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EPA Superfund
Record of Decision:

HOMESTEAD AIR FORCE BASE
EPA ID: FL7570024037
OU 12
HOMESTEAD AIR FORCE BASE, FL
09/12/2006

United States Air Force

Environmental Restoration Program

FINAL

RECORD OF DECISION FOR OPERABLE UNIT 12 – FORMER ENTOMOLOGY STORAGE SHOP

Homestead Air Reserve Base, Florida

August 2006

HOMESTEAD AIR RESERVE BASE

RECORD OF DECISION FOR OPERABLE UNIT 12 – FORMER ENTOMOLOGY STORAGE SHOP

FINAL

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Atlanta, GA

August 2006

TABLE OF CONTENTS

SECTION **PAGE**

LIST OF FIGURES

LIST OF TABLES

APPENDICES

LIST OF ACRONYMS

AFB	Air Force Base
AFRC	Air Force Reserve Command
ARAR	Applicable or Relevant and Appropriate Requirement
ARB	Air Reserve Base
BCT	BRAC Cleanup Team
BRAC	Base Realignment and Closure
BGP	Base General Plan
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Constituent of Concern
CRP	Community Relations Plan
DERM	Department of Environmental Resources Management
DoD	Department of Defense
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
ERP	environmental restoration program
FAC	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FFA	Federal Facilities Agreement
FS	feasibility study
GCTL	ground-water cleanup target level
IRA	interim remedial action
IRP	installation restoration program
kg	kilogram
LUC	land use control
MCL	maximum contaminant level
mg	milligrams
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	operable unit
PAH	polynuclear aromatic hydrocarbon
PA/SI	preliminary assessment/site investigation
PCB	polychlorinated biphenyl
RAB	Restoration Advisory Board
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
ROD	record of decision
SARA	Superfund Amendments and Reauthorization Act
SCTL	soil cleanup target level
SI	Site Investigation
SVOC	semivolatile organic compound
SWMU	solid waste management unit
µg	micrograms
VOC	volatile organic compound

HOMESTEAD AIR RESERVE BASE
HOMESTEAD, FLORIDA
RECORD OF DECISION FOR
OPERABLE UNIT 12 – FORMER ENTOMOLOGY STORAGE SHOP

1.0 DECLARATION

1.1 Site Name and Location

Homestead Air Reserve Base (ARB) [U.S. Environmental Protection Agency (EPA) Identification Number (ID No.) FL7570024037] is located within southeastern Miami-Dade County near the southern tip of peninsular Florida. The installation is located near U.S. Highway 1, approximately 25 miles southwest of Miami, immediately east of the City of Homestead boundary, and two miles west of Biscayne Bay. Operable Unit (OU) 12 is the Former Entomology Storage Shop (former Building 371) and is located within the north-central portion of Homestead ARB. OU-12 occupies approximately 0.4 acres on the north side of St. Lo Boulevard, approximately 300 feet west of Coral Sea Boulevard, and consists of a vacant grassy area and a small parking area.

1.2 Statement of Basis and Purpose

Homestead Air Force Base (AFB) was placed on the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) National Priorities List (NPL) on 30 August 1990. This resulted in the adoption of a Federal Facilities Agreement (FFA) between the EPA, the State of Florida, and the U.S. Air Force, which was finalized in early 1991. This Record of Decision (ROD) is being issued by the U.S. Air Force Reserve Command (AFRC), which is the lead agency for environmental restoration activities at Homestead ARB under CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The final remedy for OU-12 was co-selected by AFRC and EPA Region IV, with the concurrence of the Florida Department of Environmental Protection (FDEP).

This ROD presents the Selected Remedy for OU-12 at Homestead ARB, in Miami-Dade County Florida, which was chosen in accordance with CERCLA regulations, as amended by the Superfund Amendments and Reauthorization Act (SARA) and, to the extent practicable, the NCP. This decision is based on the Administrative Record file for this site.

1.3 Assessment of the Site

The response action selected in this ROD is necessary to protect the public health or welfare or the environment from actual or threatened releases of hazardous substances into the environment.

1.4 Description of the Selected Remedy

OU-12 is one of 31 sites that are part of the cleanup strategy at the former Homestead AFB. Two OUs were transferred to the Florida petroleum program, final remedial actions have not been selected for eight other OUs, and no action decisions have been made for six OUs. OU-12

has been investigated and remediated independently from all other OUs at Homestead AFB. The remedy selected in this ROD applies only to the portions of the OU-12 site where soil contains contaminants with concentrations greater than the FDEP residential soil cleanup target levels (SCTLs) shown in Table 1-1. Figure 2-2 identifies the estimated extent of soil containing contaminant concentrations exceeding residential SCTLs, which will require LUCs. The selected remedy for OU-12 is not applicable to any other site or OU at the installation.

Approximately 10 cubic yards of arsenic-contaminated soil, 411 cubic yards of polynuclear aromatic hydrocarbon (PAH)-contaminated soil, and 44 cubic yards of pesticide-contaminated soil are estimated to remain at OU-12 at concentrations that exceed the unrestricted use and unlimited exposure criteria represented by the residential SCTLs, shown in Table 1-1.

As part of the OU-12 risk evaluation, exposure point concentrations (EPCs) were calculated for constituents of concern (COCs). EPCs represent a conservative estimate of the concentration of COCs in OU-12 soil. As shown in Table 1-1, results of the OU-12 risk evaluation indicate that impacted soil does not pose an unacceptable risk to current and anticipated users of the site (i.e., commercial/industrial workers) because EPCs for all contaminants were less than the FDEP commercial/industrial SCTLs. As a result, no remedial action is required to protect anticipated users of the site. However, EPCs for total PAHs and benzo(a)pyrene exceeded residential SCTLs. Therefore, remedial action is required to be protective of residential receptors, which represent the unrestricted use and unlimited exposure scenario. The EPC for arsenic also exceeded the residential SCTL but was eliminated from further consideration in the risk evaluation because it was less than the base-specific background concentration of 10 mg/kg.

Table 1-1
Soil Cleanup Target Levels for Constituents of Concern at Operable Unit 12

Constituents of Concern	Units	FDEP Soil Cleanup Target Levels[1]		Exposure Point Concentrations[2]
		Residential	Commercial/Industrial	
Total PAHs[3]	µg/kg[4]	100	700	421.5[5]
Benzo(a)pyrene	µg/kg	100	700	378.9

Notes:
1. Chapter 62-777 of the Florida Administrative Code (FAC), dated 17 April 2005.
2. EPCs were calculated as the 95% Upper Confidence Limit (UCL) on the mean using EPA's ProUCL software.
3. PAHs are evaluated as the sum of the benzo(a)pyrene toxicity equivalents for the individual PAHs.
4. µg/kg = micrograms per kilogram.
5. Exposure point concentrations (EPCs) were calculated for PAHs as the sum of the benzo(a)pyrene toxicity equivalents for the carcinogenic PAHs.
6. mg/kg = milligrams per kilogram.

Principal Threat Wastes are source materials (e.g., contaminated soil or ground water) that contain highly toxic or highly mobile chemicals, which generally cannot be contained in a reliable manner or would present a significant risk to human health and the environment should exposure occur.

The contaminants listed in Table 1-1 are not considered principal threat wastes because they are present at concentrations that are not greatly above the SCTLs; they do not pose an excess cancer risk greater than the acceptable risk range if exposure to the contaminants were to occur; and they are relatively immobile in soil. As a result, aggressive removal and/or treatment of the contamination is not warranted and only limited action is necessary to protect human health.

The selected remedy for OU-12 is Land Use Controls (LUCs), which include:

- Use Restrictions – Residential use restrictions will be implemented to prohibit property users from using the property for residential purposes, hospitals for human care, public or private schools, or day care centers for persons under 18 years of age. Residential use will be prohibited on portions of the OU-12 property containing contaminated soil with total PAH concentrations greater than the residential SCTLs shown in Table 1-1. Figure 2-2 identifies the estimated extent of soil containing contaminant concentrations exceeding residential SCTLs, which will require LUCs.

- Digging Restrictions – Excavation of OU-12 soil containing concentrations of contaminants greater than the industrial SCTLs shown in Table 1-1 will be managed to ensure that unacceptable exposure to the contaminants does not occur. Excavation beneath or disturbance of the asphalt parking lot located in the southwestern portion of OU-12 will be not be permitted without prior approval by the Base Civil Engineer in the form of a dig permit or other approval as required by applicable Air Force instruction and procedures. Further, until soil sampling data indicate that contaminant concentrations beneath the asphalt parking lot are less than the commercial/industrial SCTLs shown in Table 1-1, the surface cover provided by the parking lot will be maintained in such a manner as to provide an effective barrier to prevent unacceptable exposure. These restrictions will be enforced through the dig permit system and construction review process that is currently in place throughout Homestead ARB. No construction or digging is allowed without prior approval by the Base Civil Engineer. The Base Civil Engineer will not approve permits for activities inconsistent with LUCs.

- Contaminated Soil Management Restrictions – LUCs will be implemented to require that any contaminated soil that is excavated at OU-12 will be properly managed on site, and that any contaminated soil transported off site will be managed in accordance with applicable Resource Conservation and Recovery Act (RCRA) regulations.

LUCs will allow the property to continue to be used in the current manner and will allow future development of the property for commercial/industrial purposes, as long as contaminated soil is properly managed. Residential use restrictions will ensure that the property is not redeveloped for residential use. Digging restrictions will prevent direct contact with contaminated surface and subsurface soils, prevent emissions of contaminant particles entrained on dust, and ensure proper personnel protection and waste management of contaminated soil that is excavated in the future.

Residential use restrictions will be identified in the Base General Plan (BGP), and the Homestead ARB Installation Commander will implement, monitor, maintain, and enforce LUCs at Homestead ARB, through the Base Civil Engineer's Environmental Flight Office through existing land-use management programs. Use restrictions will ensure that the future land use of the property remains commercial/industrial and does not change to residential use. LUCs will remain in place until confirmatory sampling data indicate that PAH concentrations have declined below unrestricted use and unlimited exposure criteria represented by the residential SCTLs in Table 1-1.

These LUCs will be implemented, monitored, maintained, and enforced at OU-12 in conjunction with LUCs at other OUs at Homestead ARB to ensure that LUCs are consistently and efficiently implemented as part of the cleanup strategy at Homestead ARB. Homestead ARB

Environmental Flight Office personnel will monitor the contaminated areas of OU-12 to ensure that LUCs are not breached and remain protective. Annual reports summarizing the results of the LUC monitoring will be submitted to FDEP and EPA. Homestead ARB Environmental Flight personnel will promptly notify EPA and FDEP if any activity that is inconsistent with the LUCs or may interfere with their effectiveness is observed at OU-12. Homestead ARB Environmental Flight personnel will notify and seek concurrence from EPA and FDEP prior to termination or modification of the LUCs and will notify EPA and FDEP prior to transfer of the property.

1.5 Statutory Determinations

The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions and alternative technologies to the maximum extent practicable.

The remedy for this OU does not satisfy the statutory preference for treatment as a principal element of the remedy for the following reasons:

- No principal threat wastes are present for which aggressive removal or treatment is warranted

- LUCs provide comparable protection of human health and are more easily implemented and cost-effective than other remedial alternatives considered in the Streamlined Feasibility Study (FS).

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. Five-year reviews will continue until contaminant concentrations in soil have decreased to levels that allow for unlimited use and unrestricted exposure.

1.6 ROD Data Certification Checklist

The following information is included in the Decision Summary section of this ROD:

- COCs and their respective concentrations—Sections 2.5 and 2.7

- Potential risk posed by the COCs—Section 2.7

- Cleanup levels established for COCs and the basis for these levels—Section 2.8

- How source materials constituting principal threats are addressed—Section 2.11

- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of ground water used in the risk assessment and the ROD—Section 2.6

- Potential land and ground-water use that will be available at the site as a result of the selected remedy—Section 2.12
- Estimated costs and the number of years over which the cost estimates are projected—Section 2.10
- Key factors that led to selecting the remedy—Section 2.10

Additional information can be found in the Administrative Record file for this site, which can be accessed at https://afrpaar.afrpa.pentagon.af.mil/docsearch/newdocsearchform.asp.

1.7 Authorizing Signatures and Support Agency Acceptance of Remedy

The following signatures certify that all parties agree to the contents of this ROD and the selected remedy.

_____ _____

Randall G. Falcon
Colonel, USAFR
Commander, 482d Fighter Wing
Homestead Air Reserve Base, Florida

Date

_____ _____

Beverly H. Banister
Acting Director, Waste Management Division
U.S. Environmental Protection Agency, Region 4

Date

2.0 DECISION SUMMARY

2.1 Site Name, Location, and Description

Homestead ARB (EPA ID No. FL7570024037) is located within southeastern Miami-Dade County near the southern tip of peninsular Florida. The installation is located near U.S. Highway 1, approximately 25 miles southwest of Miami, immediately east of the City of Homestead boundary, and two miles west of Biscayne Bay.

OU-12 is the former Entomology Storage Shop (former Building 371), also known as Site OT-25 and P-1. The site is located within the northern portion of Homestead ARB, as depicted in Figure 2-1. OU-12 occupies approximately 0.4 acres on the north side of St. Lo Boulevard, approximately 300 feet west of Coral Sea Boulevard, and consists of a vacant grassy area and a small parking area. Figure 2-2 illustrates the site layout and identifies the OU-12 boundary. Building 360, which is currently used as the Wing Headquarters, is located immediately east and north of the site.

Former Building 371 was a wood-and-concrete-floored storage building that was used to store a wide variety of organochlorine pesticides from the 1940s until the building's demolition in the mid-1980s. The building also was reportedly used to store water treatment chemicals and associated small equipment prior to its demolition. Building 371 formerly occupied a portion of the vacant area north of the asphalt parking area and west of Building 361. The northwest portion of the excavation area, identified in Figure 2-5, covers part of the former footprint of Building 371.

2.2 Site History and Enforcement Activities

Homestead AFB was placed on the NPL on 30 August 1990. This resulted in the adoption of a FFA between the EPA, the State of Florida, and the U.S. Air Force, which was finalized in early 1991.

A list of important historical events and relevant dates in the site chronology are shown in Table 2-1. The identified events are illustrative, not comprehensive.

Table 2-1
Summary of Operable Unit 12 History

Event	Date
Pesticide Storage	1940s–mid-1980s
Installation Restoration Program (IRP) Phase I–Records Search	1983
Preliminary Assessment / Site Investigation (PA / SI)	1993
Extended SI / Preliminary Risk Evaluation	1995 and 1997
Voluntary Interim Remedial Action (IRA)	2000
Post-IRA Soil Sampling	2002
Ground-Water Monitoring	2000, 2002, 2003

An IRP Phase I Records Search was completed in 1983. Based on the records search, OU-12 had a low potential for contamination, due to the nature of the chemicals stored in the building and the absence of evidence that significant spills had occurred at the site; however, additional

