EPA/ROD/R04-99/070
1999

EPA Superfund
Record of Decision:

HOMESTEAD AIR FORCE BASE
EPA ID: FL7570024037
OU 07
HOMESTEAD AIR FORCE BASE, FL
09/29/1999

Homestead Air Reserve Base, Florida

Final

Record of Decision for Operable Unit No. 7. Entomology Storage Area

January 1998

DEPARTMENT OF THE AIR FORCE
AIR FORCE RESERVE

MEMORANDUM FOR: SEE DISTRIBUTION January 29,1998

FROM: 482d SPTG/CEV
29050 Coral Sea Blvd.
Bldg. 232
Homestead ARS, F1 33039-1299

SUBJECT: Final Operable Unit 7 Record Of Decision

Attached is the Final Record Of Decision for OU-7. As noted in the Responsiveness Summary Section of the Report, there were no comments received during the comment period or public meeting. If you have any questions please contact me at (305) 224-7163.

for
John B. Mitchell, Chief
Environmental Engineering Flight

Attachment:
Final Operable Unit 7 Record Of Decision

cc:
482d SPTG/CEV, Mr. John B. Mitchell (2)
AFBCA/DD Homestead, Mr. Tom Bartol (2)
HQ AFRC/CEVV, Ms. Valerie Stacey (1)
USACE CENWO-ED-EE , Ms. Taunya Howe (4)
Gannett Fleming, Hugh Vick (1)

DISTRIBUTION:
U.S. EPA, Doyle T. Brittain
FDEP, Jorge R. Caspary
DERM, James A. Carter

Department of
Environmental Protection

Lawton Chiles
Governor

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

Virginia B. Wetherell
Secretary

March 5, 1998

Colonel Richard J. Eustace
Commander
Homestead Air Force Base
360 Coral Sea Boulevard
Homestead, Florida 33039-1299

Dear Colonel Eustace:

The Florida Department of Environmental Protection agrees with the Air Force's selected alternative for operable Unit 7 (Site SS-7), Entomology Storage Area at Homestead Air Reserve Base.

The Record of Decision specifies Capping, Access and Use Restrictions for Soil and Groundwater, Natural Attenuation and Groundwater Monitoring at Site SS-7 as a cost effective remedy that provides adequate protection of public health, welfare, and the environment. The determination to implement the above course of action at this site is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) and the National Contingency Plan (40 CFR 300). Accordingly, the site shall undergo a five-year review with the costs of the review to be absorbed by the federal government.

We appreciate your continued cooperation and look forward to an expeditious economic and environmental recovery of Homestead Air Reserve Base.

Sincerely,

Virginia Wetherell

Virginia B. Wetherell
Secretary

VBW/jrc

Lawton Chiles
Governor

Department of
Environmental Protection

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

March 19, 1998

Mr. John B. Mitchell
AFRES 482nd Reserve Wing
360 Coral Sea Blvd
Homestead ARB, FL 33039-1299

RE: Record Of Decision for Operable Unit 7. Homestead ARB, Florida

Dear Mr. Mitchell:

The Department concurs with the selected alternative detailed in the above referenced document dated January 1998 (received January 30, 1998). I am enclosing a concurrence letter signed by Secretary Virginia Wetherell. You are encouraged to proceed with groundwater monitoring at OU-7 at your earliest convenience.

If I can be of any assistance in this matter, please contact me at 904/488-3935.

Sincerely,

Jorge R. Caspary, P.G.

cc: [redacted], EPA-Atlanta
Thomas Bartol, AFBCA OL/Y
Robert Johns, DERM

TJB TB JJC JJC ESN ESN

h1698.doc

Phone: 305-224-7344
Fax: 305-224-7347

HOMESTEAD ARB, 482

Fax

To:	Doyle Brittain	From:	482 sptg/ce
Fax:	404-562-8518	Date:	September 23, 1999
Phone:	404-562-8549	Pages:	3
Re:	OU-7	cc:	

9 Urgent **9** For Review **9** Please Comment **9** Please Reply **9** Please Recycle

DEPARTMENT OF THE AIR FORCE
AIR FORCE RESERVE

MEMORANDUM FOR SEE DISTRIBUTION September 23,1999

FROM: 482d SPTG/CEV
29050 Coral Sea Blvd.
Bldg, 232
Homestead ARS, Fl 33039-1299

SUBJECT: Insertion of Institutional Control language into the Record of Decision for OU-7 Entomology Storage Area

Enclosed please find a copy of a paragraph to be inserted into the Record of Decision dated January, 1998 for OU-7. This paragraph incorporates language committing to institutional controls as included in the Land Use Control Implementation Plan (LUCIP) for this site.

If you have any questions, please do not hesitate to contact me at (305) 224-7163.

John B. Mitchell, Chief
Environmental Engineering Flight

Attachment:
ROD Insertion

Cc:
HQ AFRC/CEVV, Mr. Philippe Montaigne
AFBCE/DD Homestead, Mr. Tom Bartol
Gannett Fleming, Hugh Vick

DISTRIBUTION:
U.S. EPA. Doyle T. Brittain
FDEP. Jorge R. Caspary
DERM, James A. Carter

RECORD OF DECISION
OPERABLE UNIT SEVEN
MOA INCORPORATION LANGUAGE

By separate Memorandum of Agreement (MOA) dated 15 March, 1999, with U.S. Environmental Protection Agency (U.S. EPA) and the Florida Department of Environmental Protection (FDEP), HARS, on behalf of the Department of the Air Force, agreed to implement base-wide, certain periodic site inspection, condition certification and agency notification procedures designed to ensure the maintenance by Installation personnel of any site-specific Land Use Controls (LUCs) deemed necessary for future protection of human health and the environment. A fundamental premise underlying execution of that agreement was that through the Air Force's substantial good-faith compliance with the procedures called for therein, reasonable assurances would be provided to U.S. EPA and FDEP as to the permanency of those remedies which included the use of specific LUCs.

Although the terms and conditions of the MOA are not specifically incorporated or made enforceable herein by reference, it is understood and agreed by the Air Force, U.S. EPA and FDEP that the contemplated permanence of the remedy reflected herein shall be dependent upon the Installation's substantial good-faith compliance with the specific LUC maintenance commitments reflected therein, Should such compliance not occur or should the MOA be terminated it is understood that the protectiveness of the remedy concurred in may be reconsidered and that additional measures may need to be taken to adequately ensure necessary future protection of human health and the environment.

Land Use Controls Implemented:

Homestead ARS Installation Restoration Manager coordinates inspections and forwards discrepancies for correction.

Restrict construction. Workers must be notified that contamination exists and OSHA regulations apply if excavation activities are proposed on the site. Obtain concurrence from USEPA and FDEP prior to design. No residential usage allowed. Restrict groundwater and soil access. No water supply wells allowed within the restricted area Prior to all construction activities, a dig permit is required which also restricts groundwater and soil access for this site.

Objective:

Prevent direct contact with contaminated media. Prevent trespassers and residential use.

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

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

4WD-FFB

Maj Gen. David. R. Smith
Vice Commander, AFRC/CV
155 Second Street
Robins AFB, GA 31098-1635

SUBJ: Record Of Decision - Operable Unit 7
Homestead Air Force Base NPL Site
Homestead, Florida

Dear Maj Gen Smith

The U.S. Environmental Protection Agency (EPA) Region IV has reviewed the subject decision document and concurs with the selected remedy for the remedial action at Operable Unit (OU) 7 at the former Homestead Air Force Base (HAFB). This remedy is supported by the previously completed Remedial Investigation, Feasibility Study, and Baseline Risk Assessment Reports. The selected remedy consists Land Use Controls which include:

- Capping of the site through new construction,
- Controls to prevent residential development and placement of a potable well,
- Digging excavation restrictions around areas with elevated arsenic,
- Install one new groundwater monitoring well,
- Groundwater monitoring for organochlorine pesticides, BNAs, and TAL metals, and
- One five-year review.

