properly disclosed to officials who need to make decisions on this machine today (the "supplement" will not be completed until 2005 at the earliest, according to Air Force statements).

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The Air Force has instead made the decision to do a supplement to a 1979 EIS. This would attach a very small amount of modern data to an outmoded document, and will deny Cape Codders the procedural protections of the EIS as defined in the National

Environmental Policy Act. Further, can we expect the proposed supplement to the 1979 EIS to have real scientific quality when it follows a public Air Force announcement that no significant impact exists? Will it really be possible for the conclusion of the assessment to be reversed by the supplement? Will we get solid answers soon to questions about our daily exposure to signal phasing and ground wave formation?

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Richard Judge, of Sandwich, is a member of the governor-appointed Community Advisory Council and the Impact Area Review Team, Massachusetts Military Reservation.

wide shoe and apparel empire that manufactures its products in third-world countries such as Indonesia, Malaysia, Thailand, etc. The helpless laborers in these ghastly sweatshops provide the blood, sweat and toil so Fireman can continue as a billionaire.

In the end, the losers are Mashpee's environment, Mashpee's wildlife, and of course, Mashpee's people whose birthright has been ruthlessly taken from them!

Scott Wolfe
Mashpee

AN OPEN LETTER TO THE PEOPLE OF CAPE COD

To the Editor:

The Air Force has recently decided to convert the ongoing Service Life Extension Program (SLEP) Environmental Impact Statement (EIS) on the PAVE Phased Array Warning System (PAWS) radar at Cape Cod Air Force station into two separate environmental analyses. I want to provide the people of Cape Cod the background rationale for our decision.

Though the Air Force is changing its current course of action, our commitment to addressing the health concerns of the local community remains unchanged. The Air Force will continue to fund and participate in the five ongoing

ing efforts/studies looking at the radar.

What has caused us to do this?

In recent months, we were becoming increasingly concerned about the sustainability of our nation's early warning radars due to a lack of spare parts for technology that is decades old. Because SLEP is an 18-month program from the start of the process until completion, we needed to review the SLEP EIS process now to address concerns that cannot be fixed overnight. Through the review process, the Air Force determined that it is more appropriate to address concerns regarding SLEP - the replacement of computer hardware and the rehosting of software through separate Environmental Assessments (EA) for the radars located at Cape Cod Air Force Station; Beale Air Force Base, Calif.; and Clear AFS, Alaska. The Air Force also determined that concerns regarding the ongoing operation of the radars should be addressed through a Supplemental EIS to the 1979 Cape Cod EIS, which will include the results of the five ongoing studies/efforts related to the operation of the radars.

In a nutshell, the Air Force's new course of action is simply the very best way to address sustaining the radar's aging equipment while answering the community health questions about the radar's ongoing operation. It's impor-

tant to stress that these changes to the radar's equipment will not change the radar's energy levels or waveform characteristics, nor will they change our commitment to the Cape Cod community.

The Cape Cod PAVE PAWS radar is the only radar in the nation that is able to confirm that a satellite has detected a missile launch toward the United States from the east. Our nation requires detection using two different methods, giving the president the positive confirmation he needs to make critical, national decisions about an incoming threat.

We believe, as do many in the scientific community, that the radar is safe, but we are still committed to addressing the concerns that some Cape Codders have regarding it. We have not taken the current actions lightly, seeking to balance the defense of the nation with the concerns of some Cape Codders. We look forward to working with the community through the PAVE PAWS Public Health Steering Group and thank them, the federal, state and local officials involved in this process, as well as the concerned citizens who have taken the time to participate in the process.

Lance W. Lord
General, USAF

LETTERS POLICY

The Upper Cape Codder welcomes letters to the editor.

Letters may be sent via e-mail to uppercapcodder@cnc.com

Letter may be faxed to 508-375-4903

Letters may be mailed to: Letters Editor, 290 Route 130, Sandwich, MA 02563.

All letters must be signed. We do not print anonymous letters.

Please include your telephone number and address so that we can contact you to confirm the authenticity of your letter.

Questions about letters to the editor may be directed to John Basile, managing editor, at 508-375-4945.

All letters are subject to editing. Please be brief. Letters should be less than 500 words, and those of less than 250 words will be given first priority.

There are some types of letters we cannot print. These include letters that are libelous, that contain personal attacks, that are blatantly offensive, that promote a commercial enterprise or contain plagiarism or reproduction of copyrighted material.

We believe one of the most important roles of a newspaper is to serve as a forum for the exchange of opinions and information among members of the community. We do not necessarily agree with opinions expressed in the letters. In fact, we strive to print letters from a wide variety of viewpoints.

Please write and let us know what you think about community issues, about the news and about the way we present it. We really want to hear from you.

Panel suggests radar analysis

By KEVIN DENNEHY
STAFF WRITER

A national panel of experts asked by Congress to assess the safety of the Air Force's PAVE PAWS radar station yesterday recommended ways the military can better address the years-old issue.

In a three-page letter to the Air Force, the panel from the National Research Council suggested how and where sophisticated measurements can be collected from the Sagamore station.

The analysis will be considered by the Air Force, which earlier this year began a complex series of measurements of the radar beam emanating from the 10-story radar station, which sits on the edge of the Cape Cod Canal.

While most of the beam shoots over the surrounding towns, so-called "side lobes" spill onto the community. Some say the beam is no different than any other radar beams. Others wonder whether the phased array of beams are harming humans at the cellular level, perhaps causing diseases.

To better assess the nature of the beam, the panel, an independent agency of the National Academy of Sciences that provides research for the government, suggested:

- More sophisticated measurement equipment designed specifically for the PAVE PAWS measurements.

- Comparison between the PAVE PAWS beam measurements with

measurements of a dish antennae radar, likely at another Air Force base.

- Measuring the radar beam across the region from fire stations, which mark population centers.

Meanwhile, the council will continue its own investigation.

In particular, the council will assess whether existing studies of typical radar health effects can even be applied to PAVE PAWS, which some call a unique type of radar that has not been adequately investigated.

It's the second time the council is looking at the potential health effects of the PAVE PAWS radar, which casts a phased array of beams across the Atlantic searching for ballistic missiles and tracking satellites.

Sen. Edward Kennedy has asked them to revisit a 1978 study that concluded that potential health effects could not be ruled out.

By the fall of 2003, the panel will compile a final report on whether new studies on the PAVE PAWS radar should be conducted, says Rick Jostes, a senior program official with the Academy.

In addition to the two federal investigations, a local panel of health officials are crafting a study of the radar beam and potential epidemiological effects in the surrounding communities.

Many hope the studies will finally answer a question that has been asked since the station was built in the northern corner of the Massachusetts Military Reservation in the late 1970s.

Crown & Anchor lawsuit may move to federal court

By EMILY C. DOOLEY
STAFF WRITER

PROVINCETOWN - The "Naked Boys Singing" performers left the undressing room last summer, but the debate over nudity has moved to

ly applied the zoning bylaw, one that was approved by the state attorney general's office. It also claimed the bylaw amounted to censorship because it prohibited the performance

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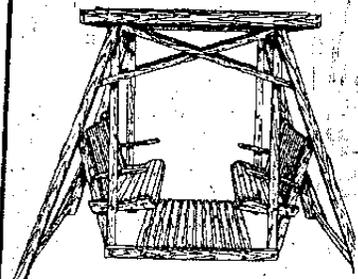
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Porch Rocker

August 15, 2002

Mr. Robert Novack
HQ AFSPC/CEVP
150 Vandenberg Street, Suite 1105
Peterson AFB, CO 80914-2370

Re: Comments on Draft EA for EWR SLEP Cape Cod Air Force Station, Massachusetts

It is not acceptable to the affected Cape Cod public to downgrade from an official legal Environmental Impact Statement (EIS) in progress to a less thorough Environmental Assessment (EA) as the stated purpose of an EA is to determine if an EIS is warranted. The official Notice of Intent to prepare an EIS for the Cape Cod PAVE PAWS was posted in the Federal Register in January of 2000. The preparation of a full site-specific EIS was at the request of Senator Kennedy, the Sandwich Board of Selectmen and other local elected officials and members of the public.

As supporting documentation for my opposition to the change from an EIS to an EA, I am attaching documentation/letters I have sent to Ms. Kate Rhudy, aid to Senator Kerry at her request, explaining the differences between EIS and EA processes and how proper public participation in the form of public hearings, etc. have been cut out in downgrading to an EA. It is apparent to me from my conversations with Ms. Rhudy that Air Force managers in their July 18, 2002 meeting with Ms. Rhudy and other Mass. Federal Delegation staffers, did fully explain all of the modifications/upgrades proposed for the approximately 80 acre Cape Cod PAVE PAWS site by the US Missile Defense Agency, US Army and US Air Force and of the existence of NEPA documentation that had already been prepared for these proposed upgrades (NMD and Milstar, etc.). Thus, our Mass. Federal Delegation staffers made decisions that affect their constituents on Cape Cod in the absence of full disclosure by Air Force managers to the public and the public's elected representatives.

This is unacceptable and the MA Federal Delegation must insist that the Air Force recommit to a full site specific EIS. The Cape Cod public was promised a full EIS by the Air Force and Mass. Federal Delegation. The process had long been underway and a draft EIS should have been released with new developments and full disclosure. Instead the public has been told by Air Force management they will prepare a Supplement to the old 1979 EIS instead. Lt. Col. Ashworth was misleading to the public and elected officials when he stated, "An EIS is an EIS." This new proposal does not fulfill the requirements of full disclosure and public participation now so that the public and DOD decision-makers can be properly informed to make what NEPA regulations term informed and "excellent decisions."

There has been no mention in the draft EA about the unusual findings in the preliminary Air Force waveform characterization measurement effort. Strong surface waves were detected out in Cape Cod communities and there was also a highly irregular shut off pattern of the beam during each pulse envelope. I am concerned that the designers and operators of the PAVE PAWS facility do not know where the beam is out in the communities when it is shutting off. The EIS has the same deficiencies as the NMD EIS and Appendix H including the omission of telling the public that non-phased data was being used to assert the safety of PAVE PAWS, a phased array warning system.