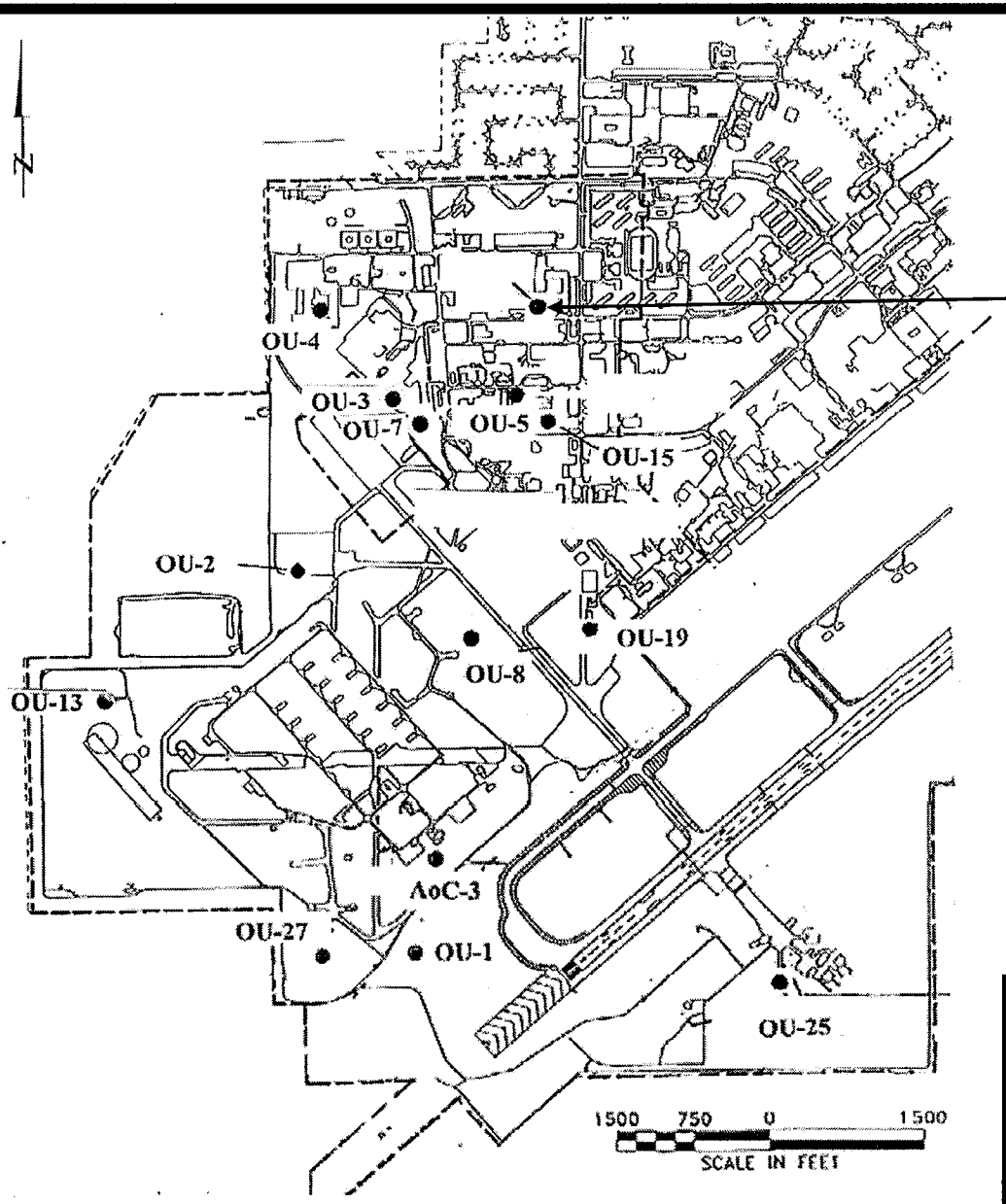
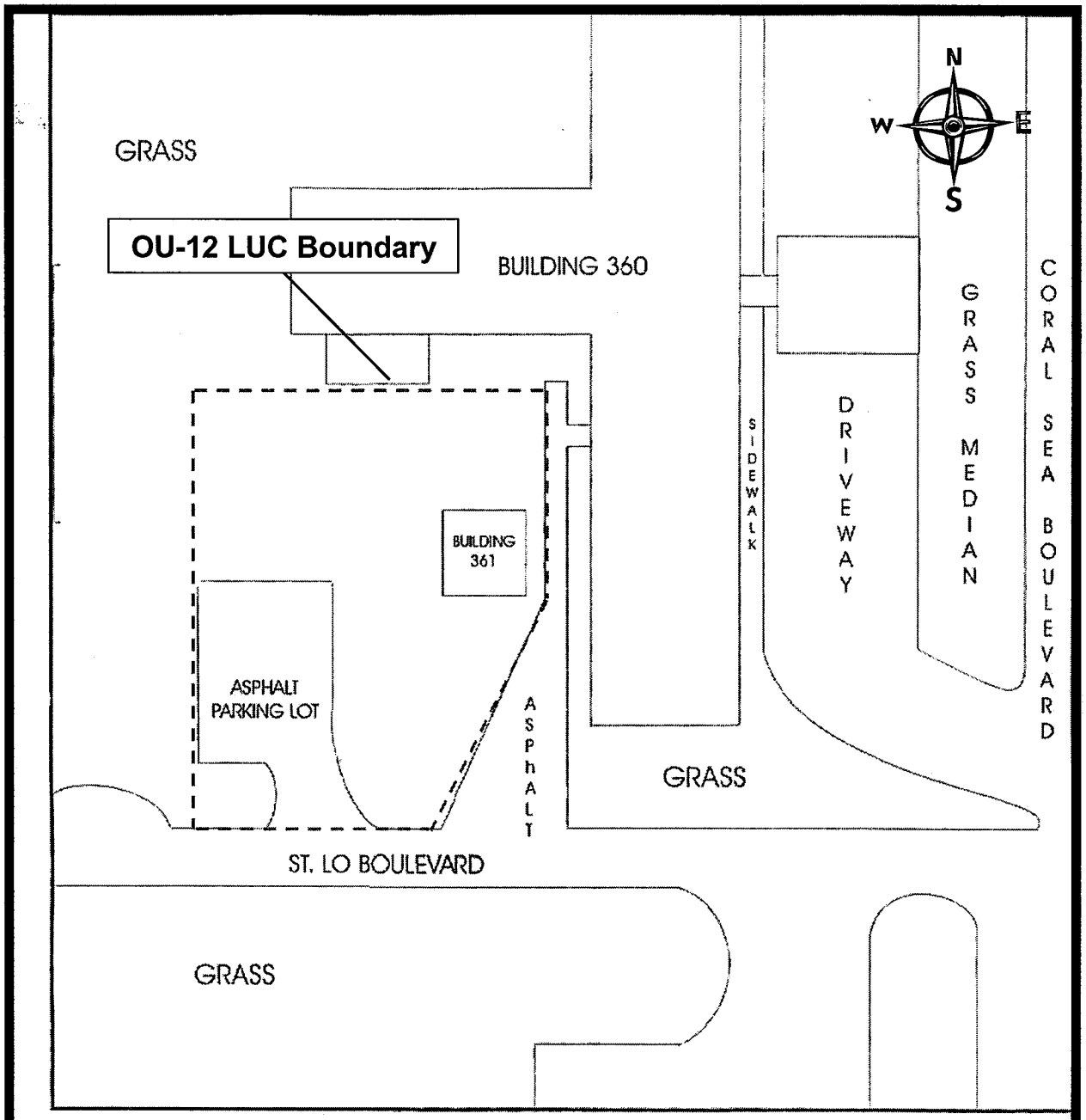


FIGURE 2-1

IRP Site Locations

Homestead ARB, Florida



SOURCE: Draft Final Letter Report, Voluntary Interim Remedial Action and Ground-Water Monitoring Activities, Operable Unit (OU) 12, Former Entomology Chemical Storage Shop (Former Building 371), Versar Inc., January 2002

NOTE: The OU-12 boundary was drawn to include all areas where residual soil contaminant concentrations exceeded the residential SCTLs.

FIGURE 2-2

OU-12 Current Site Layout Map

Homestead ARB, Florida

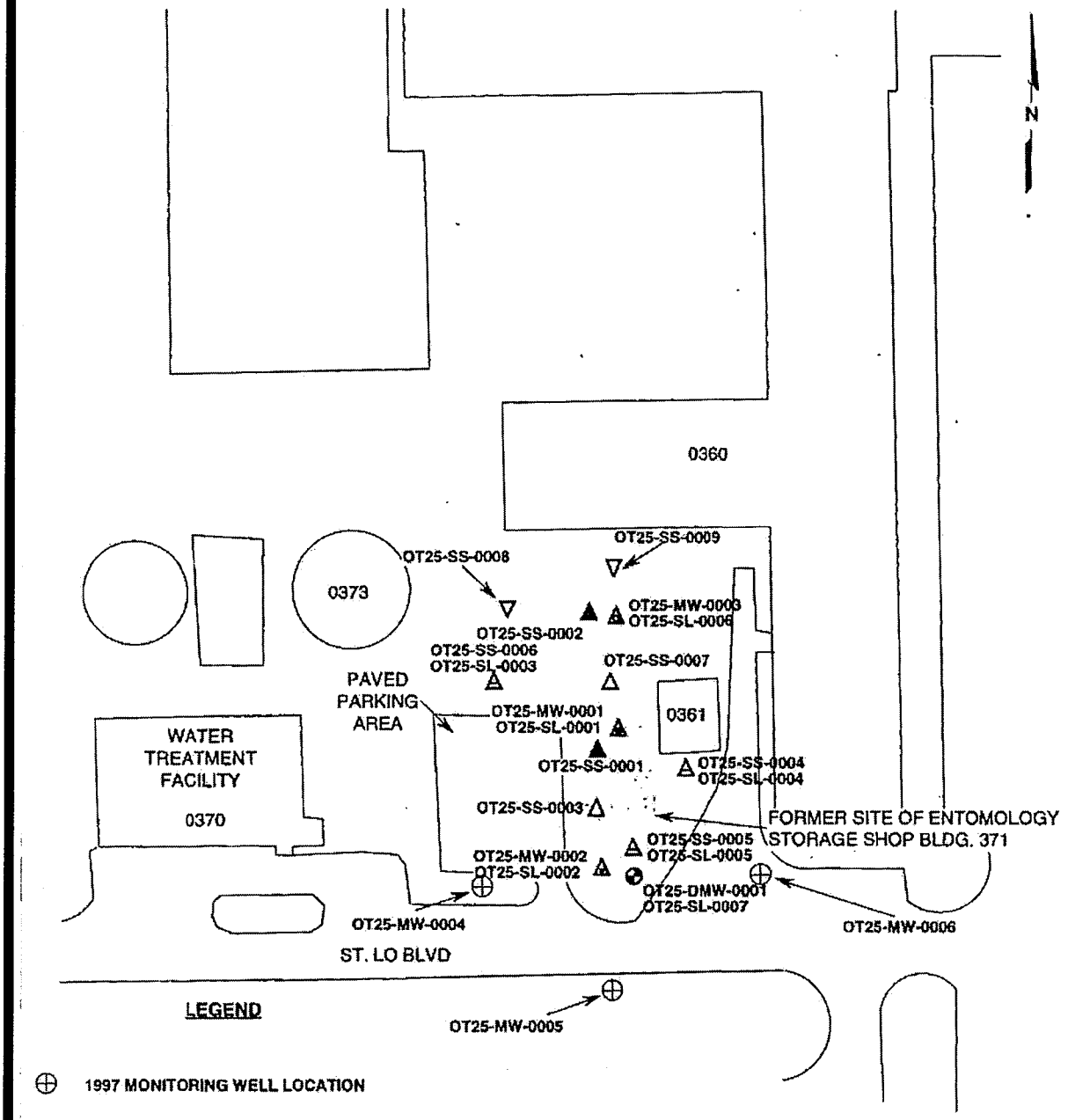
investigation activities were required to support a no action decision. While a formal remedial investigation has not been performed, a series of soil and ground-water investigations were conducted at OU-12 during 1993–1997, including a Preliminary Assessment/Site Investigation (PA/SI) (1993), an extended SI and preliminary risk evaluation (1995), and an SI addendum (1997) (Montgomery Watson, 1998). Based on the results of these investigations, a voluntary interim remedial action (IRA) was conducted in 2000 to remove contaminated surface soil (Versar, 2002). In April 2002, additional soil sampling was conducted to collect more representative confirmation soil samples from the former excavation area (IT Corporation, 2002). Figures 2-3 through 2-6 illustrate the locations of samples collected during these investigations. In 2000, 2002, and 2003, semiannual ground-water monitoring was conducted at six OU-12 monitoring wells (Versar, 2002; IT Corporation, 2003; Shaw Environmental, 2003). During these investigations, soil and ground water were evaluated for the presence of volatile organic compounds (VOCs), semivolative organic compounds (SVOCs), PAHs, total petroleum hydrocarbons, pesticides, and metals.

Based on the results of these investigations, potential final remedy alternatives were evaluated as part of a Streamlined FS for OU-12, which was initiated in 2005 and finalized in March 2006 (Booz Allen, 2006). The analysis conducted in the FS provides the basis for the final remedy identified in this ROD. The Final FS for OU-12 was submitted to EPA and FDEP for review, and letters of approval were received on 22 February 2006 and 20 February 2006, respectively. No substantial comments or concerns with the final FS for OU-12 were raised by EPA. FDEP commented that FAC § 62-780 should be listed and considered as an Applicable or Relevant and Appropriate Requirement (ARAR). Based on this comment, FAC § 62-780 was added to the ARAR analysis. No other substantial comments or concerns with the final FS for OU-12 were raised by FDEP. The Miami-Dade County Department of Environmental Resources Management (DERM) also provided comments on the Streamlined FS, which were considered in preparing this ROD.

2.3 Community Participation

The AFRC has a public participation program at Homestead ARB to promote public understanding of the cleanup process and its results, and to ensure that the community's concerns are solicited, considered, and thoroughly addressed. The backbone of this program is the Community Relations Plan (CRP), which assesses the public's level of knowledge, interest, and information needs by conducting community interviews and researching local social, demographic, economic, and political information. The CRP recommended compatible public involvement strategies that included a Restoration Advisory Board (RAB), newsletters, fact sheets, an information repository, and public meetings at project milestones.

RABs are a joint creation of the Department of Defense (DoD) and the EPA and are a vehicle for community input during environmental restoration. A RAB was formed for Homestead AFB in October 1993 and meets routinely. Community members of the RAB exchange information and discuss restoration issues with the government representatives, which include representatives from the Air Force, the EPA, and the FDEP.

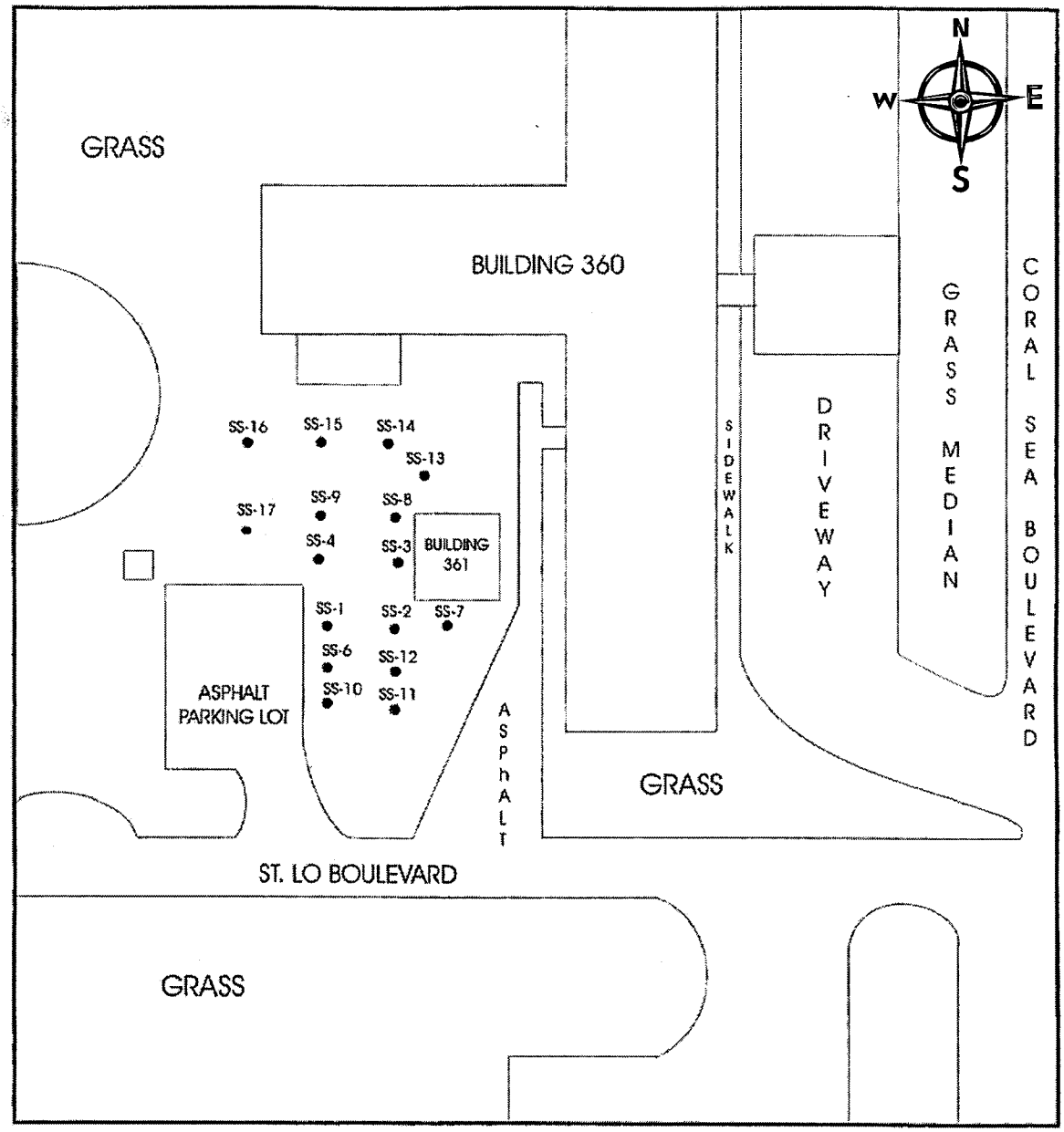


SOURCE: Draft Final Operable Unit 12, Entomology Storage Shop, Extended Site Investigation and Preliminary Risk Evaluation Report Addendum, Montgomery Watson, June 1998

FIGURE 2-3

OU-12, Entomology Storage Shop 1993, 1995, and 1997 Sample Locations

Homestead ARB, Florida



LEGEND

- Soil Sampling Location

SOURCE: Draft Final Letter Report, Voluntary Interim Remedial Action and Ground-Water Monitoring Activities, Operable Unit (OU) 12, Former Entomology Chemical Storage Shop (Former Building 371), Versar Inc., January 2002

FIGURE 2-4

OU-12, Entomology Storage Shop Preexcavation Sample Locations (April—May 2000)