The determination to implement this course of action at this site is consistent with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) as amended by the Superfund Amendments and Reauthorization Act (SARA) and the National Contingency Plan (40 CFR 300).

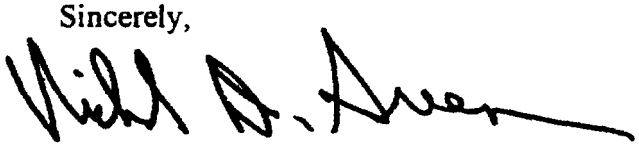
Concurrence with the Record of Decision (ROD) is conditioned on the express understanding that the Air Force is committed to the agreement reached with IV and the Florida Department of EPA Region. Environmental Protection (FDEP) that complies with EPA's April 21, 1998 Memorandum titled "Assuring Land Use Controls at Federal Facilities." We reiterate, as we advised Air Force Regional Environmental Office representatives in our meeting on May 21, 1998, our concurrence with this particular ROD is based on the

understanding that the Air Force is committed to the Memorandum of Agreement (MOA) consistent with the above-referenced Land Use Control (LUC) Policy. Furthermore, the Homestead Air Force Base BRAC Cleanup Team (BCT) will be expected to craft specific provisions for Land Use Controls as part of the resulting Land Use Control Implementation Plan for OU- 7. that will prohibit residential land use.

EPA appreciates the level of effort that was put forth in the documents leading to this decision, EPA looks forward to working with HAFB as we move towards final cleanup of the National Priorities List (NPL) site.

If you have any questions, please call me at (404) 562-8651, or Doyle T. Brittain at (404) 562-8549.

Sincerely,



Richard D. Green, Director
Waste Management Division

cc: Thomas J. Bartol, HAFB/AFBCA
John Mitchell, HAFB/AFRES
Jim Woolford, EPA/FFRO
Jorge Caspary, FDEP

FINAL

RECORD OF DECISION

FOR

OPERABLE UNIT 7
ENTOMOLOGY STORAGE AREA

Homestead Air Reserve Base, Florida

January 1998

Prepared for:

U. S. Army Corps of Engineers
Missouri River Division
Omaha District
Omaha, Nebraska

Prepared by:

Montgomery Watson
3501 N. Causeway Blvd.
Metairie, Louisiana 70002

RECORD OF DECISION

Operable Unit 7
Entomology Storage Area
Homestead Air Reserve Base
Homestead, Florida
FDEP Facility No. 138521996

January 1998

Montgomery Watson appreciates the opportunity to work for the U.S. Army Corps of Engineers, at the Homestead Air Reserve Base facility in Homestead, Florida. If you have any questions or comments concerning this report, please contact Mr. John B. Mitchell, Remedial Program Manager, Homestead Air Reserve Base.

Respectfully submitted,

MONTGOMERY WATSON

Jerry D. Gaccetta, P.G.
Project Manager

Homestead Air Reserve Base, Florida
Operable Unit 7,
Entomology Storage Area

Declaration for the Record of Decision

DECLARATION STATEMENT

FOR THE

RECORD OF DECISION FOR OPERABLE UNIT NO. 7

SITE NAME AND LOCATION

Homestead Air Reserve Base
Homestead, Dade County, Florida
Operable Unit No. 7, Site SS-7,
Entomology Storage Area (Former Site P-2)

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for the former Entomology Storage Area, Operable Unit No. 7 (OU-7), at Homestead Air Reserve Base (ARB) (formerly Homestead Air Force Base), in Homestead, Florida. The selected remedial action is chosen in accordance with CERCLA, as amended by SARA, and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the basis for selecting the remedial alternative for this Operable Unit. The information that forms the basis for this remedial action is contained in the administrative record for OU-7.

The selected alternative for OU-7 is capping by recent construction, access and use restrictions for soil and groundwater, and groundwater monitoring to detect any potential migration of groundwater contaminants. The State of Florida, the U.S. Environmental Protection Agency (USEPA), and the U.S. Air Force (USAF) concur with the selected remedy presented in this Record of Decision (ROD).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from this site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The operable unit represents the only unit for the site. This response action reduces the principle threat at the site by including the recent construction of the new Civil Engineering and POL Complex as available cover/cap to prevent exposure to site soils. It also requires the implementation of access and use restrictions for soil and groundwater, and groundwater monitoring.

The major components of the selected remedy include:

- Capping of the site by recent construction of buildings, pavement, and grassways to prevent exposure to soil and groundwater contaminants.

- Land use restrictions to prevent digging/excavation activities around areas where elevated concentrations of arsenic were detected in soil and groundwater.

- Institutional controls to prevent the placement of potable water wells into the groundwater beneath the site.

- Installation of one shallow groundwater well and groundwater monitoring for 5 years if necessary. The groundwater samples will be analyzed for organochlorine pesticides, BNAs, and TAL metals.

- Five year review to determine whether the remedy remains protective of human health and the environment.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment and through the use of a groundwater ARARs waiver, complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial actions. Because this site is in that portion of the base to be retained by the Air Force Reserves, the industrial scenario has been deemed appropriate for evaluating site risk. Risk levels at the site are below the EPA remediation-based risk benchmarks for both current and future base workers, but slightly exceed the state of Florida's target cancer risk of IE-06.

Under current and future industrial land use conditions, this alternative is protective of human health and the environment by using capping by recent construction and institutional controls to prevent exposure to soils and groundwater. With this alternative, site risk do not present a threat to human health or the environment, therefore, the more cost effective remedial action is being implemented based on evaluation of this risk and potential site usage.

Because this remedy will result in hazardous substances remaining on-site above health-based levels (arsenic in groundwater), a review will be conducted within five years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment. The review will be performed every five years thereafter until protectiveness is achieved.