Important information such as this has not been disclosed to the public in the EIS process or now downgraded EA process. The minutes of the Air Force's "out briefing" of March 7 has not been made available on the web as have other similar meetings in the past. We have repeatedly requested new Scoping meetings for the SLEP EIS so that the public can be adequately informed and properly

participate in the EIS process. Air Force officials have refused this request in writing. Instead, they cite that they based their decision to downgrade to an EA primarily on Scoping Comments received.

The Air Force's Final "Preliminary Measurements of the PAVE PAWS Radar, Phase II- Single and Double Dipole Field Measurements & Phase III- Spectrum Background Analysis by the Kirtland, AFB Team contains no useful time-domain waveform characterization information for the community. Please note the limitations section. No end to end system calibration was done and no L-antenna used as was requested. The Mass. Federal Delegation requested measurements be taken in the time-domain according to the Air Force's Electromagnetic Health and Safety Program (EHS) (letter dated April 6, 2001). More than a year later, these measurements have not been properly done and Air Force management has denied Dr. Richard Albanese who was the lead scientist of EHS to use his team. Air Force management has cost our Cape Cod community and the Air Force valuable time within the context of the environmental impact analysis/EIS.

There has not been full disclosure by Air Force officials, their have been false and misleading statements by Air Force management in the press and in letters to elected officials. There has been great confusion as to how the public and elected officials effectively participate in the process. There have been opportunities such as Civic Leader Tours, MMR open houses, etc. that were outside of the legal EIS process where members of the public and elected officials thought their comments were being heard and considered in the EIS process.

The process must be restored to a full site-specific EIS process for the Cape Cod PAVE PAWS immediately. There must be a draft EIS and public hearing on Cape Cod during the required 45-day public comment period. The Phase IV measurements must be completed and documented in this EIS along with the NRC letters/reports. Time domain measurements must be taken before, during and after and changes are considered or made to the 23 year old PAVE PAWS system for proper medical studies to be completed. It is not acceptable to defer to a later supplement to the old 1979 EIS, which would not be done for years if ever. This leaves the burden of proof on the Cape Cod community and is not acceptable 23 years later.

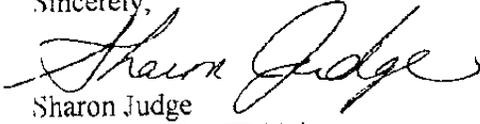
In the Air Force's official statement "Cape Cod PAVE PAWS Update, July 30th, 2002" on the official Air Force PAVE PAWS website www.pavepaws.org, officials state, "Due to concerns with the sustainability of the radar, the Air Force has decided that an Environmental Assessment is the appropriate course of action for approving the installation of new computer hardware and rehosting software." The key word is "approving." The Air Force is doing the approving and expecting the public and elected officials to go along with this. This EA however does not serve the best interests of the affected Cape Cod community and is not a proper "approval process." The National Academy of Sciences NRC committee is still in the early stages of their investigation into phased array and health effects. As I noted earlier, we still do not have any time-domain measurements as requested by our federal delegation on April 6, 2001.

The situation is not logical and has become so convoluted I recommend intervention by the Mass. Federal Delegation using all the power of their offices and investigation agencies to insure that a full EIS is completed with full disclosure to the public before decisions are made regarding proposed upgrades or decisions regarding the long term future of the facility. This would not only insure that Cape Codders health is protected but that US soldiers exposed to phased arrays in the field are protected in both the short and long-term.

Also include in EA SLEP CAPE COD Comments on GMD VCC EA

Thank you for the opportunity to comment.
See attachments.

Sincerely,



Sharon Judge



cc. Mass. Federal Delegation

April 11, 2002

U.S. Army Space and Missile Defense Command
ATTN: Mr. David Hasley
SMDC-EN-V
P.O. Box 1500
Huntsville, AL 35807-3801

RE: Comments on the Ground Based Midcourse Defense (GMD) Validation of the Operational Concept (VOC) Environmental Assessment (EA)

According to the EA, the Finding of No Significant Impact (FNSI) will be signed after a 30-day public review period, and the proposed action could be implemented unless the MDA determines that information presented during the 30-day public review period reveals an unassessed potential for significant impacts on the environment."

The EA states in Chapter 4 Section 4.4 "The analysis of Appendix H of the NMD Deployment EIS is incorporated by reference and can be briefly summarized as there would be no change to radiated peak or average power levels emitted by the Beale radar, nor would there be any change to the operating bandwidth. Thus the Proposed Action would not increase the total energy emitted by the radar in any way."

It has been well documented that the Cape Cod community is concerned with the unique parameters of the PAVE PAWS Phased Array Warning System. The Sandwich Board of Selectman formally requested an Environmental Impact Statement on November 5, 1999 for the complete existing PAVE PAWS facility, not limited to the proposed technical upgrades by the MDA (formerly the BMDO). The NMD Deployment EIS, Appendix II and the Official Response to public comment on the NMD EIS was dismissive of the public's concerns for potential non-thermal effects from exposure to PAVE PAWS unique phased array radiation, waveform, wave-front arrival time, wavefront rise and fall times, etc. Our concerns were dismissed by the BMDO in the Official Response indicating the concerns raised by Air Force physician Dr. Richard Albanese were "just theories."

New information has come forward since the release of the NMD Deployment EIS from which this EA is tiered from, that significantly affects the analysis of the PAVE PAWS radars as previously done. This new information provides evidence of the unassessed potential for significant impacts to human health from exposure to phased array radiation from PAVE PAWS radars.

Section 4.4.2 Health and Safety states in paragraph 2, "As analyzed in the deployment EIS, the main health and safety concern from operation of the UEWR at Beale AFB in a GBI VOC test site environment would be associated with RF radiation. However the UEWR's radiated peak, average power and operating bandwidths would remain unchanged from current operations of the EWR. Therefore, the proposed upgrade would be in compliance with applicable standards."

The "applicable standards" the EA refers to is the IEEE standard as referenced in the NMD Deployment EIS. This standard is not applicable to the Beale and Cape Cod PAVE PAWS as they are "phased array" radars. The IEEE standard is a heating standard only. The studies and list papers reviewed by the IEEE voting members setting the IEEE standard did not include any studies of phased arrays. There is no published study that is unambiguously relevant to the PAVE PAWS signal.

Since the release of the NMD Deployment EIS, we have become aware of the existence of the Air Force's classified Electromagnetic Health and Safety Program (EHS) and the confirmatory Ultra Wideband Program (UWB). The IEEE standards committee did not have access to these programs. The EHS Program is clearly relevant to PAVE PAWS (see attached letter from Massachusetts Federal Delegation dated April 6, 2001).

The National Academy of Sciences/National Research Council is currently in the processes of investigating the PAVE PAWS health issue. Mass. Senator Edward Kennedy called for the NAS/NRC involvement in his letter of January 11, 2001.

The NAS/NRC PAVE PAWS Committee held their first meeting on March 15, 2002 in Washington, DC. The next public meeting is scheduled for May 28, 2002 on Cape Cod.

The members of the NAS/NRC Committee with security clearance are scheduled to travel to Brooks AFB, TX on April 25, 2002 to review the classified work including EHS. Dr. Richard Albanese of Brooks AFB was the lead scientist and technical director of EHS. We are enclosing recent communications between Dr. R. Albanese, Dr. Evan Double of the NAS and Dr. Richard Miller of Brooks AFB. These communications point out the enormity of the EHS program and Air Force management's obstruction in the NAS/NRC process.

We believe that Air Force management has not properly informed the Missile Defense Agency of the EHS Program, etc. and this lack of full disclosure has led to an incomplete and misleading NMD Deployment EIS and now an incomplete and misleading GMD VOC EA.

Papers written by Dr. Richard Albanese relevant to the PAVE PAWS analysis have been held up in Air Force policy review since September 2000 (see attached papers and chain of custody letter).

Section 2.24 states, "The U.S. Air Force which operates and has real property accountability over the PAVE PAWS EWR facilities has begun the process for a separate NEPA analysis to determine the long-term status of all of the EWRs in the United States. The U.S. Air Force may not complete its NEPA analysis for several years. Upgrades to the Beale AFB EWR to support the test function of validating the GMD operational concept would not foreclose any action the U.S. Air Force determined to be appropriate, after completing its NEPA analysis. The UEWR would be able to search for different types of missiles and distinguish hostile objects (warheads) from other GMD components using improved communication.

The MDA has put the cart before the horse in not completing a proper and thorough EIS for the PAVE PAWS installations. The Sandwich Selectman specifically requested a full site-specific EIS for the Cape Cod PAVE PAWS so that the appropriate studies would be done of the existing facility.

Instead, the MDA is piece-mealing the proposed NMD system and is not properly informing the public so that they can comment effectively. There has not been full disclosure in the NMD EIS or this EA.

Section 2.2.4 states, "During GMD test operations a different radar pattern would be used and different algorithms used to interpret the raw data from the radar returns... It is anticipated that training for GMD test activities would be less than 1 percent of the total usage. At all other times, the UEWR would continue to perform its current EWR missions."



From: JUDGES [REDACTED]
To: Kate Rhudy [REDACTED]
Date: Wednesday, July 31, 2002 8:24 PM
Subject: EIS Process (http://www.pavepaws.org/eis_process.htm)

Kate,

This explanation of an EIS is provided on the official Air Force PAVE PAWS website. An EA does not require the level of public involvement that an EIS does, as described below. The Air Force, as it stands now, is apparently planning to wrap-up their EA process for the SLEP upgrades before the Phase IV measurements are taken, before Dr. Kurt Oughstun speaks publicly to the NRC panel, before the NRC completes their report.

It is not logical and not sensible for the Air Force and DoD decision makers, etc. to be making decisions on the Cape Cod site until there has been full disclosure, etc.

I will follow this e-mail with the National Missile Defense EIS reference and Appendix H involving PAVE PAWS so that you can see the NEPA documentation that has already been prepared by the Missile Defense Agency (formerly the Ballistic Missile Defense Agency) that I explained in our telephone conversation.