Homestead ARB, Florida

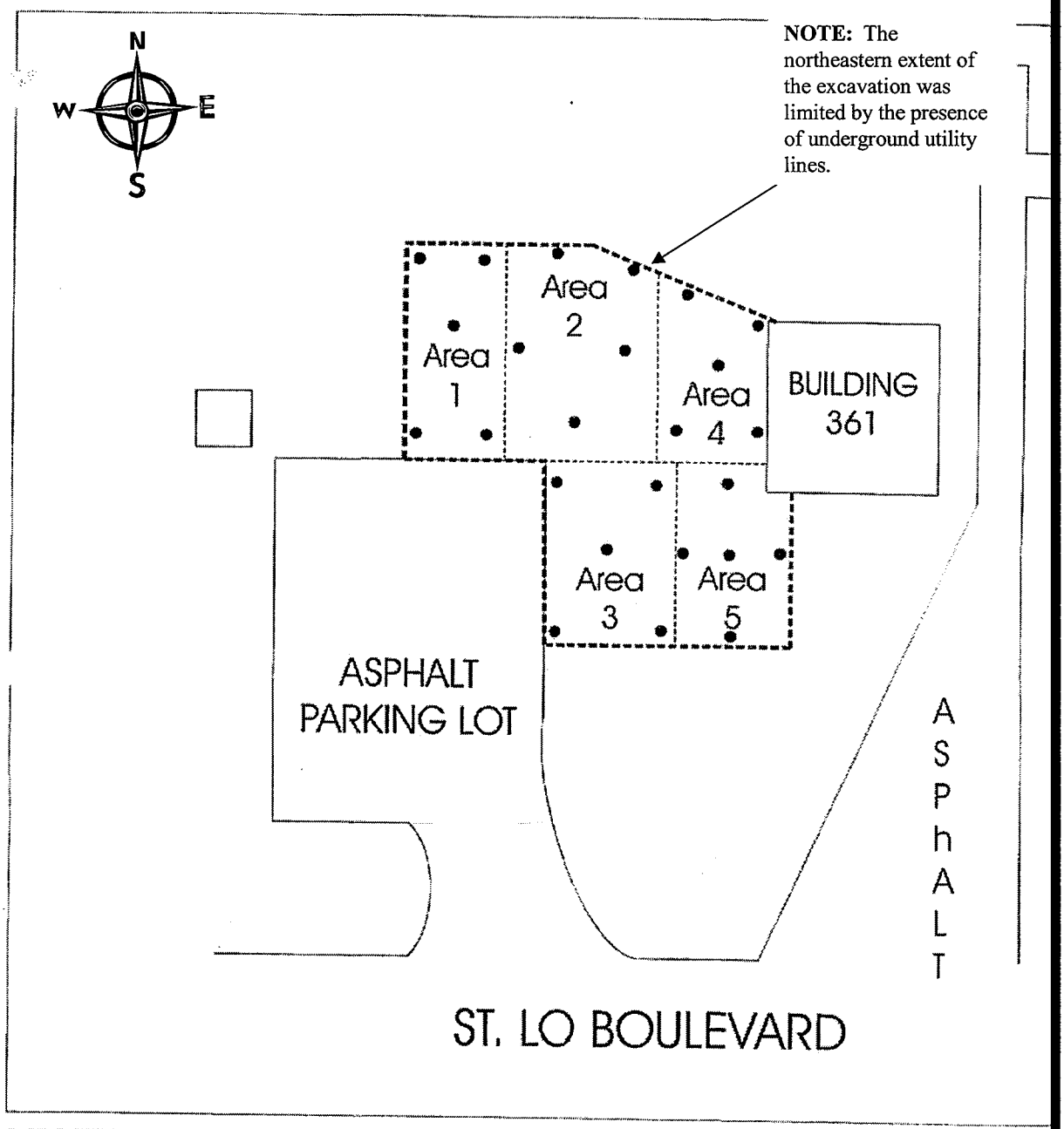
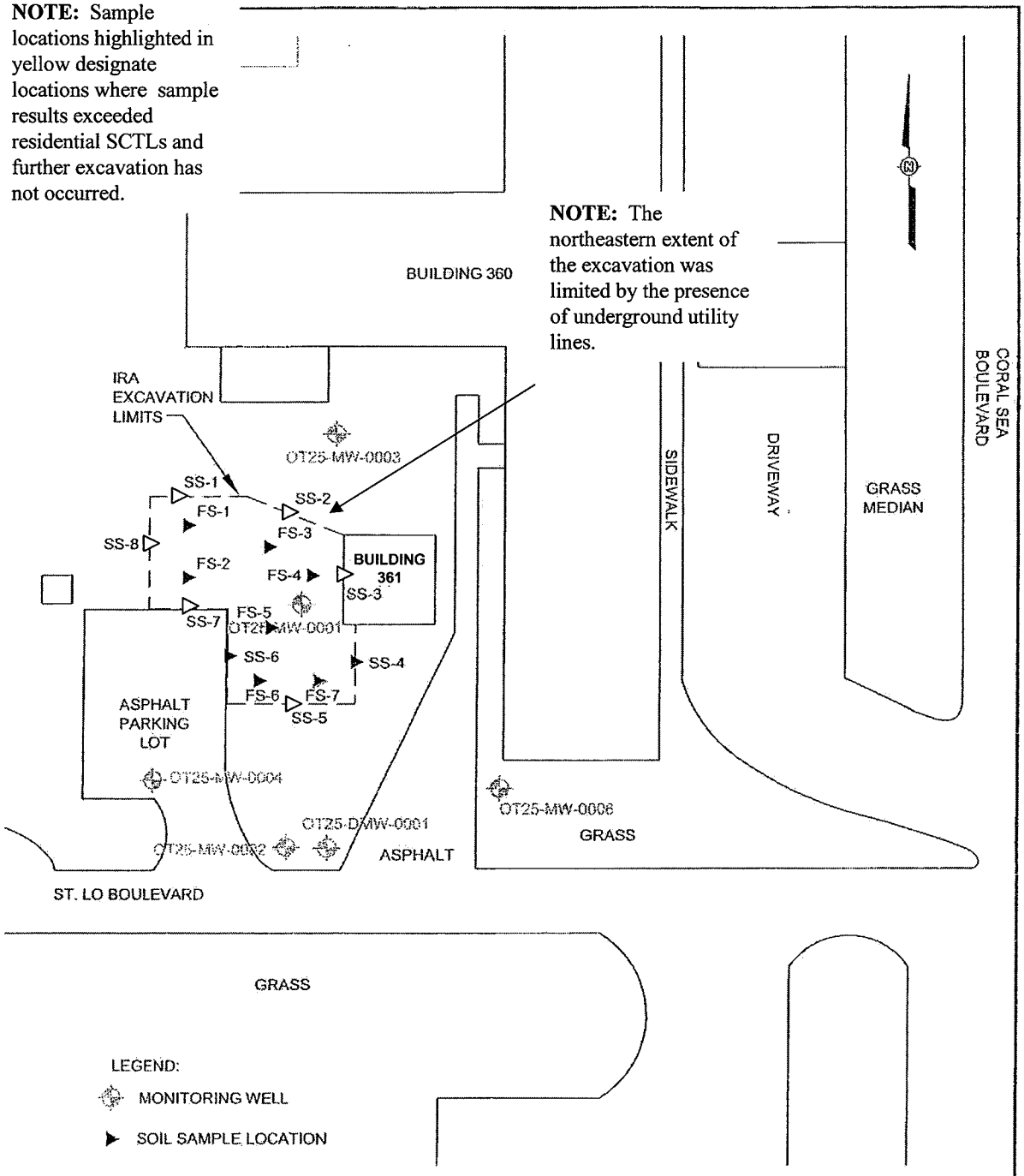


FIGURE 2-5

OU-12, Entomology Storage Shop Excavation and Confirmation Sample Locations (July 2000)

Homestead ARB, Florida

SOURCE: Draft Letter Report, Voluntary Remedial Action and Ground-Water Monitoring Activities, Operable Unit (OU) 12, Former Entomology Chemical Storage Shop (Former Building 371), Versar Inc., January 2002



SOURCE: Draft Letter Report, Operable Unit 12 Post Voluntary Interim Remedial Actions Soil Sampling Activities, Former Entomology Storage Chemical Storage Building, IT Corporation, December 2002

FIGURE 2-6

OU-12, Entomology Storage Shop Post-Excavation Sample Locations (April 2002)

Homestead ARB, Florida

RAB meetings provide opportunities for direct public participation. Presentation topics include current investigations, results, plans for the environmental restoration program, and current issues. All RAB meetings are open to the public and include a public comment period for the audience members to ask questions and express opinions and / or concerns.

For the purposes of final remedy selection, the AFRC solicited additional public input about the specific issues surrounding the proposed remedy for OU-12. To accomplish this, the AFRC developed a Proposed Plan for OU-12 and made it available for public review and comment. The Proposed Plan described:

- The contamination issues of concern at the site and the potential risks they pose to human health and the environment
- Final remedy alternatives that were considered for the site and a summary of the evaluation of alternatives that was conducted in the FS
- The preferred final remedy for the site and the means by which it is expected to protect human health and the environment
- The AFRC's interest in receiving public input on the proposed remedy, the location where the documents were available for review, and methods by which public input could be provided.

A formal comment period was conducted between 03 April and 03 May 2006. During this period, the Proposed Plan and other historical documents, such as the FS, were made available for public review at the at the Homestead Branch of the Miami-Dade County Library located at 700 N. Homestead Boulevard in Homestead, Florida. In addition, a public meeting was held on 20 April 2006, from 7:00 to 8:00 p.m. at the City Council Chamber Room in City Hall, located at 790 Homestead Boulevard, Homestead, Florida, where AFRC representatives were available to discuss the proposed remedy for OU-12 and respond directly to public comments and questions. No public comments were received during the comment period and no members of the public attended the public meeting.

2.4 Scope and Role of Operable Unit or Response Action

The remedial action for OU-12 is one component of the overall cleanup efforts that are being completed at Homestead AFB. This remedial action is the final remedy for OU-12 and will address all residual contamination that remains at OU-12, as described in Section 2.5. No principal threat wastes are present for which aggressive removal or treatment is warranted. OU-12 is one of 31 sites that are part of the cleanup strategy at the former Homestead AFB. Two OUs were transferred to the Florida petroleum program, final remedial actions have not been selected for eight other OUs, and no action decisions have been made for six OUs. The remedial action for OU-12 is not intended to address contamination at any other OU, each of which is being addressed independently. LUCs will be implemented, monitored, maintained, and enforced at OU-12 in conjunction with LUCs at other OUs at Homestead ARB to ensure consistent and efficient implementation.

2.5 Site Characteristics

OU-12 is located in an active, commercial/industrial portion of Homestead ARB. Building 361 is located within the eastern portion of the site. Building 360, which is currently used as the Wing Headquarters, is located east and north of the site. The installation's water treatment plant was formerly located immediately west of the site. St. Lo Boulevard is located south of the site. The site is covered by grass and a small paved parking area and is located on the rear side of Building 360, so it is not typically used for access to the building. The parking area is rarely used, and access to the site is largely limited to grounds maintenance workers who mow the grass.

The surface topography of the site is relatively flat, with elevations ranging from 2 feet above mean seal level (ft-msl) to 10 ft-msl. Surface soil at Homestead ARB is typically less than 6 inches thick and consists of native marl, weathered limestone bedrock, or imported fill. The water table occurs at depths ranging from 0 to 5 ft below ground surface (bgs); however, the depth is heavily influenced by season and recent rainfall. Although the general direction of ground-water flow within the shallow aquifer beneath Homestead ARB is southeasterly toward Biscayne Bay, the hydraulic gradients throughout the base are very flat. As a result, local ground-water flow directions are strongly influenced by rainfall and the presence of the drainage canal system along the base boundary (Boundary Canal).

2.5.1 Nature and Extent of Contamination

Soil. During the site investigations performed in 1993, 1995, 1997, and 2000, a total of 28 surface soil samples and 12 subsurface soil samples were collected from the grassy field south and west of Building 360, near the former location of Building 371, as shown in Figures 2-2 through 2-4. The investigations identified an area of surface and shallow subsurface (i.e., less than 3 feet bgs) soil with elevated concentrations of PAHs, pesticides, arsenic, and lead. Data from these sampling events are presented in Tables 2-2 through 2-4.

In 2000, approximately 450 tons of soil and rock were excavated from the site and disposed of at a regulatory-accepted off-site landfill. The excavation was approximately 75 feet wide by 75 feet long and extended two to three feet bgs to the top of the competent limestone bedrock (Versar, 2002), as shown in Figure 2-5. Confirmation samples collected after the IRA excavation and during additional confirmation sampling activities conducted in 2002 (see Figure 2-6) indicate that the IRA was largely successful. Data from these sampling events are presented in Tables 2-5 and 2-6.

Overall, the final round of confirmation sampling indicates that there is a minimal quantity of soil containing concentrations of contaminants that exceed commercial/industrial SCTLs. However, soil contamination exceeding unrestricted use and unlimited exposure criteria, represented by the residential SCTLs, is more widespread. Sample locations from the 2002 confirmatory sampling event that exceeded the residential SCTLs are identified in Figure 2-6. A more detailed description of the extent of contamination exceeding residential and commercial/industrial SCTLs is provided in the Streamlined FS.

Samples from various locations across the site contain concentrations of PAHs, arsenic, and pesticides that exceed these residential criteria. The lateral and vertical dimensions of the soil

TABLE 2-2
OPERABLE UNIT 12 – ENTOMOLOGY STORAGE SHOP
CONSTITUENTS OF CONCERN IN SOIL THAT EXCEED SOIL CLEANUP TARGET LEVELS (SCTLs)
1993 PRELIMINARY ASSESSMENT/SITE INVESTIGATION
(MONTGOMERY WATSON, 1998)

Constituent	SCTL[1]		Base-Specific Soil Cleanup Goals[2,3]	SS-0001[4,5] 0-1ft bgs[6] 3-Jun-93	SL-0001[4] 2-3 ft bgs 3-Jun-93	SS-0002 0-1 ft bgs 3-Jun-93
	Residential	Commercial/ Industrial				
Polycyclic Aromatic Hydrocarbons (µg/kg)[7]						
PAHs[8]	100	700	–	**1,222**[9]	**446**	ND[10]
Benzo(a)anthracene	–	–	–	1,000	ND	ND
Benzo(a)pyrene	100	700	1,500	**920**	**400**	ND
Benzo(b)fluoranthene	–	–	–	910	ND	ND
Benzo(k)fluoranthene	–	–	–	1,100	460	ND
Chrysene	–	–	–	1,200	460	ND
Dibenz(a,h)anthracene	–	–	1,500	ND	ND	ND
Indeno(1,2,3-cd)pyrene	–	–	–	ND	ND	ND
Organochlorine Pesticides (µg/kg)						
Chlordane (alpha + beta)	2,800	14,000	–	**19,000**[11]	**4,600**[11]	570
Heptachlor	200	1,000	–	**340**	150	ND
Toxaphene	900	4,500	–	ND	ND	ND
Inorganics (mg/kg)[7]						
Arsenic	2.1	12	10	ND	ND	**44**
Lead	400	1,400	–	11	3.5	31

NOTES:
1. SCTLs are based on Chapter 62-777, FAC criteria dated 17 April 2005.
2. The Base-Specific Soil Cleanup Goals for PAHs were agreed upon at the 19 September 1996 BCT meeting, based on the findings presented in "A Practical Approach for the Development of Typical Basewide PAH Concentrations Not Related to Waste Handling Practices for Use in Risk Management Decisions " (Woodward-Clyde, 1996).
3. The Base-Specific Soil Cleanup Goal for arsenic is based on the Arsenic Background Study completed in November 1996 (AFBCA, 1996).
4. Sample Type: SS = surface soil sample; SL = subsurface soil sample.
5. Diagonal hatching denotes sample locations that were excavated during the removal action in 2000.
6. bgs = below ground surface.
7. Units: µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram.
8. PAHs were calculated as the sum of the benzo(a)pyrene equivalents for the carcinogenic PAHs.
9. Bold text denotes results that exceed the residential SCTL.
10. ND = Not detected above the method detection limit.
11. Chlordane results for samples SL-0001 and SS-0001 were quantitated as technical chlordane.