Record of Decision
Operable Unit No. 7

United States Air Force Reserve Command
Robins Air Force Base, Georgia

By: _____ Date: 28 SEP 1999

David R. Smith, Major General, USAF
Vice Commander

Homestead Air Reserve Base, Florida
Operable Unit 7,
Entomology Storage Area

Decision Summary for the
Record of Decision

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DECISION SUMMARY

FOR THE

RECORD OF DECISION

1.0 SITE NAME, LOCATION, AND HISTORICAL DESCRIPTION

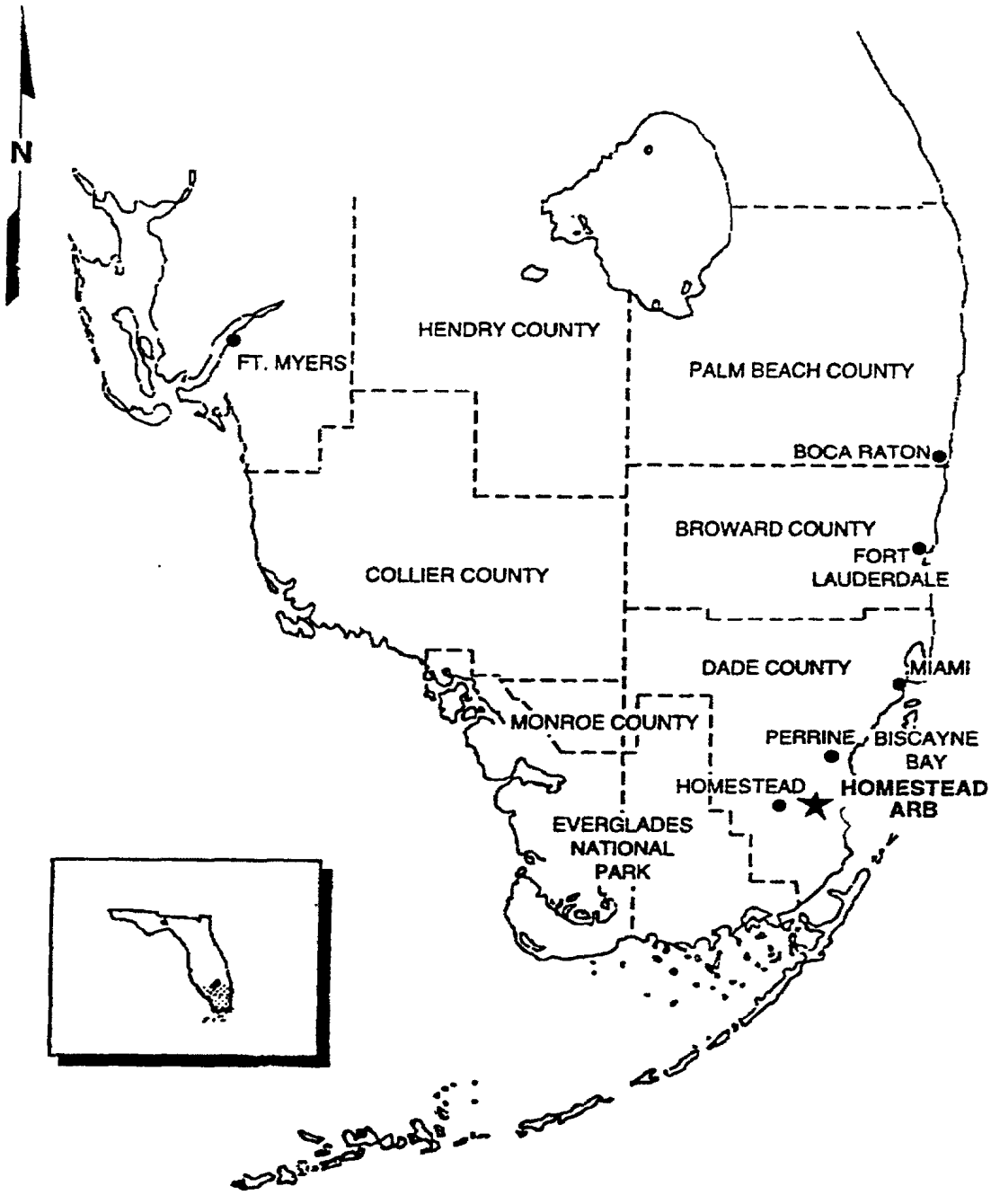
Homestead Air Reserve Base (ARB) is located approximately 25 miles southwest of Miami and 7 miles east of Homestead in Dade County, Florida (Figure 1-1). The main Installation covers approximately 2,916 acres while the surrounding areas are semi-rural. The majority of the Base is surrounded by agricultural land. The land surface at Homestead ARB is relatively flat, with elevations ranging from approximately 5 to 10 feet above mean sea level (msl). The Base is surrounded by a canal (Boundary Canal) that discharges to Outfall Canal and ultimately into Biscayne Bay approximately 2 miles east.

The Biscayne Aquifer underlies the Base and is the sole source aquifer for potable water in Dade County. Within 3 miles of Homestead ARB over 4,000 area residents obtain drinking water from the Biscayne Aquifer while 18,000 acres of farmland are irrigated from aquifer wells (USEPA, 1990). All recharge to the aquifer is through rainfall.

Homestead Army Air Field, a predecessor of Homestead Air Reserve Base, was activated in September 1942, when the Caribbean Wing Headquarters took over the air field previously used by Pan American Air Ferries, Inc. The airline had developed the site a few years earlier for pilot training. Prior to that time, the site was undeveloped. Initially operated as a staging facility, the field mission was changed in 1943 to training transport pilots and crews.

In September 1945, a severe hurricane caused extensive damage to the air field. The Base property was then turned over to Dade County and was managed by the Dade County Port Authority for the next eight years. During this period, the runways were used by crop dusters and the buildings housed a few small industrial and commercial operations.

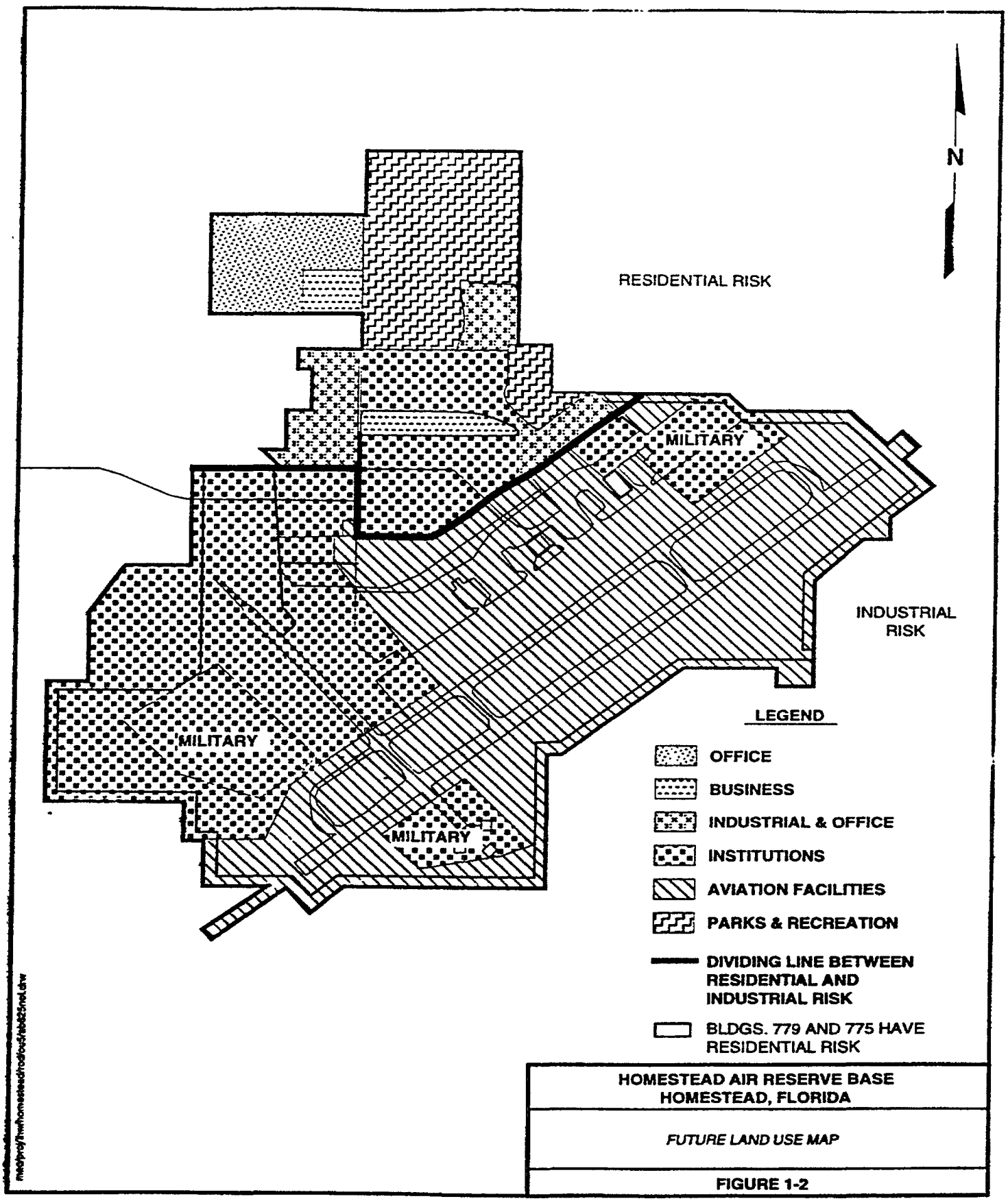
In 1953, the federal government again acquired the airfield, together with some surrounding property, and rebuilt the Site as a Strategic Air Command (SAC) Base. The Base operated under SAC until July 1968 when it was changed to the Tactical Air Command (TAC) and the