Sincerely,
Sharon Judge



Overview

The National Environmental Policy Act (NEPA), which became law in 1969, established a national environmental policy in order to create a better decision-making process for federal agencies wanting to use federal funds for major projects. NEPA requires these federal agencies to analyze the potential environmental impacts before initiating a Proposed Action, project, or program. NEPA also ensures that environmental information is made available to public officials and citizens before decisions are made and actions are taken.

To comply with NEPA, the Air Force is required to prepare an EIS if a major federal action would significantly affect the human environment. Ordinarily, maintenance and modernization of computer equipment and associated hardware would not warrant preparation of an EIS. However, due to environmental controversy surrounding the operation of the radars, the Air Force has committed to preparing an EIS.

NEPA, Council on Environmental Quality (CEQ) regulations, and 32 Code of Federal regulations (CFR) Part 989 provide guidance on the types of actions for which an EIS must be prepared. Once it has been determined that an EIS must be prepared, the proponent must publish a Notice of Intent (NOI) to prepare an EIS. This formal announcement signifies the beginning of the scoping period, during which the major environmental issues to be

addressed in the EIS are identified. A Draft EIS (DEIS) is prepared, which includes the following:

- ✦ A statement of the purpose of and need for the action
- ✦ A Description of the Proposed Action and alternatives, including the No-Action Alternative
- ✦ A description of the environment that would be affected by the Proposed Action and alternatives
- ✦ A description of the potential environmental consequences of the Proposed Action and alternatives, and potential mitigation measures.

The DEIS is filed with the U.S. Environmental Protection Agency (EPA), and is circulated to the interested public and government agencies for a period of at least 45 days for review and comment. During this period, a public hearing will be held so that the public can make comments on the DEIS. At the end of the review period, all substantive comments received must be addressed. A Final EIS (FEIS) is produced that contains responses to comments as well as changes to the document, if necessary.

The FEIS is then filed with the U.S. EPA and distributed in the same manner as the DEIS. Once the FEIS has been available for at least 30 days, the Air Force may publish its Record of Decision (ROD) for the action.

Scoping Process

The scoping process identifies the significant environmental issues relevant to the proposed activities, and provides an opportunity for public involvement in the development of the EIS. The NOI to prepare an EIS for actions to sustain operability of Air Force Space Command PAVE Phased Array Warning System (PAWS) radar sites was published in the Federal Register on January 27, 2000. Notification of public scoping was also made through local media as well as through letters to federal, state, and local agencies and officials, and interested groups and individuals.

The scoping period for the EWR SLEP activities began on January 27, 2000. Public meetings were held on the following dates to solicit comments and concerns from the general public:

- ✦ May 8, 2000 at the Forestdale Elementary School in Sandwich, Massachusetts
- ✦ May 11, 2000 at the Bourne Best Western in Bourne, Massachusetts
- ✦ May 15, 2000 at the Mashpee High School in Mashpee Massachusetts
- ✦ May 16, 2000 at the Falmouth Holiday Inn in Falmouth, Massachusetts
- ✦ August 14, 2000 at the Forestdale Elementary School in Sandwich, Massachusetts
- ✦ August 16, 2000 at the Woods Hole Oceanographic Institute in Woods Hole, Massachusetts
- ✦ August 17, 2000 at the Barnstable Marstons Mills Middle School in Marstons Mills, Massachusetts
- ✦ October 17, 2000 at the Best Western Bonanza Inn in Yuba City, California
- ✦ October 19, 2000 at the Anderson School in Anderson, Alaska.

Representatives of the Air Force presented an overview of the meeting's objectives, agenda, and procedures, and described the process and purpose for the development of an

EIS. In addition to verbal comments, written comments were received during the scoping process. These comments, as well as information from the local community, experience with similar decisions to be made, and NEPA requirements were used to determine the scope and direction of studies/analyses to accomplish this EIS.

The Environmental Office can determine, at the outset of the NEPA process, that an EIS will be required. An EIS is prepared in cases where the proposed action could cause significant degradation of the environment or has the potential for significant threat or hazard to public health or safety. In addition, an EIS is warranted in cases where substantial environmental controversy exists concerning the significance or nature of the environmental impact of the proposed action.

A handwritten signature in cursive script that reads "Karen Judge". The signature is written in dark ink and is positioned to the left of a faint, illegible stamp or set of lines.

From: JUDGES [REDACTED]
To: Kate Rhudy [REDACTED]
Cc: Congressman William Delahunt [REDACTED]; Senator Edward Kennedy [REDACTED]; Senator John Kerry [REDACTED]
Date: Wednesday, July 31, 2002 11:50 PM
Subject: getdoc (http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2000_register)

July 31, 2002
Ms. Kate Rhudy
Office of Senator John Kerry

Dear Kate,

I am forwarding to you and the Mass. Federal Delegation the official Notice of Availability of the Ballistic Missile Defense Organization's (BMDO - Now the Missile Defense Agency) National Missile Defense (NMD) Final Environmental Impact Statement (EIS) and Supplement (Appendix H for PAVE PAWS) that was posted in the Federal Register in December 2000. The term "Early Warning Radar" means "PAVE PAWS."

Please note the importance of the paragraph that states; "Under the Preferred Alternative, the NMD system would make use of the existing Early Warning Radars (EWR) upgrades for NMD and the existing space-based detection system that would be in place at the time of deployment... **A decision on implementation of the EWR upgrades for NMD, however, is contingent upon the outcome of the U.S. Air Force's EIS that addresses modernization, maintenance, and sustainment of operations of the three radar facilities.**"

I have e-mailed you the NMD URL to access the NMD FEIS and Appendix H, as well as the Army's Environmental Assessment (EA) for the Milstar System that has been installed at the Cape Cod PAVE PAWS site (but not turned on yet). I am concerned that Ms. Menda Fife, former aid to Senator Kennedy and Ms. Celes Hughes, former aid to Senator Kerry, who both left the Senators' offices abruptly recently, did not leave these and other important documentation necessary for a full understanding of the scope of issues surrounding the Cape Cod PAVE PAWs site.

As you know, I am very concerned about the Air Force announcing they now have "Congressional Approval" to downgrade the Air Force SLEP EIS to an EA, when other agencies of the DoD have already prepared NEPA documentation and have clearly stated they are depending on the outcome of the Air Force's EIS.

I cannot emphasize enough the fact that there has not been full disclosure by these DoD agencies in the NMD EIS, Milstar EA and draft SLEP EA for the public and elected officials to be fully informed and therefore to properly participate and comment in the legal EIS process. Also, the BMDO/MDA, Army and Air Force decision makers have made/will be making decisions based on incomplete information unless your offices intervene in this process.

Preparing a "Supplement" to the old 1979 EIS for PAVE PAWS as the Air Force is proposing will not be adequate as decisions will have been made prematurely in the absence of full disclosure. It is reasonable to expect the following:

*Full disclosure by the USAF (and other DoD agencies proposing upgrades to the 80+

8/15/02

acre PAVE

PAWS site) in the form of a full site-specific Draft EIS for the PAVE PAWS site ;

- * The required 45 -day public comment period on the Draft EIS
- * At least one public hearing on the Draft EIS on Cape Cod during the 45-day public

comment period

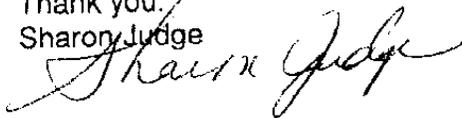
- * A Final EIS and legally enforceable Record of Decision (ROD)

It is my understanding that Air Force management has asked the Mass. Federal Delegation for permission to downgrade to an EA. It is not logical at this time to downgrade to an EA since the purpose of an EA is to either 1) Determine a Finding of No Significant Impact (FONSI) or 2) Determine whether a full EIS should be prepared.

Since the Federal Delegation and public already called for and got a committment from the Air Force to complete a full, site-specific EIS for the Cape Cod PAVE PAWS, it is not logical to downgrade to a less thorough EA at this time when we are awaiting new information including state of the art measurements of the system and confirmation of the surface wave, expert testimony before the NRC, NRC recommendations, etc.

I look forward to speaking with you this week about these challenges in hopes that the Federal Delegation will intervene in this process now to insure that all information comes forward that is critical for the protection of Cape Codders' health and for fully informed decisions regarding this machine by the DoD leadership.

Thank you.
Sharon Judge



[Federal Register: December 15, 2000 (Volume 65, Number 242)]
[Notices]
[Page 78475]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr15de00-40]

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DEPARTMENT OF DEFENSE

Office of the Secretary

Notice of Availability of The National Missile Defense Deployment
Final Environmental Impact Statement

AGENCY: Office of the Secretary, Ballistic Missile Defense
Organization, DoD.

ACTION: Notice of availability.

SUMMARY: The Ballistic Missile Defense Organization (BMDO) announces the availability of the National Missile Defense (NMD) Deployment Final Environmental Impact Statement (FEIS). The FEIS assesses the potential impacts associated with the deployment of the NMD system.

8/15/02

DATES: The review period for the FEIS will end on January 16, 2001 and comments must be received by this date.

ADDRESSES: Written comments and inquiries on the FEIS or a request for a copy of the FEIS should be directed to: SMDC-EM-V (Ms. Julia Hudson), J.S. Army Space and Missile Defense Command, PO Box 1500, Huntsville, AL 35807-3801, telephone (256) 955-4822.

FOR FURTHER INFORMATION CONTACT: Ms. Julia Hudson, telephone (256) 955-4822.

SUPPLEMENTARY INFORMATION: The BMDO announced the availability of the National Missile Defense Deployment Draft Environmental Impact Statement (DEIS) on October 1, 1999 (64 FR 190 53364) providing notice that the DEIS was available for comment. The public review period was from October 1, 1999 through January 19, 2000. Public hearings were held October 26 through November 9, 1999. Comments from the DEIS review and public hearings have been considered and included along with responses in the FEIS. Additionally, availability of an Upgraded Early Warning Radar Supplement to the NMD Deployment DEIS was announced on March 3, 2000 (65 FR 43 11560) with the public comment period from March 3, 2000 to May 12, 2000. This analysis and the comments and responses to the supplement to the DEIS have been included in the NMD Deployment FEIS.