TABLE 2-3
OPERABLE UNIT 12 – ENTOMOLOGY STORAGE SHOP
CONSTITUENTS OF CONCERN IN SOIL THAT EXCEED SOIL CLEANUP TARGET LEVELS (SCTLs)
1995–1997 EXTENDED SITE INVESTIGATION/PRELIMINARY RISK EVALUATION
(MONTGOMERY WATSON, 1998)

Constituent	SCTL[1]		Base-Specific Soil Cleanup Goals[2,3]	SS-0003[4,5] 0-1 ft bgs[6] 2-Nov-95	SS-0004 0-1 ft bgs 2-Nov-95	SL-0004[4] 2-4 ft bgs 2-Nov-95	SS-0005 0-1 ft bgs 2-Nov-95	SL-0005 2-4 ft bgs 2-Nov-95
	Residential	Commercial/ Industrial						
Polycyclic Aromatic Hydrocarbons (µg/kg)[7]								
PAHs[8]	100	700	–	**2,858**[9]	**918**[10]	**8,687**	**4,965**	**374**
Benzo(a)anthracene	–	–	–	1,800	780	7,400 D[11]	4,900 D	320 J[11]
Benzo(a)pyrene	100	700	1,500	**1,900**	**600**	**6,100 D**	**3,200**	**240 J**
Benzo(b)fluoranthene	–	–	–	2,700	780	8,400 D	5,400 D	310 J
Benzo(k)fluoranthene	–	–	–	880	280 J	1,800	1,600	110 J
Chrysene	–	–	–	1,700	710	6,800 D	4,600 D	290 J
Dibenz(a,h)anthracene	–	–	1,500	320 J	92 J	620	440	46 J
Indeno(1,2,3-cd)pyrene	–	–	–	980	410 J	2,000	1,300	140 J
Organochlorine Pesticides (µg/kg)								
Chlordane (alpha + beta)	2,800	14,000	–	**10,000**	ND[12]	ND	1,700	ND
Heptachlor	200	1,000	–	**1,200 P**[11]	ND	ND	ND	ND
Toxaphene	900	4,500	–	ND	ND	ND	ND	ND
Inorganics (mg/kg)[7]								
Arsenic	2.1	12	10	1.4 B[11]	**3**	0.9 B	**3**	0.71 B
Lead	400	1,400	–	38.2 N[11]	10.7 N	0.89 N	16.5 N	1.7 N

NOTES:
1. SCTLs are based on Chapter 62-777, FAC criteria dated 17 April 2005.
2. The Base-Specific Soil Cleanup Goals for PAHs were agreed upon at the 19 September 1996 BCT meeting, based on the findings presented in "A Practical Approach for the Development of Typical Basewide PAH Concentrations Not Related to Waste Handling Practices for Use in Risk Management Decisions " (Woodward-Clyde, 1996).
3. The Base-Specific Soil Cleanup Goal for arsenic is based on the Arsenic Background Study completed in November 1996 (AFBCA, 1996).
4. Sample Type: SS = surface soil sample; SL = subsurface soil sample.
5. Diagonal hatching denotes sample locations that were excavated during the removal action in 2000.
6. bgs = below ground surface
7. Units: µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram.
8. PAHs were calculated as the sum of the benzo(a)pyrene equivalents for the carcinogenic PAHs.
9. Bold text denotes results that exceed the residential SCTL.
10. Dark shaded cells denote results that exceed the commercial/industrial SCTL.
11. Qualifiers: B = The result was greater than the instrument detection limit but less than the quantitation limit; D = The sample was diluted; J = The value is estimated; N = Spiked sample recovery was not within control limits; P = Greater than 25% difference between the two GC columns.
12. ND = Not detected above the method detection limit.

TABLE 2-3 (CONTINUED)
OPERABLE UNIT 12 – ENTOMOLOGY STORAGE SHOP
CONSTITUENTS OF CONCERN IN SOIL THAT EXCEED SOIL CLEANUP TARGET LEVELS (SCTLs)
1995–1997 EXTENDED SITE INVESTIGATION/PRELIMINARY RISK EVALUATION
(MONTGOMERY WATSON, 1998)

Constituent	SCTL[1]		Base-Specific Soil Cleanup Goals[2,3]	SS-0006[4,5] 0-1 ft bgs[6] 2-Nov-95	SL-0006[4] 2-4 ft bgs 2-Nov-95	SS-0007 0-1 ft bgs 2-Nov-95	SS-0008 0-2 ft bgs 4-Nov-97	SS-0009 0-2 ft bgs 4-Nov-97
	Residential	Commercial/ Industrial						
Polycyclic Aromatic Hydrocarbons (µg/kg)[7]								
PAHs[8]	100	700	–	**140 J**[9,10]	**152**	**1,738**	**2,958**[11]	**5,755**
Benzo(a)anthracene	–	–	–	110 J	100 J	1,200	2,300	5,300
Benzo(a)pyrene	100	700	1,500	100 J	**110 J**	**1,100**	**2,200**	**4,300**
Benzo(b)fluoranthene	–	–	–	170 J	190 J	1,500	3,300	5,200
Benzo(k)fluoranthene	–	–	–	57 J	66 J	450	1,200	2,500
Chrysene	–	–	–	110 J	100 J	1,000	2,200	4,600
Dibenz(a,h)anthracene	–	–	1,500	ND[12]	ND	230 J	ND	ND
Indeno(1,2,3-cd)pyrene	–	–	–	61 J	64 J	920	760	1,500
Organochlorine Pesticides (µg/kg)								
Chlordane (alpha + beta)	2,800	14,000	–	1,000	560 P[10]	400 D[10]	NA[13]	NA
Heptachlor	200	1,000	–	ND	ND	36 P	NA	NA
Toxaphene	900	4,500	–	ND	ND	ND	NA	NA
Inorganics (mg/kg)[7]								
Arsenic	2.1	12	10	**3.7**	**4.7**	1.9 B[10]	**3.2**	**2.98**
Lead	400	1,400	–	20.4 N[10]	8.8 N	6.6 N	21.0	17.3

NOTES:
1. SCTLs are based on Chapter 62-777, FAC criteria dated 17 April 2005.
2. The Base-Specific Soil Cleanup Goals for PAHs were agreed upon at the 19 September 1996 BCT meeting, based on the findings presented in "A Practical Approach for the Development of Typical Basewide PAH Concentrations Not Related to Waste Handling Practices for Use in Risk Management Decisions " (Woodward-Clyde, 1996).
3. The Base-Specific Soil Cleanup Goal for arsenic is based on the Arsenic Background Study completed in November 1996 (AFBCA, 1996).
4. Sample Type: SS = surface soil sample; SL = subsurface soil sample.
5. Diagonal hatching denotes sample locations that were excavated during the removal action in 2000.
6. bgs = below ground surface.
7. Units: µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram.
8. PAHs were calculated as the sum of the benzo(a)pyrene equivalents for the carcinogenic PAHs.
9. Bold text denotes results that exceed the residential SCTL.
10. Qualifiers: B = The result was greater than the instrument detection limit but less than the quantitation limit; D = The sample was diluted; J = The value is estimated; N = Spiked sample recovery was not within control limits; P = Greater than 25% difference between the two GC columns.
11. Dark shaded cells denote results that exceed the commercial/industrial SCTL.
12. ND = Not detected above the method detection limit.
13. NA = The sample was not analyzed for this constituent.

TABLE 2-4
OPERABLE UNIT 12 – ENTOMOLOGY STORAGE SHOP
CONSTITUENTS OF CONCERN IN SOIL THAT EXCEED SOIL CLEANUP TARGET LEVELS (SCTLs)
2000 VOLUNTARY INTERIM REMEDIAL ACTION – PREEXCAVATION SAMPLING
(VERSAR, 2002)

Constituent	SCTL[1]		Base-Specific Soil Cleanup Goals[2,3]	SS-1[4,5] 0-1 ft bgs[6] Apr-00	SS-2 0-1 ft bgs Apr-00	SS-3 0-1 ft bgs Apr-00	SS-4 0-1 ft bgs Apr-00	SS-6 0-1 ft bgs Apr-00	SS-7 0-1 ft bgs Apr-00
	Residential	Commercial/ Industrial							
Polycyclic Aromatic Hydrocarbons (µg/kg)[7]									
PAHs[8]	100	700	–	**2,410**[9]	**417**	**1,282**	**1,534**	**3,612**	**1,815**[10]
Benzo(a)anthracene	–	–	–	2,090	410	970	1,120	2,750	1,620
Benzo(a)pyrene	100	700	1,500	**1,810**	**330**	**990**	**1,140**	**2,690**	**1,340**
Benzo(b)fluoranthene	–	–	–	2,510	460	1,240	1,620	3,270	1,580
Benzo(k)fluoranthene	–	–	–	1,380	ND	700	600	1,760	960
Chrysene	–	–	–	2,210	440	1,070	1,180	2,790	1,640
Dibenz(a,h)anthracene	–	–	1,500	ND[11]	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	–	–	–	ND	ND	ND	590	1,410	570
Organochlorine Pesticides (µg/kg)									
Chlordane (alpha + beta)	2,800	14,000	–	122	ND	7,600	ND	532	ND
Heptachlor	200	1,000	–	ND	ND	ND	ND	ND	ND
Toxaphene	900	4,500	–	ND	ND	ND	ND	ND	ND
Inorganics (mg/kg)[7]									
Arsenic	2.1	12	10	1.36	1.74	**2.38**	**2.28**	ND	**3.54**
Lead	400	1,400	–	5.13	**3,269**	30.5	21.9	5.4	25.6

NOTES:
1. SCTLs are based on Chapter 62-777, FAC criteria dated 17 April 2005.
2. The Base-Specific Soil Cleanup Goals for PAHs were agreed upon at the 19 September 1996 BCT meeting, based on the findings presented in "A Practical Approach for the Development of Typical Basewide PAH Concentrations Not Related to Waste Handling Practices for Use in Risk Management Decisions" (Woodward-Clyde, 1996).
3. The Base-Specific Soil Cleanup Goal for arsenic is based on the Arsenic Background Study completed in November 1996 (AFBCA, 1996).
4. Sample Type: SS = surface soil sample.
5. Diagonal hatching denotes sample locations that were excavated during the removal action in 2000.
6. bgs = below ground surface.
7. Units: µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram.
8. PAHs were calculated as the sum of the benzo(a)pyrene equivalents for the carcinogenic PAHs.
9. Bold text denotes results that exceed the residential SCTL.
10. Dark shaded cells denote results that exceed the commercial/industrial SCTL.
11. ND = Not detected above the method detection limit.

TABLE 2-4 (CONTINUED)
OPERABLE UNIT 12 – ENTOMOLOGY STORAGE SHOP
CONSTITUENTS OF CONCERN IN SOIL THAT EXCEED SOIL CLEANUP TARGET LEVELS (SCTLs)
2000 VOLUNTARY INTERIM REMEDIAL ACTION – PREEXCAVATION SAMPLING
(VERSAR, 2002)

Constituent	SCTL[1]		Base-Specific Soil Cleanup Goals[2,3]	SS-8[4,5] 0-1 ft bgs[6] Apr-00	SS-9 0-1 ft bgs Apr-00	SS-12 0-1 ft bgs May-00	SS-15 0-1 ft bgs May-00	SS-16 0-1 ft bgs May-00	SS-17 0-1 ft bgs May-00
	Residential	Commercial/ Industrial							
Polycyclic Aromatic Hydrocarbons (µg/kg)[7]									
PAHs[8]	100	700	–	**905**[9]	**10,224**	NA[10]	**7,945**[11]	**7,868**	**1,020**
Benzo(a)anthracene	–	–	–	820	9,080	NA	7,790	5,770	860
Benzo(a)pyrene	100	700	1,500	**690**	**7,590**	NA	**5,790**	**5,910**	**750**
Benzo(b)fluoranthene	–	–	–	940	7,530	NA	6,820	5,920	1,040
Benzo(k)fluoranthene	–	–	–	380	5,600	NA	3,590	3,840	420
Chrysene	–	–	–	940	8,310	NA	7,490	5,040	940
Dibenz(a,h)anthracene	–	–	1,500	ND[10]	ND	NA	ND	ND	ND
Indeno(1,2,3-cd)pyrene	–	–	–	ND	4,050	NA	3,280	4,000	370
Organochlorine Pesticides (µg/kg)									
Chlordane (alpha + beta)	2,800	14,000	–	ND	194	**4,890**	622	697	883
Heptachlor	200	1,000	–	ND	ND	ND	ND	ND	ND
Toxaphene	900	4,500	–	ND	ND	ND	ND	ND	ND
Inorganics (mg/kg)[7]									
Arsenic	2.1	12	10	**4.85**	ND	NA	NA	NA	NA
Lead	400	1,400	–	178	8.99	NA	NA	NA	NA

NOTES:
1. SCTLs are based on Chapter 62-777, FAC criteria dated 17 April 2005.
2. The Base-Specific Soil Cleanup Goals for PAHs were agreed upon at the 19 September 1996 BCT meeting, based on the findings presented in "A Practical Approach for the Development of Typical Basewide PAH Concentrations Not Related to Waste Handling Practices for Use in Risk Management Decisions " (Woodward-Clyde, 1996).
3. The Base-Specific Soil Cleanup Goal for arsenic is based on the Arsenic Background Study completed in November 1996 (AFBCA, 1996).
4. Sample Type: SS = surface soil sample.
5. Diagonal hatching denotes sample locations that were excavated during the removal action in 2000.
6. bgs = below ground surface.
7. Units: µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram.
8. PAHs were calculated as the sum of the benzo(a)pyrene equivalents for the carcinogenic PAHs.
9. Bold text denotes results that exceed the residential SCTL.
10. NA = Not analyzed for this constituent; ND = Not detected above the method detection limit.
11. Dark shaded cells denote results that exceed the commercial/industrial SCTL.

TABLE 2-5
OPERABLE UNIT 12 – ENTOMOLOGY STORAGE SHOP
CONSTITUENTS OF CONCERN IN SOIL THAT EXCEED SOIL CLEANUP TARGET LEVELS (SCTLs)
2000 VOLUNTARY INTERIM REMEDIAL ACTION – CONFIRMATION SAMPLING
(VERSAR, 2002)

Constituent	SCTL[1]		Base-Specific Soil Cleanup Goals[2,3]	Confirm-2 Jul-00	Confirm-3 Jul-00	Confirm-4 Jul-00	Confirm-5 Jul-00
	Residential	Commercial/ Industrial					
Polycyclic Aromatic Hydrocarbons (µg/kg)[4]							
PAHs[5]	100	700	–	**2,141**[6,7]	**1,027**	ND[8]	ND
Benzo(a)anthracene	–	–	–	1,350	780	ND	ND
Benzo(a)pyrene	100	700	1,500	**1,650**	**780**	ND	ND
Benzo(b)fluoranthene	–	–	–	1,640	790	ND	ND
Benzo(k)fluoranthene	–	–	–	920	440	ND	ND
Chrysene	–	–	–	1,230	790	ND	ND
Dibenz(a,h)anthracene	–	–	1,500	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	–	–	–	990	450	ND	ND
Organochlorine Pesticides (µg/kg)							
Chlordane (alpha + beta)	2,800	14,000	–	1,850	159	**12,100**	**2,820**
Heptachlor	200	1,000	–	20.7	ND	**259**	37.4
Toxaphene	900	4,500	–	ND	ND	**1,780**	270
Inorganics (mg/kg)[4]							
Arsenic	2.1	12	10	NA	NA	NA	NA
Lead	400	1,400	–	NA	6.82	NA	NA

NOTES:
1. SCTLs are based on Chapter 62-777, FAC criteria dated 17 April 2005.
2. The Base-Specific Soil Cleanup Goals for PAHs were agreed upon at the 19 September 1996 BCT meeting, based on the findings presented in "A Practical Approach for the Development of Typical Basewide PAH Concentrations Not Related to Waste Handling Practices for Use in Risk Management Decisions " (Woodward-Clyde, 1996).
3. The Base-Specific Soil Cleanup Goal for arsenic is based on the Arsenic Background Study completed in November 1996 (AFBCA, 1996).
4. Units: µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram.
5. PAHs were calculated as the sum of the benzo(a)pyrene equivalents for the carcinogenic PAHs.
6. Bold text denotes results that exceed the residential SCTL.
7. Dark shaded cells denote results that exceed the commercial/industrial SCTL.
8. ND = Not detected above the method detection limit.

TABLE 2-6
OPERABLE UNIT 12 – ENTOMOLOGY STORAGE SHOP
CONSTITUENTS OF CONCERN IN SOIL THAT EXCEED SOIL CLEANUP TARGET LEVELS (SCTLs)
2002 POST VOLUNTARY INTERIM REMEDIAL ACTION SOIL SAMPLING
(IT CORPORATION, 2002)

Constituent	SCTL[1]		Base-Specific Soil Cleanup Goals[2,3]	SS-1[4] 2-3 ft bgs[5] 10-Apr-02	SS-2 2-3 ft bgs 10-Apr-02	SS-3 2-3 ft bgs 10-Apr-02	SS-5 2-3 ft bgs 10-Apr-02	SS-7 2-3 ft bgs 10-Apr-02	SS-8 2-3 ft bgs 10-Apr-02
	Residential	Commercial/ Industrial							
Polycyclic Aromatic Hydrocarbons (µg/kg)[6]									
PAHs[7]	100	700	–	**135**[8]	**935**[9]	**201**	**404**	ND[10]	**390**
Benzo(a)anthracene	–	–	–	ND	ND	ND	380	ND	380
Benzo(a)pyrene	100	700	1,500	99 J	**860**	**180**	**300**	ND	**290**
Benzo(b)fluoranthene	–	–	–	ND	ND	ND	310	ND	310
Benzo(k)fluoranthene	–	–	–	44	350	110	200	ND	150
Chrysene	–	–	–	ND	670	ND	310	ND	330
Dibenz(a,h)anthracene	–	–	1,500	26	ND	ND	ND	ND	ND
Indeno(1,2,3-cd)pyrene	–	–	–	51 J	390	96	150	ND	160
Organochlorine Pesticides (µg/kg)									
Chlordane (alpha + beta)	2,800	14,000	–	210 J	1,200	ND	120	2,500	580
Heptachlor	200	1,000	–	ND	ND	ND	ND	ND	ND
Toxaphene	900	4,500	–	ND	ND	ND	ND	ND	ND
Inorganics (mg/kg)[6]									
Arsenic	2.1	12	10	**6**	1.4	**7.3**	1.1	**28**	**5.4**
Lead	400	1,400	–	32	15	73	ND	19	30

NOTES:
1. SCTLs are based on Chapter 62-777, FAC criteria dated 17 April 2005.
2. The Base-Specific Soil Cleanup Goals for PAHs were agreed upon at the 19 September 1996 BCT meeting, based on the findings presented in "A Practical Approach for the Development of Typical Basewide PAH Concentrations Not Related to Waste Handling Practices for Use in Risk Management Decisions " (Woodward-Clyde, 1996).
3. The Base-Specific Soil Cleanup Goal for arsenic is based on the Arsenic Background Study completed in November 1996 (AFBCA, 1996).
4. Sample Type: SS = surface soil sample
5. bgs = below ground surface.
6. Units: µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram.
7. PAHs were calculated as the sum of the benzo(a)pyrene equivalents for the carcinogenic PAHs.
8. Bold text denotes results that exceed the residential SCTL.
9. Dark shaded cells denote results that exceed the commercial/industrial SCTL.
10. ND = Not detected above the method detection limit.

contamination exceeding the residential SCTLs were estimated based on the location and depth of historical samples and multiplied to derive volume estimates for the contaminated soil. Based on these estimates, approximately 465 cubic yards of PAH-, arsenic-, and pesticide-contaminated soil are estimated to remain at the site at concentrations that exceed unrestricted use and unlimited exposure criteria.