HOMESTEAD AIR RESERVE BASE
HOMESTEAD, FLORIDA

LOCATION OF
HOMESTEAD AIR RESERVE BASE

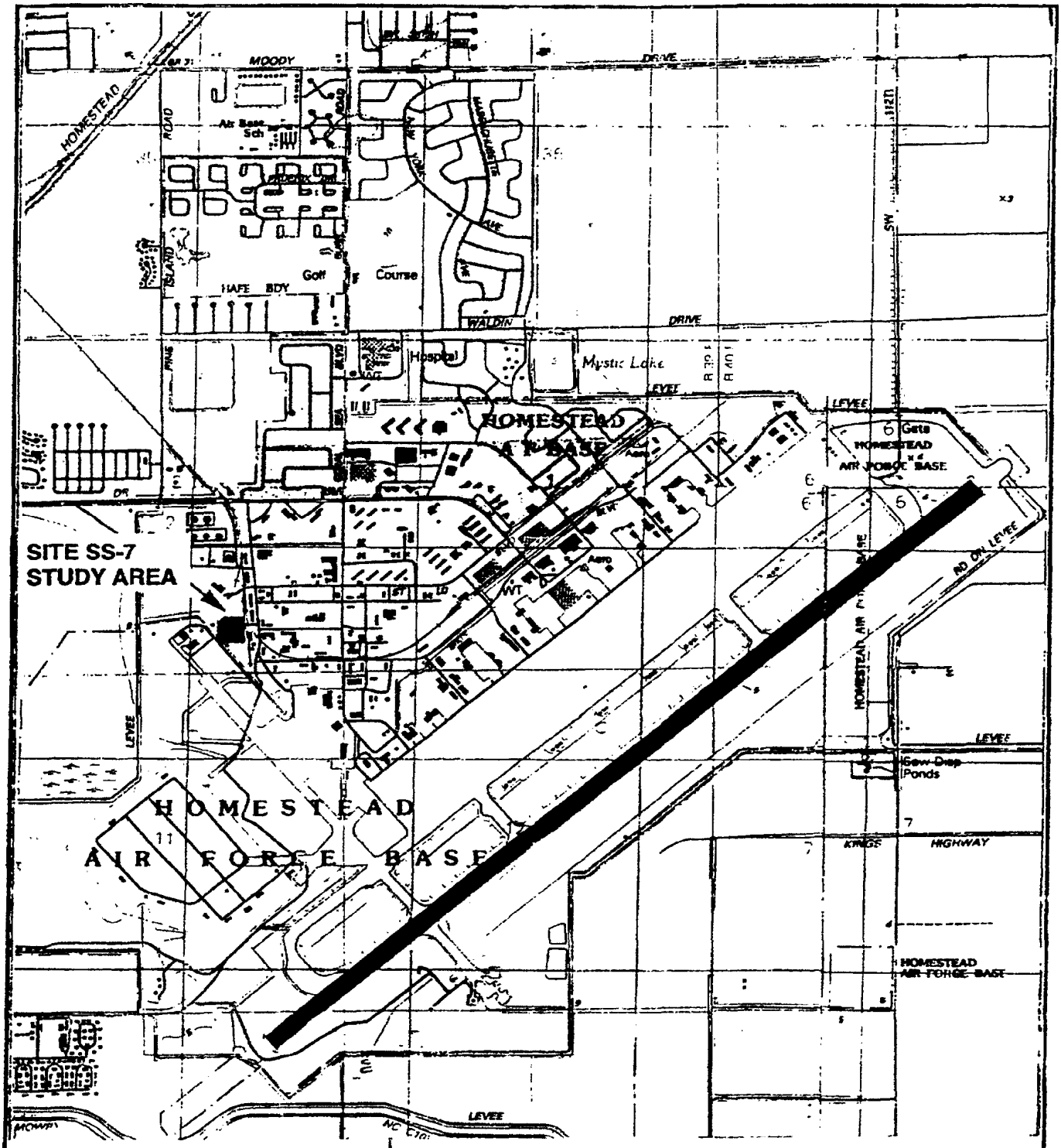
FIGURE 1-1



HOMESTEAD AIR RESERVE BASE
HOMESTEAD, FLORIDA

FUTURE LAND USE MAP

FIGURE 1-2

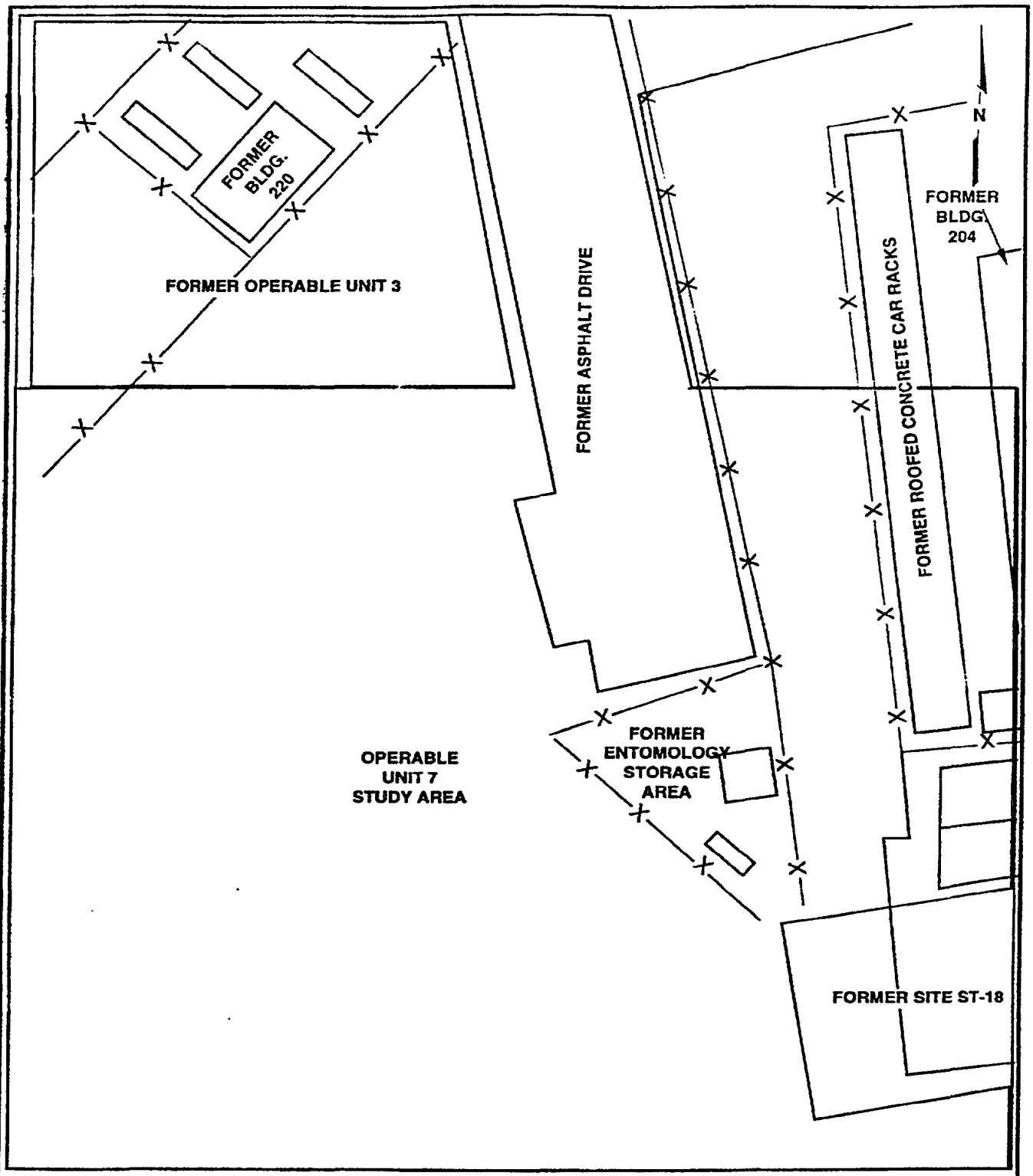


Source: USGS 7.5 minute
Topographic Quadrangles
Arsenicker, Homestead,
Goulds, and Perrine.