The NMD system would be a fixed, land-based, non-nuclear missile defense system with a land and space-based detection system capable of responding to limited strategic ballistic missile threats to the United States. Potential deployment locations for the NMD elements include sites in Alaska and North Dakota. In addition, as the operational requirements are refined other regions may be identified.

The Preferred Alternative is deployment of a NMD system with up to 100 Ground-Based Interceptor (GBI) silos and Battle Management Command and Control (BMC2) facilities at Fort Greely, Alaska; and an X-Band Radar (XBR) at Eareckson Air Station (AS) (Shemya Island), Alaska. Under the Preferred Alternative, the NMD system would make use of the existing Early Warning Radars (EWR), upgraded for NMD and the existing space-based detection system that would be in place at the time of deployment. The existing EWRs are located at Beale Air Force Base (AFB), California, Clear AS, Alaska, and Cape Cod AS, Massachusetts. If the proposed action to modify the EWRs to support a NMD deployment is selected, its implementation is contingent upon the outcome of the Air Force EIS that addresses modernization, maintenance, and sustainment of operations at the three radar facilities. The BMDO would reassess its proposed usage of the EWR facilities in light of the results of the Air Force EIS prior to installation of the NMD modifications. Due to the ongoing development of the operational requirements, proposed In-Flight Interceptor Communication System (IFICS) Data Terminals locations were not identified as the EIS was being drafted. The FEIS therefore analyzed the expected impacts on a programmatic basis. The BMDO will perform supplemental, site-specific environmental analysis for the IFICS data terminals and fiber optic cable line alignments, as required, based on the initial analysis in the FEIS.

Copies of the FEIS have been distributed to Federal, state, and local agencies; public officials; and organizations and individuals that previously requested copies of the DEIS or FEIS. Copies of the FEIS will be available for review at public libraries in communities adjacent to the potential NMD deployment sites. These communities include: Cavalier, Fargo, Grand Forks, and Langdon in North Dakota; Anchorage, Anderson, Delta Junction, Fairbanks, Healy, Kodiak, and Nenana in Alaska; Live Oak, Marysville, and Yuba City in California; Bourne, Falmouth, Masilpee, Sandwich, and West Barnstable in Massachusetts. The library locations and the FEIS are also available on the BMDO internet site:

www.acq.ods.mil/bmdo/bmdolink/html/nmd.html.

Dated: December 11, 2000.

Patricia L. Toppings,
Alternate OSD Federal Register Liaison Officer, Department of Defense.
[FR Doc. 00-32046 Filed 12-14-00; 8:45 am]
BILLING CODE 50C1-10-M

8/15/02

-----Original Message-----

From: Banks June Civ M Civ AFCEE/MMR-JPO
[REDACTED]

Sent: Wednesday, July 24, 2002 9:25 AM

To: 'bruce.ruscio' [REDACTED]
Subject: FW: Comments on Draft EPI SOW

-----Original Message-----

From: JUDGES

To: June Banks/PPPHSG

Sent: 7/21/02 5:45 PM

Subject: Fw: Comments on Draft EPI SOW

-----Original Message-----

From: JUDGES [REDACTED]

To: Banks, June, Ms, MMR-JPO [REDACTED]
[REDACTED]

Date: Sunday, July 21, 2002 10:44 PM

Subject: Comments on Draft EPI SOW

July 21, 2001

EPI SOW Comments
[REDACTED]
[REDACTED]

We formally request a minimum 30-day extension of the Public Comment Period for the proposed draft "Statement of Work For Public Health Evaluation of Radio Frequency Energy from PAVE PAWS Radar, Cape Cod AS, MA" dated 6/19/02.

We request this extension due to the fact that the Air Force in section 1.3 states that, "... the Air Force is performing an Early Warning Radar (EWR) Service Life Extension Program (SLEP) Environmental Impact Statement (EIS) on proposed system sustainment actions..." This is very misleading to the public as Air Force officials officially posted in the Sandwich Enterprise newspaper dated 7/19/02 on page 18 of the Sports Section the "Notice of Availability Draft Environmental Assessment Early Warning Radar Service Life Extension Program Cape Cod Air Force Station, Massachusetts."

Air Force officials have downgraded the SLEP EIS to an EA without sufficiently informing the Cape Cod public and elected officials as to the Air Force's actions regarding the PAVE PAWS site. This lack of informing is reflected in this draft EPI SOW. An extension of the

7/25/02

comment period is needed to adequately inform the public and elected officials of recent developments in the PAVE PAWS situation as the PPPHSG is not a surrogate for required public involvement in the EIS process.

Preliminary comments on the EPI SOW:

Section 1.3 states, "The PPPHSG is comprised of ... to provide independent oversight and guidance for the activities related to this PAVE PAWS RFE measurement survey." This is confusing to the public as this is an EPI SOW and it is not clear what the Air Force - the owners of the PAVE PAWS site and proponent for the proposed SLEP upgrade - mean by this wording. The PPPHSG is not independent of the Air Force as the Air Force wrote the EPI SOW (and RF SOW). Air Force intervention by Brig. Gen. Gregory Pavlovich denying funding of time-domain RFE measurements as discussed by the PPPHSG and public and the subsequent intervention of the AFEB in the PPPHSG process is evidence that the PPPHSG is not an "independent" oversight group.

Section 1.4 - "The Evaluation will include a review of the scientific literature and a descriptive epidemiological investigation...." The EPI SOW is "decriptive" epi work only. An "analytical" epi study is warranted based on "readily available health data for the appropriate Cape Cod population." What does the Air Force in their EPI SOW mean by the "appropriate" Cape Cod population? We, the public have repeatedly called for time-domain measurements to be used in an analytical epi investigation. We need good disease rate data for Cape Codders using actual exposure data using the most advanced technology available.

The Air Force has indicated through Lt. Col. Ruscio and Mr. James Dishner that the EHS Program will be declassified. The EHS Program has not yet been declassified and therefore is not available to the public, elected officials, entire NAS-NRC committee PPPHSG Group, etc. When will the EHS Program be declassified as requested by Mr. Dishner and others?

Section 1.4: The EPI SOW states, "A later effort may be undertaken... upon recommendation by the NRC and AFEB." This is not logical. The Phase IV effort is planned for Sept. according the NRC. There were unexpected findings in the Preliminary Phase II/III Air Force measurement effort as brought up by a citizen observer and appointed member of the PPPHSG CTAC at the July 15, 2002 meeting of the NRC in Falmouth. Follow-up is necessary before determinations can be made regarding the EPI SOW and EA/EIS, etc.

Submitted by:
Richard and Sharon Judge

[Redacted signature area]

Richard Judge
Sharon Judge
7/25/02

From: JUDGES [REDACTED]
To: Kate Rhudy [REDACTED]
Date: Thursday, July 25, 2002 11:12 PM
Subject: getdoc (http://frwebgate.access.gpo.gov/cgi-bin/getdoc.cgi?dbname=2000_register)

[Federal Register: January 27, 2000 (Volume 65, Number 18)]
[Notices]
[Page 4406]
From the Federal Register Online via GPO Access [wais.access.gpo.gov]
[DOCID:fr27ja00-22]

DEPARTMENT OF DEFENSE

Department of the Air Force

Notice of Intent To Prepare an Environmental Impact Statement (EIS) for Actions To Sustain Operability of Air Force Space Command PAVE PAWS Radar Sites at Cape Cod Air Station (AS), Massachusetts (MA); Beale Air Force Base (AFB), California (CA); and Clear Air Station (AS), Alaska (AK)

Pursuant to the National Environmental Policy Act (NEPA) of 1969, as amended (42 U.S.C. 4321, et seq.), The Council on Environmental Quality (CEQ) Regulations for Implementing the Procedural Provisions of NEPA (40 CFR Parts 1500-1508), and Air Force policy and procedures (32 CFR Part 989), Air Force Space Command (AFSPC) intends to prepare an EIS for the Service Life Extension Program (SLEP) actions to modernize the facilities at the PAVE PAWS (Phased Array Warning System) radar sites located at Cape Cod AS, MA; Beale AFB, CA; and Clear AS, AK.

The current proposal includes replacements of electronic equipment and computer software in the PAVE PAWS Early-Warning Radar facilities. The EIS will assess all impacts as they relate to these replacements, including emission of radio-frequency energy. AFSPC will be the lead agency for the EIS. The Ballistic Missile Defense Organization has been invited to be a cooperating agency. AFSPC is planning to conduct public scoping meetings to determine the issues and concerns that should be addressed in the EIS. Notice of time and location of the scoping meetings will be made to public officials, agencies and announced in the news media in areas where the meetings will be held. For further information concerning the proposed replacements of electronic equipment and computer software in the PAVE PAWS Early-Warning Radar facilities at Cape Cod AS, MA; Beale AFB, CA; and Clear AS, AK, contact Mr. George Gauger, HQ AFCEE/ECA, 3207 North Road, Brooks AFB, TX 78235-5363.

Janet A. Long,
Air Force Federal Register Liaison Officer.
[FR Doc. 00-1976 Filed 1-26-00; 8:45 am]
BILLING CODE 5001-05-U

8/15/02

FAX MEMO

To: Mr. Robert Novak
(719)- 554-3849

2nd FAX NO (719) 554-3849

From: Ron Cronin
[REDACTED]

Date: August 20, 2002

Re: Environmental Assessment public comment
Fire / University PAVE PAWS Radar Study
Request of withdrawal & support by Federal Delegation

Dear Mr. Novak.

As this is the official close out date for public comment as stated on the PAVE PAWS web site, please accept the enclosed documents as part of my public comment on the Environmental Assessment of the PAVE PAWS radar site located at Sagamore, Massachusetts.

Due to trouble with the Air force email system, FAX line and telephone number in the EA report; I had to send these comments to the Federal Delegation (via aides Kate Rudy, Brady King and Mark Forest) last week.

Also enclosed as part of my comments is my PAVE PAWS study report and the December 2001 and May 2002 Radiation Output Monitoring Station reports by Boston University engineering students (Team 17) and reports by Suffolk University graduate students.