Ground Water. In addition to the soil investigations, a total of seven ground-water monitoring wells were installed at the site, and ground-water samples were collected during several sampling events to determine whether the historic releases to surface soil impacted underlying ground water. Samples were analyzed for VOCs, SVOCs, pesticides, PCBs, metals, and cyanide. No VOCs, SVOCs, PCBs, or cyanide were detected in ground water at the site. Several pesticides were detected in ground water during the 1993, 1995, and 1997 investigations. However, pesticides were not detected during four consecutive semiannual monitoring events conducted in 2000 and 2002 after the completion of the IRA. Antimony and thallium were the only metals detected at levels of potential concern during the ground-water investigations; however, neither was detected during the last two semiannual monitoring events in 2003. Based on the results of the ground-water investigations and subsequent monitoring, the contaminated ground water at OU-12 is not an issue of concern.

2.5.2 Contaminant Fate and Transport

As described above, soil remaining at OU-12 exceeds unrestricted use and unlimited exposure criteria for PAHs, arsenic, and pesticides. Arsenic is stable in the environment and will not degrade significantly over time. The PAHs and pesticides also are stable in the environment, due to the stability of their aromatic ring structure and chlorination, respectively; however, they will slowly degrade over time. They are all relatively immobile in soil and are not expected to pose a risk to contaminate underlying ground water. This observation is supported by the last two years of ground-water monitoring conducted in 2000 and 2002, during which time PAHs, arsenic, and pesticides were not detected in ground water during any sampling event.

2.6 Current and Potential Future Land and Resource Uses

The OU-12 area is located in an active, commercial/industrial portion of Homestead ARB. Land use within the boundary of Homestead ARB includes active flight operations, "industrial" shops that support flying missions of the AFRC, and Homestead ARB temporary housing units. However, neither the OU-12 site nor the underlying ground water are currently used for any purpose. Currently exposed populations associated with OU-12 include commercial/industrial workers such as grounds maintenance workers who occasionally mow the grass in the areas surrounding Buildings 360 and 361. No other personnel enter the contaminated portions of OU-12 on a regular basis. Although highly unlikely, hypothetical future exposed populations could include construction workers and on-site residents.

Homestead ARB is expected to remain an active AFRC installation for the foreseeable future. As such, access to the installation will continue to be strictly controlled and limited to authorized individuals. As a result, the future land use of the OU-12 area is expected to remain commercial/industrial. Use of the contaminated portions of the OU-12 area is expected to remain limited, with the most likely exposure to grounds maintenance workers that occasionally mow the grass at the site.

The surficial (i.e., uppermost) aquifer, the Biscayne Aquifer, is the sole source of potable water in Miami-Dade County and has been declared a sole-source aquifer by the EPA, pursuant to Section 1425 of the Federal Safe Drinking Water Act. Ground water is not currently used in the OU-12 area. In addition, there no longer are any active drinking-water wells located within Homestead ARB and no new potable or non-potable water wells are planned for this area.

2.7 Summary of Site Risks

A streamlined risk evaluation was performed in the FS to determine the potential risks posed by exposure to contaminated media at OU-12. Based on an agreement between the AFRC, EPA, and FDEP, the evaluation focused on data from the final round of confirmation sampling conducted in 2002 because these data were deemed to be most representative of current site conditions. As a result, the following discussion evaluates potential risks posed by OU-12 soil based only on data from the 2002 Post Voluntary IRA confirmatory sampling. FDEP's SCTLs and ground-water cleanup target levels (GCTLs) and the MCLs were used as initial screening levels to conservatively evaluate if additional risk evaluation was necessary. In general, the steps in the risk evaluation process were as follows:

1) Maximum concentrations of each contaminant detected in soil and ground water were compared with FDEP's residential SCTLs or GCTLs, which are based on cancer target risk levels of 1×10^{-6} or non-cancer hazard indices of 1.0, and EPA's MCLs, respectively.

2) Contaminants in soil and ground water whose maximum concentrations did not exceed the residential SCTLs, GCTLs, or MCLs were dropped from further risk evaluation.

3) Exposure Point Concentrations (EPCs) based on the 95% UCL on the mean, were calculated in accordance with EPA guidance for contaminants whose maximum concentrations exceeded residential SCTLs, GCTLs, and / or MCLs.

4) The calculated EPCs were compared with the commercial / industrial SCTLs, which also are based on cancer target risk levels of 1×10^{-6} or non-cancer hazard indices of 1.0, and MCLs to identify contaminants of concern (COCs) requiring further risk evaluation.

5) If all EPCs were less than the commercial / industrial SCTLs, GCTLs, or MCLs, the risk evaluation was not continued.

6) Estimated cancer risks and non-cancer hazards were calculated for contaminants whose EPCs exceeded the residential SCTLs, GCTLs, and / or MCLs (i.e., the COCs) using standard EPA risk assessment methodology.

7) Estimated cancer risks and non-cancer hazards were compared to EPA's target cancer risk range of 10^{-4} to 10^{-6} and non-cancer hazard index of 1.0.

Based on the initial conservative screening level comparison, arsenic, pesticides (i.e., chlordane, heptachlor, and toxaphene), and PAHs (i.e., benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, dibenz(a,h)anthracene, and indeno(1,2,3-cd)pyrene) were detected in soil at OU-12. In accordance with Chapter 62-777, FAC, the carcinogenic PAHs are evaluated as the sum of their benzo(a)pyrene toxicity equivalents. Tables 2-2 through 2-6 summarize soil sample results from OU-12 for PAHs, pesticides, and arsenic that exceed unrestricted use and unlimited exposure criteria represented

by the residential SCTLs. Other constituents were not detected in soil at the site at concentrations greater than the current residential SCTLs. Samples that exceeded SCTLs but have since been excavated from the site are shown in the tables for information purposes. However, they have been excluded from the risk evaluation described below because they are no longer present at the site, and no longer pose a potential risk.

Several pesticides and two target metals (antimony and thallium) were initially detected in ground water at OU-12. However, concentrations of pesticides were less than detection limits during four consecutive semiannual monitoring events conducted in 2000 and 2002 after the completion of the IRA. Antimony and thallium concentrations were also less than detection limits during the last two semiannual monitoring events in 2003. As a result, maximum concentrations of contaminants in ground water did not exceed either the FDEP GCTLs or the EPA MCLs and do not pose a potential risk to receptors associated with OU-12.

2.7.1 Summary of Human Health Risk Assessment

Following an initial comparison of contaminant concentrations in OU-12 soil with FDEP residential SCTLs and in OU-12 ground water with FDEP GCTLs and EPA MCLs, it was determined that PAHs, primarily benzo(a)pyrene, and arsenic in soil required additional consideration in the streamlined risk evaluation.. Table 2-7 provides summary detection information and EPCs for COCs. Potential risks posed by arsenic, benzo(a)pyrene, and total PAHs in soil at OU-12 were evaluated by a comparison of the EPCs shown in Table 2-7 with the FDEP commercial/industrial SCTLs from Chapter 62-777 of the FAC.

Table 2-7
Summary Information for Constituents of Concern in Soil
Exceeding the FDEP Soil Cleanup Target Levels

COCs	Units[1]	Detected Concentration Range	Frequency of Detection	FDEP Commercial/ Industrial SCTL[2]	EPC[3]	Upper Confidence Limit Method
Total PAHs	µg/kg	3.81–935[4]	-	700	421.5	95% Chebyshev (Non-Parametric)
Benzo(a)pyrene	µg/kg	49–860	6/15	700	378.9	95% Chebyshev (Non-Parametric)
Benzo(a)anthracene	µg/kg	64–380	3/15	-	-	-
Chrysene	µg/kg	57–670	4/15	-	-	-
Benzo(b)fluoranthene	µg/kg	310	2/15	-	-	-
Benzo(k)fluoranthene	µg/kg	44–350	5/15	-	-	-
Indeno(1,2,3-cd)perylene	µg/kg	27–390	6/15	-	-	-
Dibenz(a,h)anthracene	µg/kg	26	1/15	-	-	-
Arsenic	mg/kg	1.1–28	13/15	12	8.34	95% Chebyshev (Non-Parametric)

1. Units: µg/kg = micrograms per kilogram; mg/kg = milligrams per kilogram.
2. FDEP SCTLs are based on Chapter 62-777, FAC criteria dated 17 April 2005.
3. Exposure point concentrations (EPCs) were calculated for PAHs as the sum of the benzo(a)pyrene toxicity equivalents for the carcinogenic PAHs.
4. Total PAH detections are based on the sum of the benzo(a)pyrene toxicity equivalents for all carcinogenic PAHs where half the detection limit was used for non-detected data.

Although certain individual samples, as represented in the "Detected Concentration Range" column in Table 2-7, exceed the commercial/industrial SCTL, the EPCs for both total PAHs and benzo(a)pyrene are less than the commercial/industrial SCTL of 700 µg/kg. Concentrations of both total PAHs and benzo(a)pyrene exceeded the FDEP residential SCTL of 100 µg/kg. Both the maximum concentrations and the EPCs for total PAHs and benzo(a)pyrene were less than the base-specific cleanup goal of 1,500 µg/kg. The base-specific soil cleanup goals for PAHs were agreed upon at a 19 September 1996 Base Realignment and Closure (BRAC) Cleanup Team (BCT) meeting, based on the findings presented in "A Practical Approach for the Development of Typical Base-wide PAH Concentrations Not Related to Waste Handling Practices for Use in Risk Management Decisions," (Woodward-Clyde, 1996). These results indicate that benzo(a)pyrene and total PAHs do not pose a potential risk to the current or anticipated future users of the site, which are commercial/industrial in nature. However, in the unlikely event that the property is used for residential purposes, contamination remains at the site at concentrations that exceed unrestricted use and unlimited exposure criteria and may pose a potential risk. Figure 2-6 identifies sample locations where results exceeded the residential SCTLs.

The EPC for arsenic (8.34 mg/kg) is less than the commercial/industrial SCTL of 12 mg/kg but does exceed the residential SCTL of 2.1 mg/kg. These results indicate that arsenic contamination at OU-12 does not pose a significant risk to the current and anticipated commercial/industrial users of the property. Although the EPC for arsenic exceeded the residential SCTL of 2.1 mg/kg, it does not exceed the base-specific cleanup level for arsenic of 10 mg/kg. The base-specific cleanup level for arsenic is a concentration agreed upon by AFRC, EPA, and FDEP to be representative of anthropogenic background concentrations typically found in soil at Homestead ARB. As a result, arsenic also is not expected to pose a significant risk to future residential users of the site..

Overall, the results of the OU-12 risk evaluation indicate that contaminated soil does not pose a significant risk to current and anticipated users of the site (i.e., commercial/industrial workers) because EPCs for all contaminants were less than the FDEP commercial/industrial SCTLs. A more detailed discussion of the results of the OU-12 streamlined risk evaluation is provided in the FS.

2.7.2 Summary of Ecological Risk Assessment

No significant ecological risks are anticipated at OU-12 because

- The area of soil contamination is small relative to the home ranges of potential target ecological receptors (e.g., gray fox).
- The site's proximity to an active commercial/industrial portion of the base, and the fact that the grassy areas of the site are regularly mown, makes the limited habitat unattractive to many animals (e.g., short-tailed shrew).

Because the contaminated portions of OU-12 are small in comparison to the size of the home ranges of potential target ecological receptors, the potential for significant exposure of wildlife to contaminants is expected to be minimal. In addition, the limited habitat offered by the OU-12 site, consisting of only mown lawn-type grassy areas between buildings, paved parking lots,

and actively used roads, is most likely unattractive to ecological receptors. Because of the unattractive and limited nature of the ecological habitat offered by OU-12, it is considered highly unlikely that contaminant concentrations associated with the site would pose a significant risk to ecological receptors. Although potential risks to individual small omnivorous mammals may occur, the limited number of individuals affected by OU-12 is unlikely to result in significant adverse effects at the population or community level.

2.8 Remedial Action Objectives

As described in Section 2.7.1, the EPCs for the COCs at OU-12 are less than the commercial/industrial SCTLs identified in Table 2-8, which are based on cancer target risk levels of 1×10^{-6} or non-cancer hazard indices of 1.0. Therefore, remedial action is not required based on the reasonably anticipated use scenario. However, the RAOs will impact the ability of the site to be used for residential use. The RAOs will also impact excavation activities at the site, by requiring that exposure to soil beneath the asphalt parking lot be controlled in such a way as to reduce the risk to an acceptable level until soil sampling data confirm that contamination is not present beneath the parking lot. In the event that use of the site changes, or that digging activities are undertaken at the site, then the remedy and these RAOs will trigger additional action to prevent unacceptable exposure. The RAOs were developed in response to exceedances of residential SCTLs, which also are based on cancer target risk levels of 1×10^{-6} or non-cancer hazard indices of 1.0, during the risk evaluation for OU-12 as discussed in more detail in Section 2.7.

The Remedial Action Objectives (RAOs) for OU-12 are intended to

- Prevent residential exposure to contaminants in soil in exceedance of the residential SCTLs shown in Table 2-8
- Prevent digging beneath or disturbance of the asphalt parking lot located in the southwestern portion of OU-12 until soil sampling data indicate that contaminant concentrations beneath the asphalt parking lot are less than the commercial/industrial SCTLs shown in Table 2-8
- Ensure that the parking area is maintained is such a manner as to provide an effective barrier to prevent unacceptable exposure to contaminant concentrations beneath the asphalt parking lot are less than the commercial/industrial SCTLs shown in Table 2-8.

Table 2-8
Soil Cleanup Target Levels for Constituents of Concern at OU-12

COCs	Units	FDEP Residential SCTLs	FDEP Commercial/ Industrial SCTLs	EPC
Total PAHs[1]	µg/kg	100	700	421.5
Benzo(a)pyrene	µg/kg	100	700	378.9

1. Total PAHs are evaluated as the sum of the benzo(a)pyrene toxicity equivalents for the individual PAHs.

2.9 Description of Alternatives

The Streamlined FS for OU-12 (Booz Allen, 2006) identified three final remedy alternatives for consideration. Based on the site characteristics described in Section 2.5, the current and

anticipated future land uses described in Section 2.6, and the potential risks described in Section 2.7, the most viable remedial alternatives for OU-25 are:

- Alternative 1 – No Further Action
- Alternative 2 – Land Use Controls
- Alternative 3 – Excavation and Off-Site Disposal.

Each of these alternatives is described below and was evaluated during the detailed analysis of alternatives in the FS.

2.9.1 Alternative 1 – No Further Action

The no further action alternative would require nothing to be done to change the current contaminated soil conditions at OU-12. No excavation, treatment, or containment of the contaminated soil would be conducted. Unrestricted use of the property and unlimited exposure to contaminated soil would be allowed. While it is likely that contaminant concentrations will reduce over time due to natural degradation processes, the rate of reduction would not be measured.

The NCP, 40 CFR 300.430(e)(6), requires that a no action alternative (or in cases where a previous removal action has been conducted, a no further action alternative) be developed and included in the analysis of alternatives. The no further action alternative is used as a baseline to compare other alternatives.

2.9.2 Alternative 2 – Land Use Controls

Alternative 2 would include LUCs being implemented to prohibit current and future users of the site from using the property for residential purposes, hospitals for human care, public or private schools, or day care centers for persons under 18 years of age. Alternative 2 would also include LUCs requiring that any contaminated soil that is excavated at OU-12 will be properly managed on site and that any contaminated soil transported off site will be managed in accordance with applicable RCRA regulations. Lastly, digging restrictions would be implemented to ensure that construction workers are not exposed to unacceptable concentrations of contaminants in soil and would ensure that the parking area is maintained is such a manner as to provide an effective barrier to prevent other unacceptable exposure. Use restrictions would be specified in the BGP and implemented, monitored, maintained, and enforced by the Homestead ARB Installation Commander through the Base Civil Engineer's Environmental Flight Office personnel.