HOMESTEAD AIR FORCE BASE
HOMESTEAD, FLORIDA

BASE LOCATION MAP

FIGURE 1-3


FORMER BLDG. 220
FORMER OPERABLE UNIT 3
FORMER ASPHALT DRIVE
FORMER ROOFED CONCRETE CAR RACKS
FORMER BLDG 204
N
OPERABLE UNIT 7 STUDY AREA
FORMER ENTOMOLOGY STORAGE AREA
FORMER SITE ST-18
LEGEND
X—X—X FENCE
STUDY AREA
50 0 50
APPROXIMATE SCALE
HOMESTEAD AIR RESERVE BASE
FLORIDA
FORMER SITE LOCATION MAP
OU-7
ENTOMOLOGY STORAGE AREA
FIGURE 1-4

4531st Tactical Fighterwing became the new host. The Base was transferred to Headquarters Air Combat Command (HQ/ACC) on June 1, 1992.

In August 1992, Hurricane Andrew struck south Florida causing extensive damage to the Base. The Base was placed on the 1993 Base Realignment and Closure (BRAC) list and slated for realignment with a reduced mission. Air Combat Command departed the Base on March 31, 1994 with Air Force Reservists activated at the Base on April 1, 1994. The 482nd Reserve Fighter Wing now occupies approximately 1/3 of the Base with the remaining 2/3 slated for use and oversight by Dade County. Figure 1-2 depicts the proposed future land use for the Base.

1.1 SITE DESCRIPTION

The Homestead ARB location is depicted in Figure 1-3. Operable Unit 7 originally encompassed a triangular area of approximately 5,265 square feet or approximately 0.13 acres and is located in the west-central portion of Homestead ARB. The Entomology Storage Area was a fenced triangular area located in the southeast corner of the Civil Engineering Storage Compound, which was a storage area for supplies and equipment. The OU-7 investigation area was later expanded to approximately 4 acres which included a large portion of the Civil Engineering Storage Compound, OU-3 PCB Spill Area, the asphalt pavement areas, and a portion of the Building 207, Site ST-18 petroleum contaminated site. The majority of the site features/structures were razed due to the Interim Removal Action performed in 1994, and rebuilding activities by the Air Force Reserves. A site map depicting the former surface features is provided as Figure 1-4.

The OU-7 study area was bordered by a concrete wall at the western edge of the Civil Engineering Storage Compound; roofed concrete car racks to the east; an asphalt parking area and Building 220 to the north; and open land consisting of crushed and weathered limestone covered by grass to the south. The limestone bedrock, which was exposed at the surface over much of the area, is generally characterized as highly weathered and is penetrable with a split-spoon formation sampler. A January 13, 1983, aerial photograph indicates railroad tracks formerly existed between the fence and the roofed concrete car racks.

A drainage canal borders the former Civil Engineering Storage Compound to the west. This drainage canal typically contains water to a depth of to 2 feet. The drainage canal flows from southeast to northwest and then to the west before draining into the Boundary Canal,

which borders Homestead ARB. The concrete wall on the eastern side of the drainage canal diverts surface water run-off from OU-7 away from the canal. The date of construction of the concrete wall is not available.

Operable Unit 7 has been retained by the 482nd Air Force Reserves as part of the Cantonment Area. Expansion of this area by the Air Force Reserves included rebuilding over the site for a new Base Supply, Civil Engineering, and POL Operations Area. The former OU-7 area is now occupied by a new civil engineering complex, three shops, a storage area, miscellaneous buildings, expanded parking areas, and grassways. Figure 1-5 depicts the current layout of the OU-7 study area.