It has been a challenge getting this information to you and I do hope the 2nd Fax number provided is operating properly. If you would be so kind as to provide a current operating email for yourself and Air Force Captain, Brad Swezey I would be glad to transmit these records via the internet. It may be an easier way to reproduce the documents for the final report.

Please feel free to contact me at home at [REDACTED] if you have any questions or comments.

Regards,

Ron Cronin
[REDACTED]

cc: Federal Delegation

Ronald Cronin
Fire / University PAVE PAWS Study

July 24, 2002

Dr. Richard L. Miller, Chief
Air Force Research Laboratory
Directed Energy Bio-effects Division (AFRI/HED)
Hawks Road
Books Air Force Base, Texas 78235-5324

RE: Ground wave observation - Kirkland Air Force Team behavior inquiry

Dear Chief Miller,

I have become aware that Air Force officials are concerned with civilian observation of the ground wave measurements recorded during the initial Kirkland Air Force Team testing in February and March 2002 and the discussions with the public of those observations and measurements by members of the Kirkland Air Force Team and the ITI Air Force employees.

For the record I would like to make you aware of what I observed, heard, reported and verbally stated at the Air Force public In Briefings, Out Briefings, non-public Kirkland Team conferences that were held in January, February and March 2002 as well as the PAVE PAWS Public Health Steering Group (PPPHSO) meeting on February 26, 2002. I make these statements under the pains and penalties of perjury and hereby further swear that they are true and accurate to the best of my knowledge and belief.

As you are aware since June 2000 the Professional Firefighters of Massachusetts (PFFM) in conjunction with Suffolk University graduate students and Boston University engineering students (Team 17) have conducted two pilot surveys of Bourne and Sandwich residents in regards to PAVE PAWS and designed a portable Radiation Output Monitoring Station (ROMS) while receiving the support of Cape Cod firefighters and their unions to assist in setup, operation and transportation.

In June 2001, January 2002 and February 2002, firefighters and the BU engineering team participated in a radar facility tour after having Air Force security clearance background checks and permission from Lt. Col. Bruce Ruscio. In addition, Lt. Col. Ruscio authorized our observation of four daylong Kirkland Team test plan meetings that were not open to the public. These meetings were held in the third floor conference room at the radar station. The Kirkland Team's meeting discussions provided both insight and approach methods to design the equipment for testing of the radiation fields both in the time domain and power density. Follow up discussion continued with Kirkland team leader, Mr. Torres and the Kirkland Team members directly by telephone, email and in person.

From January 2002 through March 2002 specific questions and their answers were relayed back and forth with the Kirkland Team via telephone and email concerning G- (Ground) Dot, B- Dot probes, the lack of both L-antenna measurements and ground wave measurements. We also coordinated a dinner (pizza) party between the engineering students and Kirkland team members during the February / March 2002 testing period.

At the Air Force in briefing held Monday, February 25, 2002, Captain Brad Sweezy assigned me as the first official public observer for the next day, Tuesday February 26, 2002. The teams started to take radiation measurements at Site 5 located at the intersection of Shawnee Road and Shakerhouse Road, Sandwich, MA.

The next day, Tuesday, February 26, 2002 the following events took place:

6:30 --7:00 AM

Team members and observers meet at the radar facility and proceeded to the trailer set up at measurement Site No.5.

7-10:00 AM

Kirkland Team members and observers interacted freely with question and answer. The observers took more of an observation role to not impede the Kirkland team members work. The Kirkland Team members freely offered questions and explanations of what was taking place.

10:30 --11:00 AM

As measurements started to be recorded by the Kirkland team the trailer became very busy. IIT / Kirkland Team member Dr. Don McLemore had some free time and suggested we setup a "classroom" outside the trailer consisting of a table and chairs. Dr. McLemore explained at length the testing methods and equipment being with reasoning and an explanation as to why L antenna and G-Dot probes were not being used. He stated to me that the X-axis (facing ground) at the 1-meter mark was being used in place of a G-Dot probe. Dr. McLemore went on to state that the X-axis would receive only about 15% of the Y and Z-axis probe readings. He explained that since the X axis was facing the ground it would only receive ground bounce radiation and the measurements would be approximately 15% of the other two probes (Y and Z). He explained how the Y and Z probes would receive 75% to 100 % radiation exposure and readings as they were facing the radar directly and set at one meter horizontal and perpendicular to the radar face. Dr. McLemore did state to me that he "did not agree with Dr. Albanese's theory" at all and in fact his ideas are just the opposite of the doctor's ideas and theories. We agreed that having opposite views is good since the science will show one of you to be correct and the other will or should be convinced beyond a reasonable doubt by the scientific evidence that Dr. Albanese was mistaken.

12:00 -- 2:00

Testing continued and lunch breaks.

2:30 - 4:30 PM

Three spikes of a ground wave were recorded in the trailer by the technicians and Dr. John Audland. Dr. Audland stated, "There are going to be repercussions from this". I witnessed the plotting of the spikes and the exchange, conversations ect between the Kirkland team members. The Kirkland Team member's manner appeared serious but not panicked. I asked if the ground wave spikes (X axis measurements) were at 15% of the other probes (Y and Z axis) measurements as I had been told earlier in the day. I was informed that the X-axis was much higher (approximately 85%) than expected in comparison to the Y and Z probes. Dr. McLemore stated to me in the trailer doorway that further examination of the wires; leads, probes and equipment would be conducted to see if it was an equipment problem that caused the ground wave spikes and further magnetic testing of the ground wave. I was also told that the team did not expect such a high X axis reading and had not brought the proper testing equipment (G-Dots) due to their initial idea of a small ground bounce reading (15%).

Later in the week during a morning briefing (7:00 am) at the radar site, I heard the confirmation of the ground wave measurements and Mr. Torres, Dr. John Audland, Dr. Albanese and Dr. McLemore speaking of the magnetic testing and it was reconfirmed that additional testing and lab testing would need to be done. I asked Dr. McLemore about such testing and he advised me that it is another means of ground wave testing using magnetic devises. Concerned about false or embellished reporting, I inquired as to what he (Dr. McLemore) would do if pressured to adjust the reports. Dr. McLemore stated that he could and would retire if he were pressured into falsifying a report on the ground wave or any measurement tests.

I asked Dr. Albanese what he though of the ground wave and I expressed my concern and disappointment with the lack of L-Antenna and G-Dot probe testing. He did say that it was still early in the testing process and that he was looking into the ground wave measurements taken at Site 5 with the other team members.

I attended most morning meetings of the Kirkland Team at the radar site. I attended the outbriefing at the radar site on March 7, 2002 and asked pointed questions concerning the measurements and specifically the ground wave spikes. I spoke to Mr. Torres, Dr. McLemore, Dr. Albanese and Dr. Audland (at length outside) about the ground wave measurements and was advised by all that further testing would have been done on the data as they only had a very small portion of the data analyzed.

At no point did any of the Kirkland Team members cause me, the public, members of our team or members in the In and Out Briefing meetings to become frighten, panicked or overly concerned. It was pointed out that they were here to conduct the scientific testing to determine the radiation output levels of the radar. They pointed out that proper scientific testing would be conducted to determine if there is a health issue with the phasing, side lobe exposures and or phase shifting of the radars beams. They assured me that they would not be unduly influenced by Air Force policy and would act in the best interest of the public health. I wrote and noted all events as the public's observer in the observer's notebook being held by the Air Force.

As a firefighter for over 25 years I have responded to and worked at large fires, accidents, suicides, murders, and bombing (including WTC 9/11) sites in Brookline, Boston, Cambridge and the metro region as well as NYC. I have seen people wildly panic, frightened, and act in a manner that was directly opposite of one in their best interest and safety. I found none of those behaviors exhibited by any member of the public due to the Kirkland Team's reports, behavior or conversations. In fact, I found the Kirkland Team members extremely professional behavior had a calming effect on the public's anxiety level concerning potential health effects due to PAVE PAWS radiation exposure. The Kirkland Team presents itself as a credible and truthful group of scientist in their presentations and statements, both publicly and privately. It was apparent at the meetings that they were not trying to pull the wool over anyone's eyes and their professionalism invokes a sense of relief by the public at large who sees their efforts as something positive was being done to find answers to a complex question.

As I have stated, I witnessed almost every aspect of the ground wave measurements issues during Phase II & III and attended Phase I, II, III public and private meetings. I will object and strongly defend any member of the Kirkland Team who is accused of releasing any information to the public or me inappropriately.

I was the official Air Force "PUBLIC OBSERVER" on Tuesday, February 26, 2002, the day the ground wave measurements were recorded. I represented the public in my official capacity as the observer and reported such in the journal and to the press and public at large. From my observations as the Air Force official observer, I concluded that Cape Cod residents are in fact exposed to radiation from the ground in a far greater amount than even the experts calculated.

Respectfully submitted,

Ronald Cronin
Dated: July 21, 2002

**SIGNED UNDER THE PAINS AND PENALTIES OF
PURJURY**

cc Kirkland Air Force Team Members
 Massachusetts Federal Delegation
 Public release

FIRE / UNIVERSITY PAVE PAWS STUDY
[REDACTED]
[REDACTED]

Honorable Senator Edward Kennedy
United States Senate
315 Russell Senate Office Building
Washington D.C. 20510

August 9, 2002

RE: Firefighters / University PAVE PAWS Radar study - Cape Cod

Honorable Senator Kennedy.

Greetings from the Professional Firefighters of Massachusetts (PFFM) and Olde Cape Cod. I commend you for your March 19, 2002 speech to firefighters across America and offer to personally heed your request that you "need [us] now more than ever". We offer our support to your statement "we can support President Bush's conduct of the war and still ask the administration to join us in addressing the urgent needs of our people here at home".

President Kennedy's request of United States citizens four decades ago when he asked them what they could do for their country has always inspired me and leads to our efforts to organize a PFFM and University study of the PAVE PAWS radar. Our offer of firefighter assistance to the Air Force was due in part to statements of a lack of military manpower to take measurement readings across Cape Cod.