2.9.3 Alternative 3 – Excavation and Off-Site Disposal

Alternative 3 requires contaminated surface soil to be excavated, removed from the site, and disposed of at an appropriately permitted landfill. LUCs will be implemented temporarily to minimize contact with the contaminated soil prior to completion of excavation activities. Soil exceeding the residential SCTLs would be excavated using a backhoe, staged on site in covered piles or roll-off boxes pending waste characterization, and transported to an off-site disposal facility for final disposition. If successfully implemented, all contaminated soil would be removed from the site, so long-term implementation of LUCs would not be required. The

estimated volume of soil that will require excavation and off-site disposal is approximately 465 cubic yards.

2.10 Summary of Comparative Analysis of Alternatives

During the detailed analysis of alternatives conducted in the FS, each of the three potential remedial alternatives was evaluated against seven of the nine criteria specified in the NCP. The first two criteria are threshold criteria. The following are statutory requirements that the alternative must satisfy to be considered a viable final remedy option:

1. Overall protection of human health and the environment
2. Compliance with Applicable or Relevant and Appropriate Requirements (ARARs).

Appendix C in the FS provides a comprehensive evaluation of chemical-, location-, and action-specific ARARs.

The next five criteria are known as the primary balancing criteria. The following are the technical criteria upon which the detailed analysis is based:

3. Long-term effectiveness and permanence
4. Reduction of toxicity, mobility, and volume through treatment
5. Short-term effectiveness
6. Implementability
7. Cost.

The following two criteria, known as the modifying criteria, also were evaluated; however, they were not evaluated as part of the FS. These criteria were assessed following regulatory and public review of the FS and Proposed Plan.

8. State acceptance
9. Community acceptance.

A detailed evaluation of each of the three remedial alternatives described in Section 2.9 was conducted in the FS. The comparative analysis from the FS, which describes the relative benefits and deficiencies of each alternative, is summarized below.

2.10.1 Threshold Criteria

All remedial action alternatives must be protective of human health and the environment and comply with ARARs in order to be considered acceptable for selection as the preferred alternative. Both Alternative 2, the preferred alternative, and Alternative 3 satisfy the threshold criteria, as described below. Therefore, either Alternative 2 or 3 would be an acceptable final remedy for OU-12. Alternative 1 is not protective of the unrestricted use and unlimited exposure scenario. As such, it is not a viable option for the final remedy at OU-12.

Overall Protection of Human Health and the Environment

As described in Section 2.7.1, COCs were not identified at OU-12 during the final confirmation sampling event in 2002 at concentrations that would pose a risk under a commercial/industrial

use scenario, which is the current and reasonably anticipated future use scenario. Therefore, Alternative 1 – No Further Action would be protective of human health and the environment under the current and anticipated future use scenario, which is commercial/industrial in nature. However, Alternative 1 does not include LUCs required to be protective of the unrestricted use and unlimited exposure scenario. Alternative 2 would protect human health and the environment by preventing unacceptable exposure to contaminated soil at the site through the implementation of LUCs. Alternative 3 would protect human health and the environment through removal of the soil contamination from the site.

Compliance with ARARs

Alternatives 2, 3, and 4 would comply with ARARs, including, but not limited to, Chapters 62-777 and 62-780 of the FAC. In addition, as discussed in Section 2.7.1, none of the residual soil contamination detected at OU-12 during the final confirmation sampling event in 2002 exceeds the commercial/industrial SCTLs, indicating that no further action is required to comply with these ARARs.

In order to evaluate the need for LUCs, the concentrations of residual soil contamination also were compared to the residential SCTLs listed in Table 2. Based on this comparison, PAHs exceed residential SCTLs, indicate a need for LUCs to be protective of the unrestricted use and unlimited exposure scenario. LUCs would not be included in Alternative 1. Alternative 2 complies with these requirements by instituting LUCs to prevent unacceptable exposure to soil containing contaminant concentrations greater than the residential SCTLs. Alternative 3 complies with these requirements by removing soil that contains contaminant concentrations greater than the residential SCTLs, so that LUCs are no longer required.

2.10.2 Balancing Criteria

Each of the three alternatives were further evaluated using the balancing criteria described in the NCP. The results of that evaluation are summarized below for Alternatives 2 and 3. Alternative 1 has been excluded from the summary below because it was eliminated from further consideration due to the lack of LUCs required to be protective of the unrestricted use and unlimited exposure scenario. The preferred alternative, Alternative 2, was selected based on the overall ability of the alternative to satisfy these criteria.

Long-Term Effectiveness and Permanence

Both Alternative 2 and Alternative 3 would provide adequate long-term effectiveness. Alternative 2 would remain effective over the long term through ongoing imposition of use restrictions and an established monitoring and enforcement program operated by AFRC. Alternative 3 may provide the greatest long-term effectiveness if all soil contamination can be removed from the site. However, the presence of existing site features, such as buildings and utilities, may result in incomplete removal of soil contamination, in which case LUCs would ultimately be required.

Reduction of Toxicity, Mobility, and Volume Through Treatment

Neither Alternative 2 nor Alternative 3 would satisfy the statutory preference for treatment. Alternative 2 would leave contamination in place and Alternative 3 would move contaminated soil to a disposal facility. Neither alternative would treat the soil to reduce the toxicity, mobility, or volume of contamination.

Short-Term Effectiveness

Both Alternative 2 and Alternative 3 would provide adequate short-term effectiveness. Alternative 2 would provide immediate protection of human health by imposition of use restrictions. Alternative 3 would provide immediate protection of human health through temporary implementation of land use restrictions and excavation and removal of contamination from the site within one year. Excavation of contaminated soil conducted as part of Alternative 3 would increase the potential for exposure to contamination. Soil currently located below-grade and inaccessible to receptors at the site would be exposed where direct contact and/or airborne dispersion would be more likely. Therefore, Alternative 3 would be slightly less effective in the short-term because the potential for exposure would be increased during excavation.

Implementability

Alternative 2 would be more easily implemented than Alternative 3. LUCs would be implemented, monitored, maintained, and enforced by the Homestead ARB Installation Commander through the Base Civil Engineer's Environmental Flight Office personnel at the installation, so they would be easily implemented. Alternative 3 would require a significantly higher level of effort and additional complexity to implement. Extensive budget programming, contracting, and planning steps would be required prior to implementation, and completion of the action would require mobilization of staff and heavy equipment to the site; excavation, transportation, and disposal of contaminated soil; and confirmation sampling and sample analysis. In addition, full implementation of Alternative 3 may be hindered by the presence of existing buildings, pavement, and underground utilities that could limit the quantity of contaminated soil that can be effectively excavated.

Cost

The estimated cost for Alternative 2 of $49,665 is significantly lower than the estimated cost for Alternative 3, which is $190,586. The difference in cost is primarily attributable to the cost of excavation of contaminated soil in Alternative 3. Since it is uncertain whether all contaminants could be removed through excavation to reduce the potential risk to residential use levels, the return on the additional investment required by Alternative 3 would be questionable. Furthermore, the cost of implementing Alternative 2 assumes that an outside contractor would be used to monitor the LUCs. It is anticipated that the LUCs would actually be implemented, monitored, maintained, and enforced by the Homestead ARB Installation Commander through the Base Civil Engineer's Environmental Flight Office personnel, in which case no external contracting costs would be incurred.

2.10.3 Modifying Criteria

The modifying criteria were evaluated based on comments received on the Proposed Plan (Booz Allen, 2006) and during the public comment period, which was held between 3 April and 3 May 2006.

State Acceptance. FDEP reviewed and provided comments on the investigation and remedy selection documents for OU-12, including the FS, the Proposed Plan, and this ROD. The AFRC has responded to each of FDEP's comments on theFS and Proposed Plan in an acceptable manner, as indicated in correspondence dated 14 March 2006.

Community Acceptance. Notices were published in the *South Dade News Leader* on Friday, 31 March 2006, and in *The Miami Herald* on Thursday, 30 March 2006, to notify members of the public of the opportunity to provide comment on the Proposed Plan for OU-12. The public notices also indicated that a meeting would be held on 20 April 2006 at 7:00 p.m. to discuss the preferred remedial alternatives for OU-12.

Prior to initiation of the public comment period on 3 April 2006, a copy of the Proposed Plan for OU-12 and other historical documents, such as the FS, were made available for public review at the Homestead Branch of the Miami-Dade County Library located at 700 N. Homestead Boulevard in Homestead, Florida.

A public meeting was held on 20 April 2006 from 7:00 to 8:00 p.m. at the City Council Chamber Room in City Hall, located at 790 Homestead Boulevard, Homestead, Florida, to inform members of the public of the preferred remedial alternatives to address contamination at OU-12. A poster presentation was prepared that summarized the information provided in the Proposed Plan and identified the preferred remedial alternative as LUCs. Representatives of AFRC were available at the meeting to discuss the preferred remedial alternatives and to answer questions. No comments were provided on the Proposed Plan or Preferred Alternative during the public meeting.

As indicated in the notices published in local newspapers, a formal public comment period was conducted from 3 April 2006 to 3 May 2006. Comments on the Proposed Plan for OU-12 were provided by DERM in a letter dated 5 May 2006, which were considered in preparing this ROD. No other public comments were received for OU-12 during the public comment period. DERM also provided comments on the Draft Final version of this ROD in a letter dated 6 July 2006, which were considered in preparing this ROD. Responses to DERM's comments on the Draft Final ROD are provided in Section 3.0, Responsiveness Summary.

2.10.4 Comparison of Alternatives

Table 2-9 provides a side-by-side comparison of the seven threshold and primary balancing criteria for the three alternatives. As the table indicates, Alternative 2 – LUCs, and Alternative 3 – Excavation and Off-Site Disposal both satisfy the threshold criteria of protection of human health and the environment and compliance with ARARs. Therefore, either Alternative 2 or 3 would be an acceptable final remedy for OU-12. However, Alternative 1 does not include LUCs required to be protective of the unrestricted use and unlimited exposure scenario. As such it is not a viable option for the final remedy at OU-12.

Table 2-9
Comparison of Alternatives

Criteria	Alternative 1 No Further Action	Alternative 2 Land Use Controls	Alternative 3 Excavation and Off-Site Disposal
Threshold Criteria			
1. Overall Protection of Human Health and the Environment	◕	●	●
2. Compliance with ARARs	◕	●	●
Primary Balancing Criteria			
3. Long-Term Effectiveness and Permanence	◑	◕	◕
4. Reduction of Toxicity, Mobility, or Volume Through Treatment	○	○	○
5. Short-Term Effectiveness	●	●	●
6. Implementability	●	◕	◕
7. Cost	●	●	◑

○ = Poor; ◔ = Fair; ◑ = Moderate; ◕ = Good; ● = Excellent

Alternatives 2 and 3 would provide adequate short- and long-term effectiveness and provide immediate protection of human health by imposition of use restrictions. Alternative 2 would remain effective over the long term through ongoing imposition of use restrictions and an established monitoring and enforcement program operated by Homestead ARB Environmental Flight Office personnel. Future use of the OU-12 area for residential use would be restricted. These restrictions would be implemented to prohibit current and potential future users of the site from using the property for residential purposes, hospitals for human care, public or private schools, or day care centers for persons under 18 years of age. Alternative 3 may provide the greatest long-term effectiveness if all soil contamination can be removed from the site. However, soil contamination would be disturbed during remedy implementation, so that there would be a short-term increase in the potential for exposure to contaminants. In addition, the presence of existing site features, such as asphalt parking areas, may result in incomplete removal of soil contamination, in which case LUCs would ultimately be required. Neither Alternative 2 nor Alternative 3 would satisfy the statutory preference for treatment. Alternative 2 would leave contamination in place and Alternative 3 would move contamination to a disposal facility. Neither alternative would treat the soil to reduce the toxicity, mobility, or volume of contamination.

Alternative 2 would be more easily implemented and less costly than Alternative 3. LUCs would be implemented, monitored, maintained, and enforced by the Homestead ARB Installation Commander through the Base Civil Engineer's Environmental Flight Office personnel, so they would be easily implemented and would not incur costs for external contractor support. Excavation and off-site disposal would cost approximately $190,586, and full implementation of the remedy may be hindered by the presence of existing buildings, pavement, and underground utilities.

2.11 Principal Threat Wastes

The NCP states that EPA expects to use treatment to address the principal threats posed by a site, wherever practicable. This preference does not impact the decision at OU-12 because there are no principal threat wastes present at the site.

Principal threat wastes are defined as those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. The contamination present at OU-12 is not considered a principal threat waste because:

- **They are not highly toxic** – Contaminants are present at concentrations that are not significantly greater than the SCTLs and would present an excess cancer risk near the acceptable risk range were exposure to occur.
- **They are not highly mobile** – The concentrations and solubility of the soil contaminants are relatively low, so they are not a potentially significant source of ground-water, air, or surface-water contamination. This observation is supported by ground-water monitoring results that demonstrate that, in the absence of any controls, soil contaminants are not present in the shallow groundwater beneath the site.

As a result, aggressive source removal, treatment, or physical containment is not necessary.

2.12 Selected Remedy

To achieve the RAOs defined in Section 2.8, Alternative 2, Land Use Controls, was selected by AFRC and the EPA as the final remedy for OU-12. Alternative 2 requires that LUCs be placed on the portions of the OU-12 site containing residual soil contamination that exceed unrestricted use and unlimited exposure criteria represented by the residential SCTLs, as specified in Table 2-8. Alternative 2 includes:

- Use Restrictions – Residential use will be prohibited on portions of the OU-12 property containing contaminated soil at concentrations greater than unrestricted use and unlimited exposure criteria represented by the residential SCTLs shown in Table 2-8. The residential use restrictions will be implemented to prohibit property users from using the property for residential purposes, hospitals for human care, public or private schools, or day care centers for persons under 18 years of age. Use restrictions will ensure that the future land use of the property remains commercial/industrial and does not change to residential use. Figure 2-2 identifies the estimated extent of soil containing contaminant concentrations exceeding residential SCTLs, which will require LUCs to prevent residential use.

- Digging Restrictions – Excavation of OU-12 soil containing concentrations of contaminants greater than the industrial SCTLs shown in Table 2-8 will be managed to ensure that unacceptable exposure to the contaminants does not occur. Excavation beneath or disturbance of the asphalt parking lot located in the southwestern portion of OU-12 will be not be permitted without prior approval by the Base Civil Engineer in the form of a dig permit or other approval as required by applicable Air Force instruction

and procedures. Further, until soil sampling data indicate that contaminant concentrations beneath the asphalt parking lot are less than the commercial/industrial SCTLs shown in Table 2-8, the surface cover provided by the parking lot will be maintained in such a manner as to provide an effective barrier to prevent unacceptable exposure. These restrictions will be enforced through the dig permit system and construction review process that is currently in place throughout Homestead ARB. No construction or digging is allowed without prior approval by the Base Civil Engineer. The Base Civil Engineer will not approve permits for activities inconsistent with LUCs. The OU-12 LUC boundary on Figure 2-2 identifies the area where digging activities will be restricted.

- Contaminated Soil Management Restrictions – LUCs will be implemented to require that any contaminated soil that is excavated at OU-12 will be properly managed on site and that any contaminated soil transported off site will be managed in accordance with applicable RCRA regulations.

LUCs will remain in place until confirmatory sampling data indicate that contaminant concentrations have declined below unrestricted use and unlimited exposure criteria represented by the residential SCTLs in Table 2-8. The Air Force will utilize its Base General Plan (BGP) as an administrative LUC to prevent any use inconsistent with this ROD. Within 60 days after ROD signature, the Air Force will make appropriate changes to the BGP to incorporate use restrictions for the site. The appropriate section of the BGP will state:

> Residential use, including hospitals for human care, public or private schools, or day care centers for persons under 18 years of age, of OU-12 is prohibited. Any requests (for example, through excavation permits, such as AF Form 103, or the construction review process, AFI 32-1001) for residential use or substantial construction (i.e., construction requiring longer than 100 days) will be denied, unless the procedures for proposed land use changes described in OU-12 Record of Decision (ROD), dated August 16, 2006 are followed. These procedures involve no less than 45-day notice to EPA and FDEP in advance of any proposed land use changes that are inconsistent with an industrial/commercial use scenario. See the ROD for additional requirements related to monitoring, reporting and enforcing of the LUCs.

These restrictions will be documented in the BGP along with a listing of the GPS coordinates of the OU-12 site boundary and a detailed map (Figure 2-2) identifying the OU-12 LUC boundary. The BGP is one of the first and primary documents to be reviewed when installation personnel are proposing projects on the installation. The Air Force will consult the BGP before making any land use decisions at OU-12. Air Force Instruction (AFI) 32-1021 requires installations to comply with their BGP and ensure that there are no land-use constraints stemming from the Environmental Restoration Program (ERP) that would impact facility siting and construction.

As defined in AFI 23 32-7062, a BGP establishes a systematic framework for decision-making with regard to the development of Air Force installations. It incorporates various Air Force programs such as operational, environmental, urban planning, and

others, to identify and assess development alternatives and ensure compliance with applicable federal, state, and local laws, regulations, and policies at Homestead ARB. AFI 32-7062 requires component installations to develop and maintain a BGP as a central repository for information deemed essential for planning and managing the installation's physical assets, including environmental siting constraints such as LUCs.