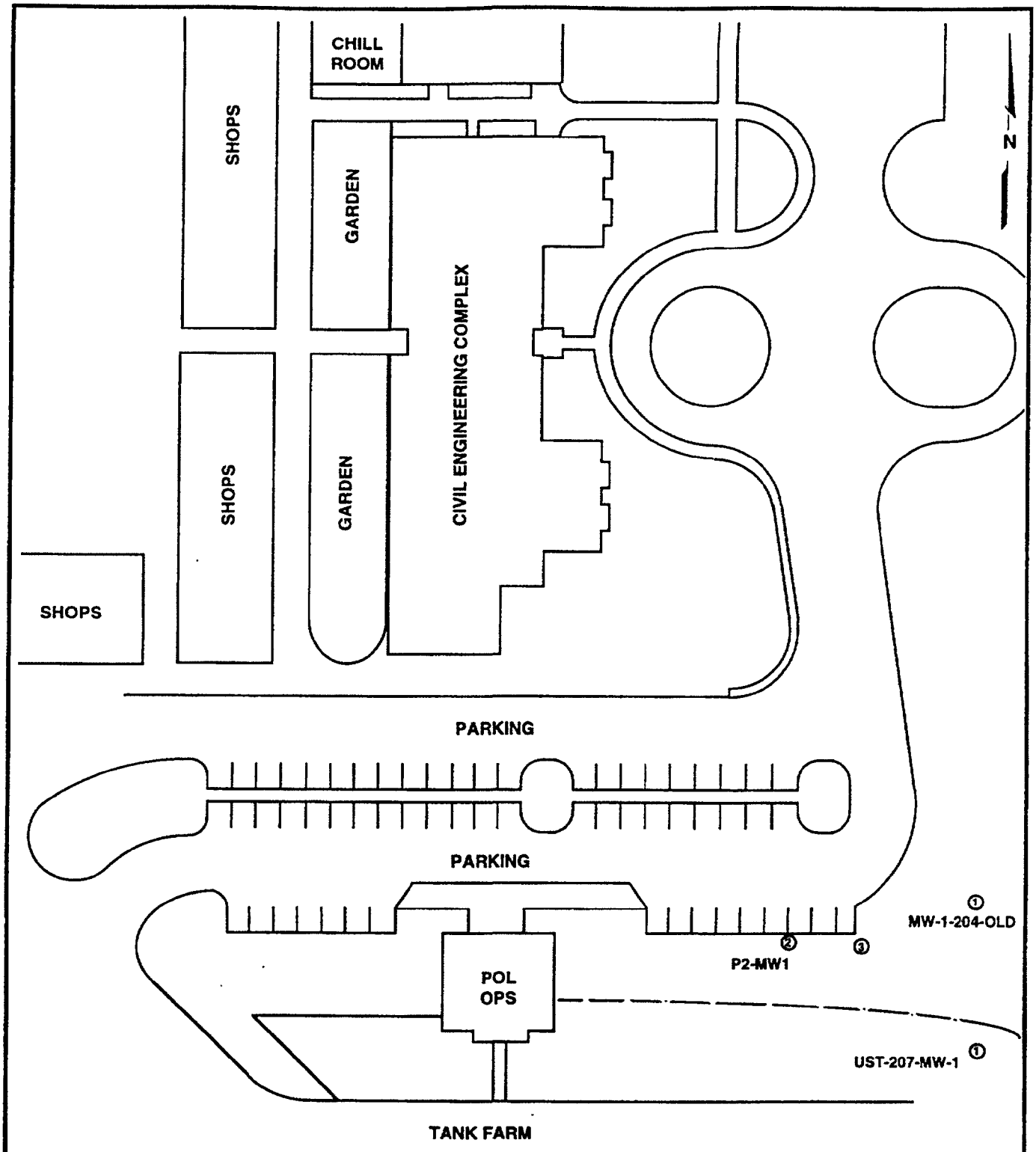
1.2 REGIONAL LAND USE

The area adjacent to Homestead ARB, including OU-7, to the west, east, and south within a half-mile radius is primarily composed of farmland and plant nurseries. Residential areas are located within a half-mile to the north and southwest of the Base. Woodlands are located approximately one-half-mile east of the facility and mangroves and marsh occur adjacent to Biscayne Bay. The Biscayne National Park is located 2 miles east of Homestead ARB; the Everglades National park is located 8 miles west-southwest of the Base; and the Atlantic Ocean is approximately 8 miles east of the Base.

1.3 SURFACE HYDROLOGY

Surface hydrology at Homestead ARB, including OU-7 is controlled by five main factors: 1) relatively impermeable areas covered by runways, buildings and roads; 2) generally high infiltration rates through the relatively thin layer of soil cover; 3) flat topography; 4) generally high infiltration rates through the outcrop locations of the Miami Oölite Formation; and 5) relatively high precipitation rate compared to evapotranspiration rate. Infiltration is considered to be rapid through surfaces of oölite outcrop and areas with a thin soil layer. Infiltration rates are accelerated by fractures within the oölite, as well as naturally occurring solution channels. Precipitation percolates through the relatively thin vadose zone to locally recharge the unconfined aquifer.

Natural drainage is limited because the water table occurs at or near land surface. The construction of numerous drainage canals on Homestead ARB has improved surface water drainage and lowered the water table in some areas. Rainfall runoff from within Homestead ARB boundaries is drained via diversion canals to the Boundary Canal.



LEGEND

- NEW SITE LAYOUT
- ① MONITORING WELL, INSTALLED 1994 BY OHM
- ② MONITORING WELL, INSTALLED 1989 BY GERAGHTY & MILLER, ABANDONED
- ③ PROPOSED NEW MONITORING WELL

APPROXIMATE SITE LAYOUT IS NOT TO SCALE

50 0 50

APPROXIMATE SCALE

HOMESTEAD AIR RESERVE BASE
FLORIDA

OPERABLE UNIT 7, ENTOMOLOGY
STORAGE AREA
CURRENT SITE LAYOUT

FIGURE 1-5

aa060not.drw

A drainage divide occurs within the Homestead ARB facility property, running from the northern end of the facility, toward the center. Water in the Boundary Canal flows generally south and east along the western boundary of the property, and south along the eastern boundary, converging at a storm-water reservoir located at the southeastern corner of the Base. Flow out of the stormwater reservoir flows into Outfall Canal, which, in turn, flows east into Biscayne Bay, approximately 2 miles east of the Base. Water movement is typically not visible in the canals in dry weather due to the lowered water table and the very low surface gradient (0.3 feet per mile) that exists at the Base.

1.3.1 Regional Hydrogeologic Setting

The regional hydrogeology in the southeast Florida area consists of two distinct aquifers: the surficial aquifer system, which consists of the Biscayne Aquifer and the Grey Limestone Aquifer, and the lower aquifer, the Floridan Aquifer.

Biscayne Aquifer. The Biscayne Aquifer at Homestead ARB consists of the Miami Oölite, Fort Thompson Formation, and the uppermost part of the Tamiami Formation. In general, the most permeable parts of the aquifer lie within the Miami Oölite and the Fort Thompson Formation.

The Biscayne Aquifer underlies all of Dade, Broward, and southeastern Palm Beach Counties. The Biscayne Aquifer is the sole source of potable water in Dade County and is a federally-designated sole-source aquifer pursuant to Section 1425 of the Safe Drinking Water Act (SDWA). The Biscayne Aquifer supplies drinking water to approximately 2.5 million people within local communities. All recharge to the aquifer is derived from local rainfall, part of which is lost to evaporation, transpiration, and runoff.

The Biscayne Aquifer has reported transmissivities ranging from approximately 4 to 8 million gallons per day per foot (mgd/ft) (Allman et al., 1979).

Water-table contours indicate that under natural conditions, groundwater flows southeasterly toward Biscayne Bay. The hydraulic gradient is approximately 0.3 ft/mile. The water table at Homestead ARB generally is encountered within 5 to 6 feet of land surface, but may occur at or near land surface during the wet season (May to October). Fluctuations of groundwater levels and local variations in the direction of groundwater flow are due to several factors: (1) differences in infiltration potential, (2) runoff from paved areas, (3) water-level

drawdown near pumping wells, (4) significant but localized differences in lithology (e.g., silt-filled cavities) and (5) drainage effects of canals and water-level control structures.

Floridan Aquifer. Underlying the low-permeability sediments of the Tamiami Formation and Hawthorn Group are the formations which constitute the Floridan Aquifer.

The Floridan Aquifer is made up of limestones and dolomites. It is under artesian pressure and water levels in deep wells may rise 30 to 40 ft above ground surface. Groundwater within these Miocene and Eocene age formations tends to contain dissolved constituents at levels significantly above those recommended for drinking water. In view of the poor water quality and the depth of water yielding zones (800 to 900 feet below ground surface (bgs)), the Floridan Aquifer is of limited usefulness as a source of potable water supply in the study area.

1.4 SITE GEOLOGY AND HYDROGEOLOGY

The stratigraphy of the shallow aquifer system as determined from soil borings performed during site investigations by Geraghty & Miller (G&M) and Montgomery Watson consists of a surficial weathered Miami Oölite ranging in depth from 2 to 6 feet bgs. The weathered limestone consists of a white to brown semi-consolidated oölitic limestone. This strata is underlain by consolidated to semi-consolidated oölitic and coral limestone interbedded with coarse to fine sand and clayey sand layers and lenses down to the total depth of borings (approximately 40 feet bgs).

The Biscayne Aquifer is one of the most transmissive aquifers in the world. It underlies Homestead ARB. A thin vadose zone, nominally less than 5 feet deep, overlays the groundwater table at the site. As previously stated, the aquifer structure is a calcium carbonate matrix. This lithology is known to have natural concentrations of target analyte list (TAL) metals. In descending order by concentration, calcium, aluminum, iron magnesium, sodium, and potassium can be considered the primary metals of carbonate rock. The other TAL metals occur in trace concentrations, less than 50 milligrams per kilogram (mg/kg). It should be expected that, as precipitation infiltrates and recharge takes place, leaching of metal ions from the weathered vadose zone and shallow unsaturated zone occurs. Regional data collected suggest that concentrations of trace metals can be expected to be the greatest in the shallow portion of the aquifer because of the proximity to the source (i.e., the weathering vadose structure). These observations support a hydrogeologic model in which the shallow portion of the aquifer has a greater horizontal transmissivity than the vertical

component during recharge events. The conceptual model that the shallow groundwater is discharging to the ditches and canals provides sufficient detail for the purpose of discussing OU-7.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

2.1 OPERABLE UNIT NO. 7 HISTORY

2.1.1 Past Site Usage

The former Entomology Storage Area was used in the 1960s as a storage area for bulk quantities of pesticide compounds. Diesel fuel was also reportedly stored in the southern portion of the site. Operable Unit 7 was later expanded to include a large portion of the Civil Engineering Storage Compound, a former petroleum contaminated site, Building 207 (Former Site ST-18) and OU-3 (Former PCB Spill Area), increasing the total area to approximately 4 acres. A list of pesticides stored on Homestead ARB are presented in Table 2-1. The dates and quantities of pesticides and diesel fuel stored at the site are not available.