I write you today out of concern for the residents of Cape Cod who we are sworn to protect and serve who may be exposed to the ground waves and side lobe radiation from the PAVE PAWS radar facility. To ensure a complete and comparative study of the measurements taken this past winter and spring we seek your withdrawal, support and approval of the Environmental Assessment (EA) that you granted on July 18, 2002.

With all due respect, it appears to us that your recent approval contradicts your public statements and press release dated December 13, 1999, which we relied heavily on to support and under take our two-year study of the radiation output. You stated:

"[T]he U.S. Air Force has agreed to conduct a full Environmental Impact Statement (EIS) on the PAVE PAWS radar at the M. M. R. The study will cover Air Force operations, Air Force hardware and software upgrades to the radar, and any upgrades by the Department of Defense to make PAVE PAWS a part of a possible missile defense system".

And;

"It's important for the Air Force to conduct this new Environmental Impact Statement on PAVE PAWS. I also commend the Air Force for taking the extra, unprecedented step to meet the concerns of the community by establishing a citizen/ government partnership to look into any possible past and current health and safety impacts of the PAVE PAWS community".

If I am not mistaken, an EA has three main purposes the most important one being a determination of an EIS with public opinion and comment periods as required. It was apparent in 1999 that such was the case and that an EIS was necessary as ordered and supported by your office and Congress. To now state that an EA is sufficient after the EIS process is well under way does not appear logical and seriously undermines our two year

study and past efforts to measure and properly compare the radiation output data from the different Phases of Preliminary Measurement Of The PAVE PAWS study.

As you are aware through your staff assistant, Ms. Menda Fife, the PPFM in conjunction with Suffolk University Sawyer School of Management's graduate students under the leadership of Dean Michael Lavin and Boston University College of Engineering students (Team 17) under Dean Mark Horenstein and Professor Michael Ruane conducted pilot studies of Cape Cod resident's health concerns (2000), designed Radiation Output Monitoring Station (RAMS) (2001 /2002) for 32 firehouses on Cape Cod and paralleled the Kirtland Air Force team measurement efforts Phase I- IV in January , February and March 2002. Recently, Under Secretary of the Air Force James Dishner authorized my request for our teams to again parallel the Kirtland Team's measurement (Phase IV) efforts slated for mid September 2002.

At a PPFM state meeting in the Spring 2000, the state body voted to support the designed and implementation of a Fire / University PAVE PAWS study based on your December 1999 call for a full FIS and two Boston University health studies of elevated (23% above state average) cancer rates of Cape Cod residents. These studies were commissioned and funded through the Massachusetts Department of Public Health (MDPH). In addition, the United States Congress requested (January 12th and February 12, 2001) that the National Academy of Science (NAS) conduct an independent assessment of the PAVE PAWS radiation study.

On July 26, 2002, the Cape Cod Times reported that a NAS letter was submitted to the Air Force suggesting sophisticated measurement devices be used and that "measuring [of] the radar beam[s] across the region from fire stations, which mark population centers".

The July 22, 2002 NAS report itself states that:

"on page 92-93 of the Protocol for Phase II and Phase III the Air Force recommends that "the community be a major player in selecting the sites" of Phase IV measurements" ...and that the study accept the offer of "the use of 32 firehouses on Cape Cod for hosting measurements efforts to determine population exposures. Since firehouses tend to be located to represent population densities, it might be well for Phase IV measurements to be conducted in some or all of the firehouses."

A Congressional letter from you dated April 6, 2001 to the Air Force requested that the PAVE PAWS studies be conducted in accordance with the Electromagnetic Health Study (EHS) and its follow up Ultra Wide Band study (UWB). This led to our team's attempts to duplicate the two studies (EHS and UWB) by obtaining Air Force access to them and devising our study in parallel to the Kirtland Air Force teams PAVE PAWS study.

In the spring of 2000, the PFFM's Cape Cod locals caucused and tour the radar facility and offered their support, labor, and services to assist in the radiation study at Cape Cod firehouses. These secure firehouses are in residential neighborhoods within both radar beams and their side lobes, have heat, electricity, antenna masts, equipment rooms and are manned 24/7 by uniform personnel as a semi military organization.

In 2000 and 2001 I sought out two highly regarded universities in Boston to assist and participate in the radiation study. Graduate students from Suffolk University's Sawyer

School of Public Management and engineering students from Boston University's College of Engineering conducted pilot surveys of upper cape residents and designed a Radiation Output Monitoring (ROM) Station for the PFFM, toured the radar facility, sat in on Kirtland team briefings (third floor of the radar facility), received Air Force security clearance and acted as official Air Force public observers of the Kirtland team's measurement efforts on Cape Cod (see attached Suffolk and Boston University studies).

Since the Kirtland Team and our Team measurements are based on the existing equipment, we ask that no changes be allowed which may skew Phase IV measurement results and prevent the comparison with earlier (Phase II-III) results. This could possible prevent or skew the Kirtland team and our team ability to compare apples to apples, i.e. Phase III ground wave measurements to phase IV ground wave measurements. It is a fair conclusion to state and had been stated by members of the Kirtland team that a comparison of data cannot be properly conducted between the two final Phases (III and IV) if the equipment is changed, altered or upgraded before the Phase IV measurements are recorded

Below are the reasons I seek your immediate intervention to prevent any computer upgrade or equipment change pending the Kirtland Team completion of the Phase IV measurement process slated to be done and completed next month, September 2002.

1. We acknowledge the vital national defense and need for the radar facility and fully support its operations in a safe environment for the citizens of Cape Cod who are exposed to the two beam's side lobe radiation.

2. The lack of any L-Antenna measurements or readings by the Kirtland Team. Our teams sought to have L- Antenna measurements included in the study as early as September 2001 through the PAVF PAWS Public Health Steering group (PPPHSG) and in communication requests to the Air Force Kirtland Team before and after the team's In/Out Briefings in January, February and March 2002.

3. The lack of data, measurements, and incomplete reporting (page 83 of Phase III Spectrum Background Analysis Final Report- July 2002) of the ground wave spikes measured at Site 6 (Shakerhouse and Shawme Rd) as observed and recorded in the Air Force's Citizen Observer's Notebook by the official citizen observer assigned to observe the measurement proceeding. That morning, Dr. MacLemore advised me that a 15% (compared to Y & Z axis readings) maximum ground wave reading could be expected. At approximately 2:30 PM that day four separate spikes (ground wave) were recorded off the X-Axis, which were approximately 85% over the Y & Z axis. The lead engineer stated at that moment "that there will be repercussions from this". I was told that further magnetic testing would need to be conducted. These later test also show the ground wave readings.

4. The recent intervention and filing of charges against Kirtland Team members by Air Force officials for the alleged public release of the ground wave data. See attached Affidavit to Air Force Chief Miller, USAF in defense of charges preferred against Kirtland Team members for alleged release of ground wave data to public.

5. We currently seek the official transcripts or tapes of the Kirtland team's March 2002 public Out Briefing held at the radar site conference room were the Kirtland team members, the PAVE PAWS Public Health Steering Group's (PPPHSG) technical committee chairman (C. Kleekamp), I as well as others spoke about the issue of the ground wave measurements. Though the January and February 2002 In / Out Briefing minutes, transcripts and tapes are available online at the PAVEPAWS.gov web site, the March tape is unavailable or missing due to a recent office move. Could your office provide me a copy of the transcript or missing meeting minutes as they contain vital information for the public record of the discussion of the effects of the recorded ground waves?

6. The lack of calibration of the facilities 32 transmitters on the radar face which control the 15,000 plus elements and the difficulty the team had in referencing Raytheon radar design manuals to adjust them due to age, pattern and industry protection laws. The team had to reverse engineer the transmitter calibrations and reset them outside their designed level or frequency to insure continued functional operation of the radars beams. It was privately stated in the radar

lobby that Raytheon officials are extremely concerned that the facility may not be operating within the bounds of its 1978 design.

As always, the Professional Firefighters of Massachusetts look forward to working with you and your staff to help resolve any issue of public health and safety that affects the Commonwealth's residents. We offer our assistance to you, the Air Force and the Kirtland team to finish Phase IV of the measurement protocol.

I state and submit this letter as an Affidavit and official response to the Environmental Assessment (EA) and further state that the attached reports, letters, memo's and statement of events are true and accurate to the best of my knowledge.

SIGNED UNDER THE PAINS AND PENALTIES OF PERJURY.

Respectfully Submitted,

Ronald Cronin
Dated August 9, 2002


Ms. Martin / Mr. Brady King

cc: Federal Delegation
USAF Secretary James Dishner
Kirtland Air Force Team
PFFM President
Dean Lavin- Suffolk University
Dean Horenstein Boston University
Boston University Team 17
Public

**BROOKLINE FIRE FIGHTER LOCAL 950
PAVEPAWS STUDY COMMITTEE**

Honorable Congressman William D. Delahunt
Congress of the United States
Washington D.C. 20515

April 7, 2001

RE: PAVEPAWS radiation output study.

Dear Congressman Delahunt,

Thank you for taking a moment and speaking to me at Suffolk University's MPA Association's Breakfast Seminar held at the Sheraton in Hyannis on March 18, 2001. Your speech and style, or as you put it "question and answer" opportunity was witty, direct, and intriguing. As I mentioned, I am a veteran Brookline Firefighter, and one of their State Delegates, a Suffolk University Graduate student, and Suffolk University MPA Student Association Cape Cod representative.

I am writing to take you up on your offer to review my proposed plan to conduct a study of the radiation output from the Cape Cod PAVEPAWS (Precision Acquisition Vehicle Entry Phased Array Warning System) facility. And at your suggestion, to pass my proposal onto Senator Kennedy's office and any other agency that you may feel would accomplish our mutual goal of getting accurate readings of the radiation output and the study funded.

Since this past January I have met with and received unanimous endorsement of the Professional Fire Fighter of Massachusetts (PFFM) Executive Board, the Local Union's elected officials at the PFFM State meeting in January and February, and when caucusing the Cape Cod Firefighter Local. I have mapped all the firehouses on the Cape and researched and devised a concise methodology study in order to get accurate, unbiased, and statistically significant data result of the radiation output from the facility.