The BGP and any additional LUC determined by the Air Force to be necessary will be implemented, monitored, maintained, reported on, and enforced by the Homestead ARB Installation Commander through the Base Civil Engineer's Environmental Flight Office personal through existing land-use management programs, such as the Base Civil Engineering Work Clearance Form (AF Fm 103) (digging permit) and the construction review process (AFI 36 32-1001). No construction or digging will be allowed without prior approval by the BCE in the form of a dig permit or other approval as required by applicable AFI and procedures. The BCE will not approve dig permits for activities inconsistent with the residential use scenario as described in this ROD. The Air Force will ensure that these or similar equivalent instructions, processes, and or requirements will be complied with for all proposed construction or soil-disturbing activities.

Although AFRC may later transfer these procedural responsibilities to another party by contract, property transfer agreement, or through other means, AFRC will retain ultimate responsibility for remedy integrity. AFRC will exercise this responsibility in accordance with CERCLA and the NCP. LUCs will be removed from the BGP only after concurrence by EPA and FDEP and after confirmatory sampling data have determined that contaminant concentrations in soil have declined to concentrations less than unrestricted use and unlimited exposure criteria represented by the residential SCTLs identified as the RAOs for OU-12 in Table 2.8.

AFRC will notify the EPA and FDEP as soon as practicable, but no later than 10 days after discovery of any activity that is inconsistent with the LUC objectives or use restrictions, or any other action that may interfere with the effectiveness of the LUCs. AFRC will notify EPA and FDEP regarding how the activity that is inconsistent with the LUC objectives or use restrictions will be addressed as soon as practicable, but no later than 10 days after sending EPA and FDEP notification of the breach. AFRC will notify EPA and FDEP 45 days in advance of any proposed land use changes that are inconsistent with land use control objectives or the selected remedy.

AFRC will provide notice to EPA and FDEP at least six (6) months prior to any transfer or sale of OU-12 so that EPA and FDEP can be involved in discussions to ensure that appropriate provisions are included in the transfer terms or conveyance documents to maintain effective LUCs. If it is not possible for the facility to notify EPA and FDEP at least six months prior to any transfer or sale, then AFRC will provide notification as soon as possible but no later than 60 days prior to the transfer or sale of OU-12. In addition to the land transfer notice and discussion provisions above, AFRC further agrees to provide EPA and FDEP with similar notice, within the same time frames, as to federal-to-federal transfer of property. In the event the Air Force transfers the property or any portion of it outside federal ownership, the Air Force will include the restriction against residential use as defined in this ROD in any deed or transfer instrument. AFRC will provide a copy of executed deed or transfer assembly to EPA and FDEP.

AFRC will not modify or terminate LUCs at OU-12, begin implementation actions, or modify land use without approval by EPA and FDEP. AFRC will seek prior concurrence before any anticipated action that may disrupt the effectiveness of the LUCs or any action that may alter or negate the need for LUCs.

In addition, monitoring of the environmental use restrictions and controls associated with OU-12 will be conducted annually by AFRC. At the next Five-Year Review cycle, the Five-Year Review will make recommendations on the continuation, modification, or elimination of annual reports and LUC monitoring frequency. The intent of the monitoring will be to ensure that the remedy provides adequate protection of human health and the environment while contaminants remain in OU-12 soil at concentrations that exceed unrestricted use and unlimited exposure criteria defined as the residential SCTLs identified in Table 2-8. The monitoring results may be included in a separate report or as a section of another environmental report, if appropriate, and provided to the EPA and FDEP. The annual monitoring reports will be used in preparation of the Five-Year Review to evaluate the effectiveness of the remedy. The Five-Year Review report will be submitted to the regulatory agencies in accordance with the FFA.

The annual monitoring report, submitted to the regulatory agencies by AFRC, will evaluate the status of the LUCs and how any LUC deficiencies or inconsistent uses have been addressed. The annual evaluation will address whether use of the property has conformed with the restrictions and controls described above.

2.13 Statutory Determinations

The AFRC expects the selected remedy to satisfy the following statutory requirements of CERCLA §121(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost-effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment as a principal element, or explain why the preference for treatment will not be met.

Based on the information currently available, the selected remedy meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing and modifying criteria. The selected remedy will be protective of human health and the environment and comply with ARARs. The ARARs for OU-12 are the SCTLs from Chapter 62-777 of the FAC, dated 17 April 2005, as specified in Table 2-8. The LUCs identified in the selected remedy will prohibit residential use of the property where contaminant concentrations in soil exceed residential SCTLs and will ensure that contaminated soil excavated from OU-12 is properly managed. A complete evaluation of ARARs applicable to OU-12 is provided in Appendix C of the FS.

Alternative 2 will be cost-effective because it will provide the same level of protectiveness and effectiveness as Alternative 3 at a significantly reduced cost. Implementation, monitoring, maintenance, and enforcement of LUCs will be conducted by the Homestead ARB Installation Commander through the Base Civil Engineer's Environmental Flight Office personnel, through existing land-use management programs.

The selected remedy for OU-12 does not satisfy the statutory preference for treatment as a principal element of the remedy for the following reasons:

- No principal threat wastes are present for which aggressive removal or treatment is warranted

- LUCs provide comparable protection of human health and are more easily implemented and cost-effective.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of remedial action to ensure that the remedy is, or will be, protective of human health and the environment. This requirement is pursuant to CERCLA § 121 and the NCP 40 CFR 300.430(f)(4)(ii).

2.14 Documentation of Significant Changes

The Proposed Plan for OU-12 was released for public comment prior to the public meeting on 20 April 2006. The Proposed Plan and other historical documents, such as the FS, were made available for public review at the Homestead Branch of the Miami-Dade County Library located at 700 N. Homestead Boulevard in Homestead, Florida. The Proposed Plan identified Alternative 2, LUCs, as the Preferred Alternative for OU-12.

Comments provided by DERM in a letter dated 11 July 2006 were determined to be appropriate and relevant. As a result, significant changes, although with somewhat minor impact on the overall remedy for OU-12, were made to the remedy, as originally identified in the Proposed Plan. DERM's comments are addressed in Section 3.0, Responsiveness Summary.

Specifically, DERM's primary concern, identified in Comment Number 1, in their letter dated 6 July 2006, was that use restrictions were not sufficient for OU-12 because no soil sampling had been performed beneath the asphalt parking lot located in the southwestern portion of OU-12. Based on discussions with DERM personnel during a meeting on 19 July 2006, it was agreed that digging restrictions, which prohibit excavation beneath or disturbance of the asphalt parking lot located in the southwestern portion of OU-12, should be added to the selected remedy. The digging restrictions would also include a provision to ensure that the surface cover provided by the parking lot is maintained in such a manner as to provide an effective barrier to prevent unacceptable exposure until soil sampling data indicate that contaminant concentrations beneath the asphalt parking lot are less than the commercial/industrial SCTLs. As a result, the selected remedy identified in this ROD includes the agreed-upon digging restrictions, which were not included in the remedy, as originally identified in the Proposed Plan.

3.0 RESPONSIVENESS SUMMARY

As indicated in Section 2.10.3, public notices published in local newspapers solicited public comments on the preferred alternative for OU-12 and announced a public comment period from 3 April 2006 to 3 May 2006. The public notices also indicated that a meeting would be held on 20 April 2006 at 7:00 p.m. to discuss the preferred remedial alternatives for OU-12. No public comments were provided on the Proposed Plan during the public comment period or on the Preferred Alternative during the public meeting.

The Miami-Dade County Department of Environmental Resources Management (DERM) provided comments on the Streamlined FS dated 6 August 2006, and the Proposed Plan dated 5 May 2006. These comments were noted during preparation of the final version of this ROD, and revisions were made to address each of DERM's comments. In addition, DERM provided comments on the Draft Final OU-12 ROD in a letter dated 6 July 2006. Responses to these comments are provided below.

Comments from the Miami-Dade County Department of Environmental Resources Management (DERM) on the Draft Final OU-12 ROD

6 July 2006

DERM Comment: DERM reiterates that the proposed Land Use Controls (LUCs) are not sufficient for this site. Refer to the attached January 25 and March 14, 2006 DERM letter for comments regarding the selected remedy for this site.

Air Force Response: Air Force representatives discussed this issue at length with DERM representatives during a meeting on 19 July 2006. During the meeting, DERM representatives indicated that digging restrictions beneath the asphalt parking lot and a restriction that requires the parking lot be maintained in such a manner as to provide an effective barrier to soil beneath the parking area would be an acceptable approach to addressing their comment.

As a result, additional restrictions have been added to the selected remedy for OU-12. These restrictions are identified under the description of digging restrictions provided in Section 2.12 of the Final OU-12 ROD and indicate that

"Excavation beneath or disturbance of the asphalt parking lot located in the southwestern portion of OU-12 will be not be permitted without prior approval by the Base Civil Engineer in the form of a dig permit or other approval as required by applicable Air Force instruction and procedures. Further, until soil sampling data indicate that contaminant concentrations beneath the asphalt parking lot are less than the commercial/industrial SCTLs shown in Table 2-8, the surface cover provided by the parking lot will be maintained in such a manner as to provide an effective barrier to prevent unacceptable exposure. These restrictions will be enforced through the dig permit system and construction review process that is currently in place throughout Homestead ARB. No construction or digging is allowed without prior approval by the Base Civil Engineer. The Base Civil Engineer will not approve permits for activities inconsistent with LUCs. The OU-12 LUC boundary on Figure 2-2 identifies the area where digging activities will be restricted."

DERM Comment: The report shall be accurate and consistent throughout when referring to the applicable cleanup target levels for Homestead Air Reserve Base. For example, arsenic (10 mg/kg) has an alternate residential soil cleanup level (SCTL) based on background and the carcinogenic PAHs have an alternate industrial SCTL. Furthermore, federal Maximum Contaminant Levels (MCLs) for groundwater shall also be used appropriately (i.e. not for soil cleanup target level reference). Text and tables shall be corrected for modified as applicable.

Air Force Response: This comment refers primarily to text discussions at the beginning of Section 2.7, which described the steps performed as part of the OU-12 risk evaluation, and at the beginning of Section 2.7.1, which described the results of a screening level comparison of contaminant concentrations detected at OU-12. The ROD in general and, specifically, the text in these sections has been revised to improve consistency and to clarify that SCTLs were used to screen soil data and GCTLs and MCLs were used to screen ground-water data. Tables were corrected accordingly.

DERM Comment: Section 1.4, Page 2, Line 10 and paragraph beginning on line 26 [of the Draft Final OU-12 ROD dated March 2006]. Contaminants either exceed applicable cleanup target levels or they do not exceed applicable cleanup target levels. It is not appropriate to theorize on the significance or insignificance of an exposure risk based on how much or little a contaminant exceeds the applicable cleanup target level by or on the basis of how "near" it is to an acceptable range. Therefore, DERM recommends removal of the subjective terminology.

Air Force Response: The referenced text, which provides the definition of a principal threat waste, was taken directly from EPA's *A Guide to Principal Threat and Low Level Threat Wastes* (OSWER 9380.3-06FS) dated November 1991. However, to improve clarity of the discussion in Section 1.4, the text referring to principal threat wastes has been revised as follows

"The contaminants listed in Table 1-1 are not considered principal threat wastes because they are present at concentrations that are not greatly above the SCTLs; they do not pose an excess cancer risk greater than the acceptable risk range if exposure to the contaminants were to occur; and they are relatively immobile in soil. As a result, aggressive removal and/or treatment of the contamination is not warranted and only limited action is necessary to protect human health."

Principal Threat Wastes are source materials (e.g., contaminated soil or ground water) that contain highly toxic or highly mobile chemicals, which generally cannot be contained in a reliable manner or would present a significant risk to human health and the environment should exposure occur.

DERM Comment: Unless a site-specific risk assessment is conducted to properly evaluate acceptable non "permanent" residential uses, the term "permanent" shall not precede "residential" when referring to the type of use restrictions to be imposed on the site.

Air Force Response: The ROD has been revised as requested.

DERM Comment: The report indicates that the restrictions to be imposed will only be applicable to the portions of the OU-12 site that exceed applicable cleanup target levels. If the applicable restrictions are only going to [be] placed on a portion of the site, a Professional Land Survey is required to appropriately define the portions and shall be included as part of the institutional control.

Air Force Response: During a meeting on 19 July 2006 meeting, DERM representatives indicated that a professional land survey was not necessary because the OU-12 LUC boundary had been expanded to include all of the asphalt parking lot located in the southwestern portion of OU-12, the area formerly occupied by the entomology storage shop (Building 371), and the area bounded on the north and east by Building 361. Figure 2-2 has been revised to more clearly illustrate the extent of the area that will be restricted by LUCs included in the final remedy for OU-12.

DERM Comment: The May 20, 2005 Response to Comments on the Draft Streamlined Feasibility Study report (DERM Comment #2) stated that procedures for removing the Land Use Controls will be specified in the ROD (i.e. confirmation sampling prior to determining if the restrictions can be lifted). This information is not included in the ROD.

Air Force Response: Section and 2.12 has been revised to include the following text

"LUCs will be removed from the BGP only after concurrence by EPA and FDEP and after confirmatory sampling data have determined that contaminant concentrations in soil have declined to concentrations less than unrestricted use and unlimited exposure criteria represented by the residential SCTLs identified as the RAOs for OU-12 in Table 2.8."

DERM Comment: Section 2.2, Page 6, Line 32 describes the "absence of evidence that significant spills had occurred…" at the OU-12 site. The relevance of this terminology (i.e. is this required language for the ROD) should be further described. A spill significant enough to require assessment, remedial action, and closure with Land Use Controls has occurred at this site. Therefore, as discussed in item #3 above, DERM recommends removal of such subjective terminology.

Air Force Response: The referenced language was intended to provide the historical conclusions of the IRP Phase I Records Search that was completed for OU-12 in 1983. To improve the clarity of this discussion, the text immediately following Table 2-1 has been revised as follows:

"An IRP Phase I Records Search was completed in 1983. Based on the records search, OU-12 had a low potential for contamination, due to the nature of the chemicals stored in the building and the absence of evidence that significant spills had occurred at the site; however, additional investigation activities were required to support a no action decision."

DERM Comment: In some instances, Antimony is used where Arsenic is the applicable chemical of concern (i.e. Section 2.10.1, Page 29, Line 17 [of the Draft Final OU-12 ROD dated March 2006]).

Air Force Response: Section 2.10.1 has been revised accordingly. No other incorrect usages of antimony were identified.

DERM Comment: The report states that input from the United States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) as well as public comments (Section 2.3) were used during the Feasibility Study process to substantiate the remedy presented in the ROD. The report does not include a section or statement regarding comments made by DERM. If DERM comments are not included in this process, the report should be accurate by stating this so as not to imply that the USEPA, FDEP, and public comments are the only comments made available for the ROD or associated documents.

Air Force Response: Section 2.10.3, Community Acceptance, has been modified to indicate that DERM provided comments on the Proposed Plan for OU-12 in a letter dated 5 May 2006. In addition, DERMs comments on the Draft Final OU-12 ROD have been included and responded to in Section 3.0, Responsiveness Summary. Finally, because changes were made to the remedy originally proposed in the Proposed Plan for OU-12 based on DERM's comments, Section 2.14, Documentation of Significant Changes, was changed accordingly.

APPENDIX A

REFERENCES

References

Air Force Base Conversion Agency. Arsenic Background Study. November 1996.

Booz Allen Hamilton Inc. Final Streamlined Feasibility Study for Operable Unit 12 – Former Entomology Storage Shop. February 2006.

Booz Allen Hamilton Inc. Final Proposed Plan for Operable Unit 12 – Former Entomology Storage Shop. March 2006.

Clinton, William. Executive Order 13016, Amendment to Executive Order No. 12580. 28 August 1996.

Florida Administrative Code. Chapter 62-777, Contaminant Cleanup Target Levels Rule. 17 April 2005.

IT Corporation. Draft Letter Report, Operable Unit 12 Post Voluntary Interim Remedial Actions Soil Sampling Activities, Former Entomology Chemical Storage Building. December 2002.

IT Corporation. Draft Letter Report, Operable Unit No. 12, Year Two Post Voluntary IRA Ground-Water Monitoring Results. January 2003.

Montgomery Watson. Draft Final, Operable Unit No. 12, Entomology Storage Shop Extended Site Investigation and Preliminary Risk Evaluation Report Addendum. June 1998.

Reagan, Ronald. Executive Order 12580, Superfund Implementation. 23 January 1987.

Shaw Environmental, Inc. Draft Letter Report: Year Three Post Voluntary IRA Ground-Water Monitoring Results. September 2003.

U.S. Environmental Protection Agency, ProUCL Version 3.0 User Guide. April 2004.

Versar, Inc. Draft Final Operable Unit 12, Entomology Storage Shop, Extended Site Investigation and Preliminary Risk Evaluation Report Addendum. June 1998.

Versar, Inc. Draft Final Letter Report, Voluntary Interim Remedial Action and Ground-Water Monitoring Activities, Operable Unit No. 12, Former Entomology Chemical Storage Shop (Former Building 371). January 2002.

Woodward-Clyde. A Practical Approach for the Development of Typical Basewide PAH Concentrations Not Related to Waste Handling Practices for Use in Risk Management Decisions. April 1996.

APPENDIX B

REGULATORY CORRESPONDENCE

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

February 20, 2006

Mr. Michael Andrejko
482nd MSG/CEV
29350 Westover Street
Building 232
Homestead ARB, FL 33039-1299

RE: Final Streamlined Feasibility Study for Operable Unit 12, Former Entomology Storage Shop, Homestead Air Reserve Base, Miami-Dade County, Florida.