2.1.2 Current Site Usage

The OU-7 area has been retained by the 482nd Air Force Reserve as part of the cantonment area. The site was rebuilt by the Air Force Reserves in 1996 as part of the new Base Supply, Civil Engineering, and POL Operations area. Operable Unit 7 is now occupied by a new civil engineering complex, three shops, a storage area, miscellaneous buildings and a expanded parking areas, and grassways.

2.2. ENFORCEMENT HISTORY

2.2.1 CERCLA Regulatory History

The Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) established a national program for responding to releases of hazardous substances into the environment. In anticipation of CERCLA, the Department of Defense (DOD) developed the Installation Restoration Program (IRP) for response actions for potential releases of toxic or hazardous substances at DOD facilities. Like the U.S. Environmental Protection Agency's (USEPA's) Superfund Program, the IRP follows the procedures of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

TABLE 2-1

PESTICIDES STORED AT HOMESTEAD AIR RESERVE BASE, FLORIDA

Vaponite 2EC	chloropicrin
Wasp Freeze	SA-77, Cide Kick
Ficam W (bendiocarb)	Nalco-Trol
malathion 95%	Dal-e-rad
Cynthion 57%	Velpar
baygon strips	Hyvar X (bromacil)
baygon 1.5%	diquat
Dibrom (85% Naled)	Aquazine (simazine)
Dursban Granules 0.5% (chlopyrifos)	Balan
Dursban 4E	Banvel 720
Inspector PT 565	Pramitol 5PS
Knox-out 2FM (Diazinon)	paraquat
baygon bait	Eptam 7-E
Precor 5E	Round-Up (glyphosphate)
Talon-G	Karmex (diuron)
Baytex	AATREX
d-Phenothrin (spray cans)	Promitol 25e
Nemacur	Asulox
Seven (carbaryl)	Dowpon (dalapon)
Keithane MF	Dithane M-45
Dowfume MC-2 (methyl bromide)	Fungo 50 (methyl thiophanate)
Phostoxin (aluminum phosphide)	Tersan 1991 (benomyl)

Note: Capitalization of the first letter indicates that the name is a registered trademark.
Source: Geraghty & Miller, Inc., 1992/Engineering Science, 1983

Homestead ARB was already engaged in the IRP Proram when it was placed on the National Priorities List (NPL) on August 30, 1990. Cleanup of DOD facilities is paid for by the Defense Environmental Restoration Account (DERA), which is DOD's version of Superfund.

The Superfund Amendment and Reauthorization Act (SARA), enacted in 1986, requires federal facilities to follow NCP guidelines. The NCP was amended in 1990 (see 40 CFR 300 et seq.) to implement CERCLA under SARA. In addition, SARA requires greater USEPA involvement and oversight of Federal Facility Cleanups. On March 1, 1991, a Federal Facility Agreement (FFA) was signed by Homestead ARB (formerly Homestead AFB), the USEPA, and the Florida Department of Environmental Protection (FDEP). The FFA guides the remedial design/remedial action (RD/RA) process.

The purpose of the FFA was to establish a procedural framework and schedule for developing, implementing, and monitoring appropriate response actions at Homestead ARB in accordance with existing regulations. The FFA requires the submittal of several primary and secondary documents for each of the operable units at Homestead ARB. This ROD concludes all of the remedial investigation/feasibility study (RI/FS) requirements for OU-7 and selects a remedy for the OU.

As part of the RI/FS process, Homestead ARB has been actively involved in the Installation Restoration Program (IRP). From 1983 to 1992, 27 Potential Sources of Contamination (PSCs) were identified at Homestead ARB. Ten sites have been investigated in the PA/SI stage of CERCLA, with four sites warranting no further investigation and six sites requiring further investigation. One of the PSCs sites has been closed under the Resource Conservation and Recovery Act (RCRA) guidelines and seven sites were investigated under the FDEP petroleum contaminated sites criteria (Florida Administrative Code (FAC) 62-770). Additionally, a RCRA Facility Investigation (RFI) has been conducted to evaluate numerous solid waste management units (SWMUs) identified during the RCRA Facility Assessment (RFA). A cleanup effort was initiated after Hurricane Andrew to prepare the base for realignment. This included the removal of fuel storage tanks and oil/water separators. Additional PSCs have been identified subsequent to 1992 as a result of investigations and/or remediation of the base. The following PSC sites are currently in various stages of reporting under the CERCLA RI/FS guidelines.

PSC Name	Operable Unit No.
Fire Protection Training Area 2	1
Residual Pesticide Disposal Area	2
Oil Leakage Behind the Motor Pool	4
Electroplating Waste Disposal Area	5
Aircraft Washrack Area	6
Entomology Storage Area	7
Fire Protection Training Area 3	8
Boundary Canal	9
Landfill LF-12	10
Sewage Treatment Plant/Incinerator Ash Disposal Area	11
Entomology Shop	12
Landfill SS-22	13
Drum Storage Area	14
Hazardous Storage Bldg.	15
Missile Site	16
Hanger 793	17
Construction Debris Landfill	18
Bldg. 208	19
Bldg. 618 Parking Lot	20
#32, Bldg. 619 Parking Lot	21
Bldg. 761/764	22
Bldg. 814	25
Bldg. 745	26
Bldg. 268 & 268 A	27
Bldg. 750	28
Bldg.760	29

Operable Unit No. 3 PCB Spill, C.E. Storage Compound and OU-9 Boundary Canal have been closed out with No Further Action Record of Decisions (ROD's). Operable Units 1, 2, 4, and 6 have been completed through the ROD stage requiring various levels of remedial action/remedial design. OU-8 has been closed out under CERCLA with a No Further Investigation Decision Document and has been transferred to investigation and oversight in accordance with the FAC 62-770 program. Two Solid Waste Management Units, OU-23 and OU-24, have been closed out while three areas of concern (AOC-1, AOC-3, and AOC-5) are

in the preliminary assessment phase of investigation. Figure 2-1 depicts the above-listed CERCLA sites, as well as the FAC 62-770 fuel contaminated sites currently under investigation.

The Base Realignment and Closure (BRAC) Cleanup Plan currently incorporates both the IRP and associated environmental compliance programs to support full restoration of the base.