As I mentioned at the breakfast, I have sent three letters to the Senator's Washington office but have not received a written response. I called David Bowen of Senator Kennedy's Health Section in January and February 2001. I received a return call on February 9, 2001 at my firehouse from Ms. Beth Cameron of the Health Section concerning my proposal and my desire to meet with an aid to the Senator. I still await to hear back from Mr. Bowen or Ms. Cameron.

The Massachusetts Firefighter Educational Bill now before the House Way and Means has

provided me and the members of Professional Firefighter of Massachusetts an opportunity to return to school and conduct Graduate work. One proposal that the 12,000 plus members have endorsed is to assist the Air Force is obtaining accurate and significant reading of the PAVEPAWS facility.

The PFFM would be providing a leadership role with its members assistance in cooperation with Suffolk University's Cape Cod Graduate Management Program, and Boston University's Graduate College of Engineering. The PFFM, Suffolk University, and Boston University all have the available tools and components to conduct the radiation measurements' portion of the proposed United States Air Force PAVEPAWS study.

Currently, the United States Air Force, Cape Cod civic leaders, their town's Boards of Health, Senator Kennedy, Senator Kerry, yourself, Barnstable County Health officials, the Massachusetts Department of Health, as well as the public at large are requesting an in depth study of the Phase Array Radar signal and radiation levels that the radar facility emits. Recently a Steering Committee of Upper Cape Health officials, political and Air Force representatives was formed to organize and select a team of experts to conduct a study of the PAVEPAWS facility.

The purpose of allowing the PFFM and graduate students to study the radiation output of the PAVEPAWS facility is to independently ascertain the radiation exposure levels emitted by the radar facility. With the three independent organizations involved (the PFFM, Suffolk University, and Boston University) this study would be accomplished in an unbiased, scientific, and creditable fashion within nine to twelve months.

With the PFFM, Suffolk University, and Boston University's association in the tracking, recording, and documentation of the amount and levels of radiations emitted from the facility a public service of mammoth proportion will be accomplished. Our study will provide much needed statistical and accurate measurements in order to help resolve and settle the regional health fears and national defense concerns that are having a delay effect on the Air Force's planned computer upgrade at the facility.

This study could also fulfill Senator Kennedy's January 11, 2001 requests to Secretary Peters of the Air Force that this study becomes a "Pilot Program" and be expanded as a "Model" throughout other communities of the state or country. This would also free up Air Force staff, researchers, and consultants, thereby allowing them to attend any medical or animal research section of the study.

As Firefighter, we understand the position that the Air Force has been placed in and the job importance of the facility. That it acts as an early warning system to detect and determine attack characteristics of intercontinental ballistic missiles and sea launched ballistic missiles against the United States. We have researched the two current separate Environmental Impact Statements (EIS) by the Air Force and the Ballistic Missile Defense Organization (BMDO).

benefits of having us conduct a study is to ensure unbiased and incorruptible data outcomes and the proper recording and reporting of data 24 hours a day. Due to the general trust and admiration of Massachusetts firefighters and with the involvement of two highly acclaimed Universities, greater public acceptance and support of the finding are anticipated. In addition, we posit that our results will be more readily accepted by the military and State and Federal agencies.

Our study goal is to obtain accurate radiation measurements at various heights and evenly dispersed locations (firehouses) throughout Cape Cod and the Islands. Also being considered in the study are the areas of Plymouth and Southeastern Massachusetts that are within range of either of the facilities radar beams.

The study will require electronic equipment be set up and calibrated at each selected firehouse or site. Precise synchronization, calibration, location, and positioning of the equipment will be conducted. Continuous monitoring, D-Dot, L-Antenna, time domain, intensity, and any other relatively significant tests will be conducted.

Uniformed Fire Fighters, manning the selected secure firehouses 24 hours a day, seven days a week, will provide the necessary security and manpower to conduct the daily readings, recording, and data entry. Data entry would provide a time, date, weather, and a measurement signature attached at the moment of entry by the firefighter. The taking and entering of the measurements would never be reason to delay or impede any of the fire fighter's duties. All aesthetic appearances, site work, and liability issues will be addressed with the host community.

In March Major Sacra and Captain Frederick of the Air Force invited the firefighters to a tour and educational seminar at the PAVEPAWS facility. Lately, Major Sacra has been extremely helping in providing connections at the Air Force base in regards to our study proposal and tour.

I hope to get grant funding provided to conduct the study through the National Research Council, the Air Force, or the Massachusetts Department of Public Health. I seek, and ask you for assistance and support in my endeavor, should you think favorably upon our study proposal.

Please feel free to contact me at Fire Alarm should you care to be briefed as to our exact plans and methods of our proposed study.

Respectfully Submitted,

Ronald J. Cronin
Brookline Local 950 - State Delegate

David Dow
[REDACTED]
[REDACTED]
August 13, 2002
[REDACTED]

Mr. Jonathan D. Farthing
HQ AFCEE/ECA
3207 North Road
Brooks AFB, Tx. 78235-5363

Dear Mr. Farthing:

I am submitting comments on behalf of the Sierra Club on the Air Force Center for Environmental Excellence's (AFCEE) Draft Environmental Assessment (EA) for Installation of Milstar Fixed Communication Control Station at the Cape Cod Air Station, Massachusetts. In April 2002 (same time frame in which the draft EA was prepared by AFCEE) the Massachusetts Chapter-Sierra Club passed a resolution in regards to the PAVE PAWS Public Health Study in which it was stated that the Sierra Club's position was that the Environmental Impact Statement (EIS) for the PAVEPAWS should not be approved until the health studies being carried out by the PAVEPAWS Public Health Study Group (PPPHSG) and the National Academy of Sciences/National Research Council's (NAS/NRC) Committee to Assess the Potential Health Effects from Exposure to PAVE PAWS Low-level Phased Array Radiofrequency Energy are completed. We await the results from these health studies before taking a position on whether the PAVE PAWS system at the Cape Cod Air Station poses health risks to the public. We feel that these potential health issues should be evaluated as part of an integrated EIS process with the associated scientific investigations being carried out in a holistic fashion. Thus we oppose breaking out the Milstar Fixed Communication Station as a separate EA or simply doing a supplement to the 1979 EIS as a way to address the results from the currently ongoing studies for characterizing the phased array signal and epidemiologic studies of its potential health effects.

We feel that a new EIS is needed to address long standing public concerns that were left unanswered in the 1979 EIS. Since the Air Force has decided to insert itself into the PPPHSG process rather than turning the study over to Barnstable County for a truly independent analysis, they will have to bear a higher burden of proof for no harm from the existing PAVE PAWS system, much less any changes accompanying the upgrade to become part of the Ballistic Missile Defense System (BMDS). Since the Sierra Club supports the precautionary approach, we feel that in the face of scientific uncertainty public policy should opt to protect public health and the environment and the burden of proving no harm falls upon the Air Force and not the public or PPPHSG. AFCEE's decision to prepare an EA and not a new, comprehensive EIS is a discouraging response to our concerns and those of other members of the public.

The Cape Cod Group-Sierra Club has the lead for the Massachusetts Chapter-Sierra Club in addressing issues related to the Massachusetts Military Reservation (MMR) and we have tried to work with the military in a spirit of cooperation to allow essential training without polluting our ground water (sole source aquifer for drinking water) or impacting the habitat required for protected species. Given the emerging controversy on environmental regulations impacting military training (military encroachment issue), and the fact that the Sierra Club and most other national environmental organizations oppose the Department of Defense's (DoD) efforts to seek exemptions from the Migratory Bird Treaty Act (MBTA), Endangered Species Act (ESA), Marine Mammal Protection Act (MMPA), National Environmental Policy Act (NEPA) to facilitate military training/operational activities within the U.S. These national environmental organizations feel that there are existing mechanisms for the military to get relief for necessary training/operational activities without writing special exemptions into our basic environmental legislation.

Raymond F. Dubois, Jr. testifying on behalf of the DoD's Readiness and Range Preservation Initiative

before the House Committee on Resources, Subcommittee on Fisheries, Conservation, Wildlife, and Oceans stated that the MMPA's definition of harassment needed to be changed so that the Navy could "must train as we intend to fight". In the past the Massa. Army National Guard (MANG) burned propellant bags on the ground at Camp Edwards under the guise of training as they fought. This is one of the sources of the ground water pollution underlying Camp Edwards and shows that military training can't occur to the detriment of protecting public health and the environment. The history at the MMR is full of missed opportunities where if the military had been more proactive in addressing citizen concerns, it would have been less costly to carry out the cleanups of our polluted ground water and would have not engendered the public distrust which hampers us in moving toward a new future relationship.

Given this background it does not seem to be a propitious time for the Air Force to backtrack on its pledge to the citizens of Cape Cod and our political representatives to prepare a new EIS for the PAVE PAWS system to include the new health studies, and to instead opt for a less exhaustive EA which would likely have minimal public involvement. We need to move forward into the future at the MMR with the military conducting compatible training, while at the same time protecting public health and the environment of the special place that is Cape Cod. The lack of public trust in the military's ability to fulfill its promises has hampered us in the past and the military needs to move beyond half way measures if we are to move into the future that we all desire.

Thanks for your consideration in this matter.

Yours truly,

David Dow
Treasurer, Cape Cod Group-Sierra Club



The Commonwealth of Massachusetts
Executive Office of Health and Human Services
Department of Public Health
250 Washington Street, Boston, MA 02108-4619

JANE SWIFT
GOVERNOR

ROBERT P. GITTENS
SECRETARY

HOWARD K. KOH, MD, MPH
COMMISSIONER

09/09/02

Mr. Robert Novak
HQ AFSPC/CEVP
150 Vandenberg Street, Suite 1105
Peterson AFB, CO 80914-2370

Dear Mr. Novak:

The Massachusetts Department of Public Health (MDPH), Bureau of Environmental Health Assessment, has reviewed the Draft Environmental Assessment for the Early Warning Radar (EWR) Service Life Extension Program (SLEP) at Cape Cod Air Force Station, Massachusetts. This document notes that the "EWR SLEP action involves the replacement of outdated computer components and rehosting software." Therefore, it is our understanding that the "proposed replacement components and the rehosting of software would not change the power output of the Solid-State or the characteristics of the radiofrequency energy emitted from the radar."