Dear Mr. Andrejko:

I have completed my review of the Final Streamlined Feasibility Study for Operable Unit 12, Former Entomology Storage Shop, Homestead Air Reserve Base, dated February 2006 (downloaded February 13, 2006), prepared by Booz Allen Hamilton, Inc. The document is accepted as final with two caveats. The first is that the document did not have signatures or certifications by those who created the document. Please submit these certification pages so that they may be added to the document. The second is that while the list of State ARARs does not include Chapter 62-780, Florida Administrative Code, Contaminated Site Cleanup Criteria, I will expect this rule to be added to the list of ARARs in the Record of Decision for this site. I did not originally comment on this as the original Draft Streamlined Feasibility Study for Operable Unit 12 was submitted prior to the rule having gone into effect. Thus, it was never addressed in the Air Force's responses to the Department's comments.

If you have any concerns regarding this letter, please contact me at (850)245-8997.

Sincerely,

David P. Grabka, P.G.
Remedial Project Manager

CC: Tim Bahr, FDEP
Doyle Brittain, EPA Region 4, Atlanta

Lee Conesa, Northrup Grumman/AFRPA
Wilbur Mayorga, DERM
Paul Wierzbicki, FDEP Southeast District

JJC____ ESN____

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

February 22, 2006

4WD-FFB

EMAIL & US MAIL

Lawrence Ventura, Environmental Flight Chief
Homestead Air Reserve Base
482d SPTG/CEV
360 Coral Sea Blvd.
Homestead ARB, FL 33039-1299

SUBJ: Feasibility Study for Operable Units 12, 25, and 27
Homestead Air Reserve Base, Florida

Dear Mr. Ventura:

The Environmental Protection Agency (EPA) has reviewed the subject documents and considers them acceptable as written. EPA approves each of them. If you have any questions, please call me at (404) 562-8549.

Sincerely,

Doyle T. Brittain

Doyle T. Brittain
Senior Remedial Project Manager

cc: Lee Conesa, HAFB/AFRPA
David Grabka, FDEP
Wilbur Mayorga, DERM
Philippe Montaigne, AFRES

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET, S.W.
ATLANTA, GEORGIA 30303

March 31, 2006

4WD-FFB

EMAIL & US MAIL

Lawrence Ventura, Environmental Flight Chief
Homestead Air Reserve Base
482d SPTG/CEV
360 Coral Sea Blvd.
Homestead ARB, FL 33039-1299

SUBJ: Final Proposed Plans for Operable Units 12, 25, and 27, and Final Feasibility Study for Operable Unit 25; Homestead Air Reserve Base, Florida

Dear Mr. Ventura:

The Environmental Protection Agency (EPA) has reviewed the subject documents and agrees with them as written. All comments submitted by EPA on the previous draft documents have been adequately addressed. Therefore, EPA approves the subject documents. If you have any questions, please call me at (404) 562-8549.

Sincerely,

Doyle T. Brittain
Senior Remedial Project Manager

cc: Lee Conesa, HAFB/AFRPA
Philippe Montaigne, HQ AFRC/CEVX
David Grabka, FDEP
Wilbur Mayorga, DERM
Susan Markley, DERM

Department of Environmental Protection

Jeb Bush
Governor

Twin Towers Building
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Colleen M. Castille
Secretary

April 5, 2006

Mr. Michael Andrejko
482nd MSG/CEV
29350 Westover Street
Building 232
Homestead ARB, FL 33039-1299

RE: Final Proposed Plan for Operable Unit 12, Former Entomology Storage Shop, Homestead Air Reserve Base, Miami-Dade County, Florida.

Dear Mr. Andrejko:

I have completed my review of the Final Proposed Plan for Operable Unit 12, Former Entomology Storage Shop, Homestead Air Reserve Base, dated March 2006 (downloaded March 28, 2006), prepared by Booz Allen Hamilton, Inc. My previous comments on the Proposed Plan have been addressed. Therefore, the document is approved.

If you have any concerns regarding this letter, please contact me at (850)245-8997.

Sincerely,

David P. Grabka

David P. Grabka, P.G.
Remedial Project Manager

CC: Tim Bahr, FDEP
Doyle Brittain, EPA Region 4, Atlanta
Lee Conesa, Northrup Grumman/AFRPA
Wilbur Mayorga, DERM
Paul Wierzbicki, FDEP Southeast District

CJC ___ ESN ESN

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July 6, 2006

CERTIFIED MAIL NO. 70031680000088247505
RETURN RECEIPT REQUESTED

Mike Andrejko
482nd MSG/CEV
29350 Westover St., Bldg. 232
Homestead ARB, FL 33039-1299

Re: Draft Final Record of Decision (ROD) for OU-12-Former Entomology Storage Shop dated May 2006 and prepared by Booz Allen Hamilton, Inc. for the OU-12 facility (HWR-102/File-12223) located at, near, or in the vicinity of Homestead ARB, Homestead, Miami-Dade County, Florida.

Dear Mr. Andrejko:

The Department of Environmental Resources Management (DERM) has reviewed the above-referenced document received May 30, 2006. The following comments are provided:

1. DERM reiterates that the proposed Land Use Controls (LUC's) are not sufficient for this site. Refer to the attached January 25 and March 14, 2006 DERM letters for comments regarding the selected remedy for this site.

2. The report shall be accurate and consistent throughout when referring to the applicable cleanup target levels for Homestead Air Reserve Base. For example, arsenic (10 mg/kg) has an alternate residential soil cleanup target level (SCTL) based on background and the carcinogenic PAHs have an alternate industrial SCTL. Furthermore, federal Maximum Contaminant Levels (MCLs) for groundwater shall also be used appropriately (i.e. not for soil cleanup target level reference). Text and tables shall be corrected or modified as applicable.

3. Section 1.4, Page 2, line 10 and paragraph beginning on line 26. Contaminants either exceed applicable cleanup target levels or they do not exceed applicable cleanup target levels. It is not appropriate to theorize on the significance or insignificance of an exposure risk based on how much or little a contaminant exceeds the applicable cleanup target level by or on the basis of how "near" it is to an acceptable risk range. Therefore, DERM recommends removal of such subjective terminology.

4. Unless a site-specific risk assessment is conducted to properly evaluate acceptable non "permanent" residential uses, the term "permanent" shall not precede "residential" when referring to the type of use restrictions to be imposed on the site.

5. The report indicates that the restrictions to be imposed will only be applicable to the portions of the OU-12 site that exceed applicable cleanup target levels. If the applicable restrictions are only going to placed on a portion of the site, a Professional Land Survey is required to appropriately define the portions and shall be included as part of the institutional control.

6. The May 20, 2005 Response to Comments on the Draft Streamlined Feasibility Study report (DERM Comment #2) stated that procedures for removing the Land Use Controls will be specified in the ROD (i.e. confirmation sampling prior to determining if the restrictions can be lifted). This information is not included in the ROD.

7. Section 2.2, Page 6, Line 32 describes the "absence of evidence that significant spills had occurred..." at the OU-12 site. The relevance of this terminology (i.e. is this required language for the ROD) should be further described. A spill significant enough to require assessment, remedial action, and closure with Land Use Controls has occurred at this site. Therefore, as discussed in item #3 above, DERM recommends removal of such subjective terminology.

8. In some instances, Antimony is used where Arsenic is the applicable chemical of concern (i.e. Section 2.10.1, Page 29, Line 17).

9. The report states that input from the Unites States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Protection (FDEP) as well as public comments (Section 2.3) were used during the Feasibility Study process to substantiate the remedy presented in the ROD. The report does not include a section or statement regarding comments made by DERM. If DERM comments are not included in this process, the report should be accurate by stating this so as not to imply that the USEPA, FDEP, and public comments are the only comments made available for the ROD or associated documents.

If you have any questions concerning the above, please contact Thomas Kux, P.G., of the Pollution Remediation Section at (305) 372-6700.

Sincerely,

Wilbur Mayorga, P.E., Chief
Pollution Control Division

TK
enclosure

pc: David Grabka, P.G., FDEP (TAL)
Doyle Brittain, USEPA Region IV, Waste Management Division FFB, 61 Forsyth St. SW, Atlanta, GA 30303

MIAMI-DADE COUNTY

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March 14, 2006

CERTIFIED MAIL NO. 70031680000088247062
RETURN RECEIPT REQUESTED

Mike Andrejko
482nd MSG/CEV
29350 Westover St., Bldg. 232
Homestead ARB, FL 33039-1299

Re: Draft Proposed Plan for OU-12-Former Entomology Storage Shop dated February 2006 and prepared by Booz Allen Hamilton, Inc. for the OU-12 facility (HWR-102/File-12223) located at, near, or in the vicinity of Homestead ARB, Homestead, Miami-Dade County, Florida.

Dear Mr. Andrejko:

The Department of Environmental Resources Management (DERM) has reviewed the above-referenced document received February 14, 2006. The Preferred Alternative listed in Section 9.0 indicates that Land Use Controls prohibiting residential uses on the property is the selected remedy for the site. In accordance with DERM's letter dated January 25, 2006, this is not sufficient. Please refer to comment #1 of the attached January 25, 2006 DERM letter regarding the remedial alternative recommended by DERM.

If you have any questions concerning the above, please contact Thomas Kux, P.G., of the Pollution Remediation Section at (305) 372-6700.

Sincerely,

Kevin Sloggy

Wilbur Mayorga, P.E., Chief
Pollution Control Division

TK
enclosure

pc: David Grabka, P.G., FDEP (TAL)
Doyle Brittain, USEPA Region IV, Waste Management Division FFB, 61 Forsyth St. SW, Atlanta, GA 30303

MIAMI-DADE COUNTY

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January 25, 2006

CERTIFIED MAIL NO. 7003 1680 0000 8824 6959
RETURN RECEIPT REQUESTED

Mike Andrejko
482nd MSG/CEV
29350 Westover St., Bldg. 232
Homestead ARB, FL 33039-1299

Re: Draft Final Streamlined Feasibility Study for OU-12-Former Entomology Storage Shop dated December 2005 and prepared by Booz Allen Hamilton, Inc. for the OU-12 facility (HWR-102/File-12223) located at, near, or in the vicinity of Homestead ARB, Homestead, Miami-Dade County, Florida.

Dear Mr. Andrejko:

The Department of Environmental Resources Management (DERM) has reviewed the above-referenced document received December 29, 2005 and hereby offers the following comments:

1. DERM does not object to a remedy that includes industrial use restrictions managed by Land Use Controls (LUCs) along with maintaining the existing surface cover at the site. Additional investigation into the asphalt parking area (i.e., beyond the SS-7, 28 mg/kg arsenic sample location) was not conducted and the extent and degree of potential soil contamination under this surface cover is unknown. However, if it can be demonstrated that the asphalt parking lot was present prior to the estimated time period that the arsenic impacts may have occurred, DERM would not object to limiting the closure with LUCs to industrial use only.

2. Refer to the attached Air Force Response to DERM Comments document. Section 4.1.2.3 has not been updated to reflect that the Record of Decision (ROD) will specify the procedures for removing the LUCs.

If you have any questions concerning the above, please contact Thomas Kux, P.G., of the Pollution Remediation Section at (305) 372-6700.

Sincerely,

Wilbur Mayorga, P.E., Chief
Pollution Control Division

TK
attach
pc: David Grabka, P.G., FDEP (TAL)
Doyle Brittain, USEPA Region IV, Waste Management Division FFB, 61 Forsyth St. SW, Atlanta, GA 30303

MIAMI-DADE COUNTY

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August 4, 2006

CERTIFIED MAIL NO. 7003 1680 0000 8831 5204
RETURN RECEIPT REQUESTED

Mike Andrejko
482nd MSG/CEV
29350 Westover St., Bldg. 232
Homestead ARB, FL 33039-1299

Re: Final Streamlined Feasibility Study for OU-12-Former Entomology Storage Shop dated February 2006 and prepared by Booz Allen Hamilton, Inc. for the OU-12 facility (HWR-101/File-12223) located at, near, or in the vicinity of Homestead ARB, Homestead, Miami-Dade County, Florida.

Dear Mr. Andrejko:

The Department of Environmental Resources Management (DERM) has reviewed the above-referenced document received February 13, 2006. Since the comments from the attached January 25, 2006 DERM letter regarding the Draft Final FS have not been addressed, DERM does not concur with the recommendations of the report and does not concur with approving the report as final.

If you have any questions concerning the above, please contact Thomas Kux, P.G., of the Pollution Remediation Section at (305) 372-6700.

Sincerely,

Wilbur Mayorga, P.E., Chief
Pollution Control Division

TK
attachment

pc: David Grabka, P.G., FDEP (TAL)
Doyle Brittain, USEPA Region IV, Waste Management Division FFB, 61 Forsyth St. SW, Atlanta, GA 30303

MIAMI-DADE COUNTY

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January 25, 2006

CERTIFIED MAIL NO. 7003 1680 0000 8824 6959
RETURN RECEIPT REQUESTED

Mike Andrejko
482nd MSG/CEV
29350 Westover St., Bldg. 232
Homestead ARB, FL 33039-1299

Re: Draft Final Streamlined Feasibility Study for OU-12-Former Entomology Storage Shop dated December 2005 and prepared by Booz Allen Hamilton, Inc. for the OU-12 facility (HWR-102/File-12223) located at, near, or in the vicinity of Homestead ARB, Homestead, Miami-Dade County, Florida.

Dear Mr. Andrejko:

The Department of Environmental Resources Management (DERM) has reviewed the above-referenced document received December 29, 2005 and hereby offers the following comments:

1. DERM does not object to a remedy that includes industrial use restrictions managed by Land Use Controls (LUCs) along with maintaining the existing surface cover at the site. Additional investigation into the asphalt parking area (i.e., beyond the SS-7, 28 mg/kg arsenic sample location) was not conducted and the extent and degree of potential soil contamination under this surface cover is unknown. However, if it can be demonstrated that the asphalt parking lot was present prior to the estimated time period that the arsenic impacts may have occurred, DERM would not object to limiting the closure with LUCs to industrial use only.

2. Refer to the attached Air Force Response to DERM Comments document. Section 4.1.2.3 has not been updated to reflect that the Record of Decision (ROD) will specify the procedures for removing the LUCs.

If you have any questions concerning the above, please contact Thomas Kux, P.G., of the Pollution Remediation Section at (305) 372-6700.

Sincerely,

Wilbur Mayorga, P.E., Chief
Pollution Control Division

TK
attach
pc: David Grabka, P.G., FDEP (TAL)
Doyle Brittain, USEPA Region IV, Waste Management Division FFB, 61 Forsyth St. SW, Atlanta, GA 30303

Air Force Reserve Command Responses to Technical Review Comments
Draft Streamlined Feasibility Study for Operable Unit (OU) 12—
Former Entomology Storage Shop
Homestead Air Reserve Base (ARB), Florida
February 2005

Comments from Wilbur Mayorga, P.E., Miami-Dade County Department of Environmental Resources Management, dated 8 March 2005

The Department of Environmental Resources Management (DERM) has reviewed the above-referenced document received February 9, 2005, and hereby offers the following comments:

Comment 1: Section 2.3.1 Land Use Controls (LUCs) of the report includes physical mechanisms including surface cover as part of a LUC. For consistency, Sections 3.2 and 4.1.2 should also include these mechanisms in the description of Alternative 2 – Land Use Controls. As acknowledged throughout the report, levels above industrial exposure remain on site that require the existing physical barriers to remain in place.

AFRC Response: The discussion in Section 2.3.1 is presented in the context of identification and screening of technologies that may be appropriate elements of a remedy for the site. In this case, the discussion regarding LUCs is a general description of the types of mechanisms that could be employed as LUCs. In general, LUCs may include physical, legal, or administrative mechanisms.

In the case of OU-12, the AFRC does not believe that additional physical barriers are necessary to protect site workers from exposure to the contaminated soil. However, AFRC recognizes the value of maintaining existing surface cover (e.g., grass, pavement) to limit the likelihood of direct contact with surface soil.

Section 3.2 will be revised to include maintenance of existing surface cover as a component of the remedy, and Section 4.1.2 will be revised to explicitly address the efficacy of this portion of the remedy.

Comment 2: Section 4.1.2.3 of the report indicates that concentrations of PAHs may naturally decline over time allowing a majority of the restrictions to be lifted. Confirmation sampling will be required and must be approved by the applicable regulatory agencies prior to removing any restrictions. Include this requirement in the text.

AFRC Response: The Record of Decision (ROD) for OU-12 will specify the remedial action objectives (RAOs) for the site, requirements for demonstrating when the objectives have been met, and procedures for removing the LUCs and closing the site.

Section 4.1.2.3 will be revised to state that requirements for lifting the LUCs will be specified in the ROD.

Comment 3: Section 4.1.2.7 and Section 4.2 indicate that LUCs will be implemented and administered by Environmental Flight. Be advised that although for cost evaluation this statement may be appropriate, the applicable local, state, and federal agencies will maintain control over the imposition of these restrictions.

AFRC Response: Comment acknowledged. The AFRC recognizes the role of the Miami-Dade County DERM, FDEP, and EPA in providing regulatory oversight for remedy implementation at OU-12. However, the AFRC retains the overall responsibility and authority to implement the remedy.