As you are likely aware, MDPH had convened an expert panel that noted among other things that "health effects data on the type of radiation emitted by PAVE PAWS are unclear, sometimes contradictory, or lacking; and better environmental data are needed to characterize opportunities for exposure and potential health impacts from the facility (MDPH, March 2000)." The findings of this report helped to prompt further environmental study and associated epidemiological assessment by the U.S. Air Force. Considering the SLEP statement that radar output would remain unchanged by the proposed modifications, it appears that this proposed action would not affect our previous recommendation (i.e., that a better understanding of public environmental exposure opportunities be sought).

Importantly, we understand that the Air Force is preparing to submit a supplemental environmental impact statement to address community health concerns related to continued use of the radar. We look forward to reviewing and commenting on this document.

Sincerely,

A handwritten signature in cursive script, appearing to read "Suzanne K. Condon".

Suzanne K. Condon, Assistant Commissioner
Bureau of Environmental Health Assessment

MDPH, March 2000.

Memorandum to Readers of the Expert Panel Report on PAVE PAWS Prepared for the MDPH from Suzanne K. Condon, Director, Bureau of Environmental Health Assessment Regarding MDPH Opinion of Report Contents. Available at <http://www.state.ma.us/dph/beha/epi/reports/pavepaws/intro.htm>

APPENDIX D

EWR SLEP AND RADAR WAVEFORM EFFECTS



DEPARTMENT OF THE AIR FORCE
HEADQUARTERS ELECTRONIC SYSTEMS CENTER (AFMC)
HANSCOM AIR FORCE BASE MASSACHUSETTS

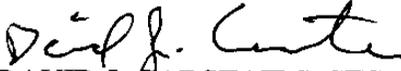
MEMORANDUM FOR AFSPC/CC

AUG 27 2002

FROM: ESC/ND
1050 E. Stewart Ave.
Peterson AFB CO 80914-2902

SUBJECT: Early Warning Radar (EWR) Service Life Extension Program (SLEP) and
Radar Waveform Effects

1. The Early Warning Radar (EWR) Service Life Extension Program (SLEP) will modify the aging and unsupported computers and peripherals used in the Ballistic Missile Early Warning System (BMEWS) and PAVE Phased-Array Warning System (PAWS) radars.
2. Changing the peripherals or changing the unsupported computers will not change the radiated transmitted pulses since neither the Receiver-Exciter (REX) nor the Beam Steering Unit (BSU) will be changed. Therefore, the input to the transmitter amplification chain will not be affected by SLEP.
3. The transmitter amplification chain will neither be revised nor modernized, thus the design of the two sets of components which control the radiated pulse shape will not be altered. Hence the radiated pulse shape will not experience changes due to SLEP modifications.
4. The detailed technical waveform assessment and a listing of the currently planned, potential future, and risk reduction hardware/software modifications for Cape Cod are provided as attachments.


DAVID J. CARSTAIRS, SES
System Program Director
Strategic & Nuclear Deterrence C2 SPO

Attachments:

1. Technical Waveform Assessment
2. EWR SLEP modification list

Attachment 1

Early Warning Radar (EWR) Service Life Extension Program (SLEP) Technical Waveform Assessment

1. The Early Warning Radar (EWR) Service Life Extension Program (SLEP) will not alter or affect the PAVE PAWS radiated emissions in any way. The surveillance and tracking operations of the PAVE PAWS radar are totally computer controlled. The central data processor, Control Data Corporation (CDC) 170-865 computer (circa early 1980's vintage) schedules the radar mode (i.e., radar waveforms) to be used in the next interval of time. These modes include surveillance, track and operability assessment. The radar orders are sent to the Radar Control Logic (RCL - "Radar Controller"), a ModComp Classic II/75 computer (also circa early 1980's vintage) that distributes the appropriate commands and the time of their execution to the radar hardware components. These components include the Receiver-Exciter (REX), the Signal Processor (SPR), and the Beam Steering Unit (BSU). Prior to transmitting a radar pulse, the BSU, under RCL control, translates the requested beam position into commands for the array phase shifters. Once computed, the BSU commands the execution of the phase shift. The REX stores the transmit requirements for each of the radar pulses to be used for a particular operational mode. The REX executes RCL orders concerning the choice of the particular transmit pulse (or pulses) to be used in the required time interval and the time of transmission of each pulse. The radiated transmit pulse is amplified prior to radiation by the antenna. The transmit amplification chain includes an Array Group Driver (AGD) which amplifies the pulse output by the REX and distributes it to 56 subarray drivers. Each subarray driver amplifies this same signal and distributes it to 32 transmit-receive modules. The amplifiers are designed for class C operation. This means that the amplifiers are only on when a signal reaches them; when the pulse is complete, the amplifiers turn themselves off. Neither the central data processor nor the ModComp computers controls the on-off timing or the operation of these amplifiers.

2. The EWR SLEP will modify the aging and unsupportable computers and peripherals used in the BMEWS & PAVE PAWS radars. Changing the peripherals or changing the unsupportable computers will not change the radiated transmitted pulses since neither the REX nor the BSU will be changed. Therefore, the input to the transmitter amplification chain will not be affected by SLEP. The transmitter amplification chain will neither be revised nor modernized. Thus the design of the two sets of components which control the radiated pulse shape will not be altered. Hence the radiated pulse shape will not experience changes due to the SLEP.

CURRENT LIST (1st SET - "BAD ACTORS"):

- **Solid State Module Test Set (SSMTS):** Stand-alone test set that tests solid state modules from the radar array face. The SSMTS consists of both the AN/FPM-38 Test Set, Antenna System, and AN/FPM-35 Receiver-Transmitter Test Set.
- **Radar Controller (RCL) & Digital Module Test Set (DMTS) Peripherals:** Provides supportable COTS replacements for the existing RCL and DMTS peripheral devices. SLEP plans to modify the disk drives and magnetic tape units with devices that are supportable for at least 10 years. The existing ModComp controller would be replaced with an existing commercially available controller, SCSI hard drive, and SCSI tape drives. Using COTS solutions has the advantage of reducing the engineering effort.
- **CYBER Disk & Tape:** The CYBER D&T replacements are to be of equivalent capability as the current operational equipment. The installed D&T devices must also be designed to minimize the floor space requirements. The drives must be addressable by either CYBER computer to support switchover between redundant strings and to provide equivalent or better throughput performance. There is also a need to maintain the capability of reading existing 9-track tapes for data compatibility or to convert the tapes to a more modern media.
- **NPU Cards:** These are currently operational on PAVE PAWS - intended to augment the supply system to draw on as spares. The radar system has a Network Processing Unit which contains a Memory Module Line Replaceable Unit (LRU). The original NPU Memory Module has become unsupported due to a lack of spares, and original components are no longer manufactured or available. This is a reengineered replacement of this NPU Memory Controller Card (MCC).

POTENTIAL FUTURE LIST (2nd SET - "BAD ACTORS"):

** This equipment is currently operational on PAVE PAWS - these SLEP items are to augment the supply system to draw on as spares.

- **CYBER Memory Card (Modules):** These are where the CYBER memory is located. There are 19 different types. Limited stock in supply system – potential purchase of available assets through third-party vendors.
- **CYBER Power Supply:** Provide the necessary voltage to run the equipment. Anticipated to fail at an increased level; candidate for form-fit-function replacement or reengineering/manufacture.
- **Dew Point Sensor:** Environmental sensors that are part of the CYBER suite. When the relative humidity gets too high, they shutoff the power to the computers to keep them from catching fire. Candidate for reengineering.

- Multi-Access Controller (MAC) Switch: Interface between the Data Processor CYBERs and the Data Channel Controller (DCC).
- Standard Interface Cards: Potential purchase of additional boards from ModComp as spares.
- ACP Card: Purchase of additional boards from ModComp as spares for form-fit-function replacement.
- MODCOMP Classic IIs: Existing computers used in the RCL. Diminishing source of spares. Purchase of existing, used commercial RCLs to be used for spare parts

RISK REDUCTION ACTIVITIES:

- CYBER Emulation (RePlace Technology): Provides an instruction set level clone of the legacy CYBER 765/785 systems using RePlace Emulation platform:
 - Emulates the CYBER 170 Central Processor (CP) instruction set in real-time
 - Emulator run on Intel Itanium2 64-bit symmetric multi-processor platform.
 - Emulates the CYBER 170 Peripheral Processor Unit (PPU) instruction set in real-time
 - Emulator run on PowerPC platform (same as SLEP "1st Set Bad Actors" controller)
 - Use SIMPACT to replace CP NPUs
 - Sun Sparc based workstation
 - Connect to PPU emulator via Ethernet
 - Use SLEP "1st Set Bad Actors" modification for disk / tape peripherals
 - Runs all software executables, including CPCIs, CYBER OS, and RTOS, with no modifications
 - No changes to the legacy software required -- runs the existing binary executables "as is"
 - Site-specific versions of legacy software accommodated
 - Captures all undocumented legacy code features
 - Use of new, modern hardware greatly reduces facility space requirements
 - Eliminates necessity for support equipment needed by antiquated legacy hardware, e.g., motor generators, cooling units, dew point sensor, etc.
 - Greatly reduced power consumption
 - Uses standard Open System Interfaces between subsystems
 - Simplifies the Verification & Validation process:
 - V&V of legacy machine emulation, not mission software
 - V&V for the system is the same as that for the legacy system
 - VIEWstation support tool provides extensive real-time, non-intrusive diagnostic and maintenance capability for legacy software
 - Minimal change from operator's, developer's, or software maintainer's viewpoint-- Familiar MMI maintained
 - Allows mission software maintenance with either legacy languages and tools or modern languages and tools

- CYBER 960 Evaluation: Obsolete CYBER 865/875s are out of production and becoming difficult to sustain. Risk Reduction activity involves exploration of the concept to replace CYBER 865/875s with CYBER 960s. Used 960s may be available through CYBER Resources, however maintenance history unknown, spares/repair sources unknown, etc. Risk reduction activity involves evaluating the “unknowns” to determine feasibility of this concept as a viable option.