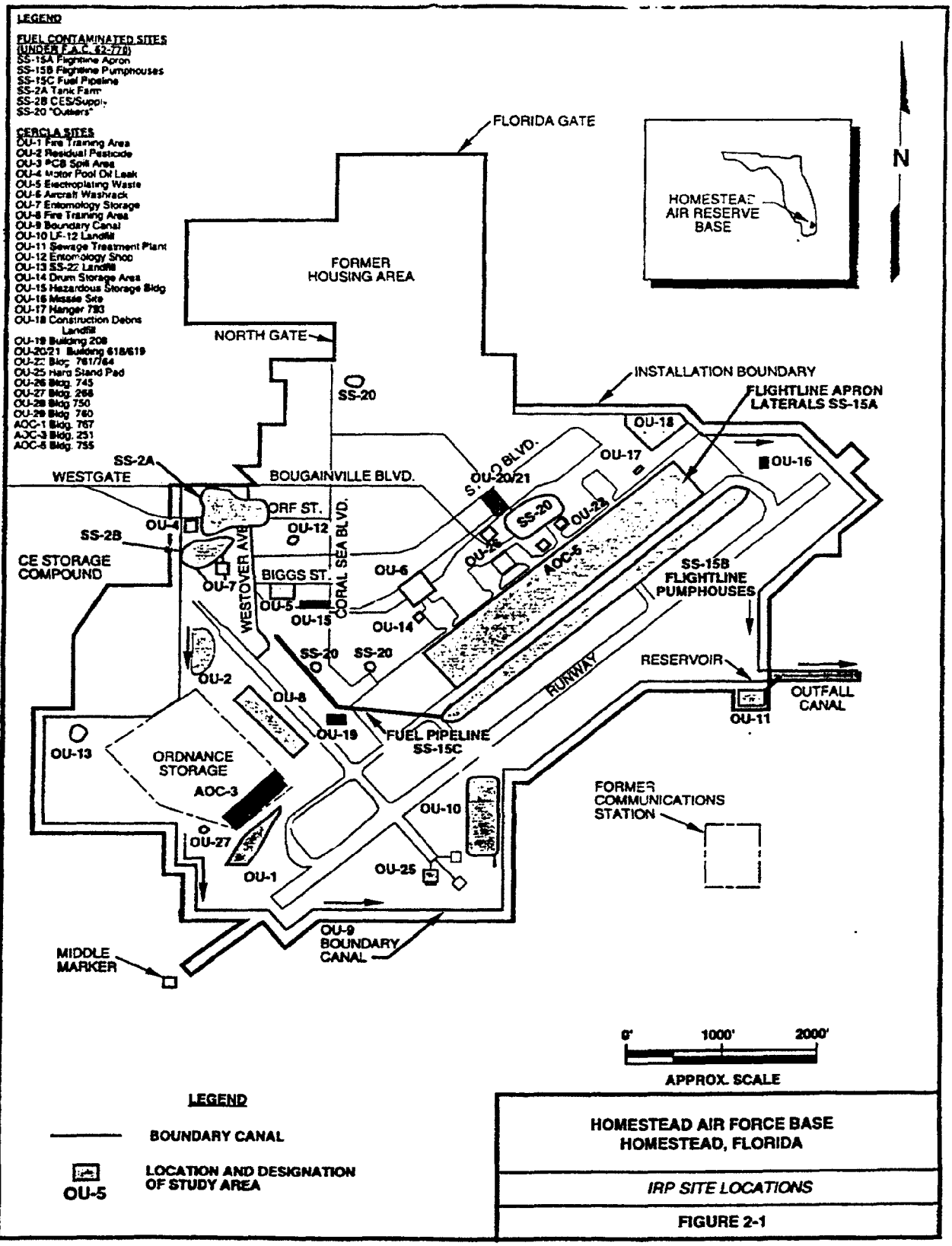
2.3 INVESTIGATION HISTORY

2.3.1 IRP Phase I - Record Search

An IRP Phase I - Records Search was performed by Engineering Science, and is summarized in their report, dated August 1983 (Engineering-Science, 1983). During the Phase I study, sites with the potential for environmental contamination resulting from past waste disposal practices were identified. Thirteen sites of potential concern were identified by reviewing available installation records, interviewing past and present Base employees, inventorying wastes generated and handling practices for these wastes, conducting field inspections, and reviewing geologic and hydrogeologic data. In general, Phase I studies are used to determine if a site requires further investigation.

The thirteen identified sites were ranked using the Hazard Assessment Rating Methodology (HARM) developed by JRB Associates of McLean, Virginia, for the USEPA. HARM was later modified for application to the Air Force IRP. The following factors are considered in HARM: (1) the possible receptors of the contaminants; (2) the characteristics of the waste; (3) potential pathways for contaminant migration; and (4) waste management practices. HARM scores for the sites ranked at Homestead ARB ranged from a high of 72 to a low of 7 out of 100. Eight of the thirteen sites were determined to have a moderate-to-high contamination potential, one of which was the Entomology Storage Area. These sites were recommended for additional monitoring. The remaining five sites were determined to have a low potential for environmental contamination.

According to the IRP Phase I Report, OU-7 received a moderate to high HARM score of 63 due to the high hazard of wastes used and the high potential for contaminant migration via surface and groundwaters of the site. Operable Unit 7 scored high as a potential migration pathway because of the extremely permeable nature of the soils and underlying rock in the area and the proximity of the drainage canal bordering the Civil Engineering Storage


LEGEND
FUEL CONTAMINATED SITES (UNDER F.A.C. 62-770)
SS-1A Flightline Apron
SS-1B Flightline Pumphouses
SS-1C Fuel Pipeline
SS-2A Tank Farm
SS-2B CES/Supply
SS-20 "Outliers"
CERCLA SITES
OU-1 Fire Training Area
OU-2 Residual Pesticide
OU-3 PCB Spill Area
OU-4 Motor Pool Oil Leak
OU-5 Electroplating Waste
OU-6 Aircraft Washrack
OU-7 Entomology Storage
OU-8 Fire Training Area
OU-9 Boundary Canal
OU-10 LF-12 Landfill
OU-11 Sewage Treatment Plant
OU-12 Entomology Shop
OU-13 SS-22 Landfill
OU-14 Drum Storage Area
OU-15 Hazardous Storage Bldg
OU-16 Missile Site
OU-17 Hanger 780
OU-18 Construction Debris Landfill
OU-19 Building 208
OU-20/21 Building 618/619
OU-22 Bldg. 761/764
OU-23 Hard Stand Pad
OU-26 Bldg. 745
OU-27 Bldg. 268
OU-28 Bldg 750
OU-29 Bldg 760
AOC-1 Bldg. 767
AOC-3 Bldg. 251
AOC-5 Bldg. 755
FLORIDA GATE
HOMESTEAD AIR RESERVE BASE
N
FORMER HOUSING AREA
NORTH GATE
SS-20
INSTALLATION BOUNDARY
FLIGHTLINE APRON LATERALS SS-1A
OU-18
OU-17
OU-16
SS-2A
WESTGATE
BOUGAINVILLE BLVD.
S.W. 0 BLVD.
OU-20/21
ORF ST.
OU-4
OU-12
SS-2B
CE STORAGE COMPOUND
OU-7
BIGGS ST.
OU-5
OU-15
CORAL SEA BLVD.
WESTOVER AVE
OU-6
OU-14
SS-20
OU-23
OU-26
AOC-5
SS-1B FLIGHTLINE PUMPHOUSES
SS-20
SS-20
OU-2
OU-8
OU-19
FUEL PIPELINE SS-1C
RUNWAY
RESERVOIR
OUTFALL CANAL
OU-11
OU-13
ORDNANCE STORAGE
AOC-3
OU-27
OU-1
OU-10
OU-25
FORMER COMMUNICATIONS STATION
OU-9 BOUNDARY CANAL
MIDDLE MARKER
0'
1000'
2000'
APPROX. SCALE
LEGEND
BOUNDARY CANAL
LOCATION AND DESIGNATION OF STUDY AREA
OU-5
HOMESTEAD AIR FORCE BASE
HOMESTEAD, FLORIDA
IRP SITE LOCATIONS
FIGURE 2-1

Compound site. The Phase I report recommended collecting five soil/bedrock samples, performing water extraction of them, and analyzing the extract for pH, 2,4,5-TP, Chlordane, DDT and its metabolites, and non-phosphate radical of carbaryl (Sevin).

2.3.2 IRP Phase II - Confirmation/Quantification

An IRP Phase II study was performed by Science Applications International Corporation, and a report was completed in March 1986 (SAIC, 1986). The objectives of Phase II were to confirm the presence or absence of contamination, quantify the extent and degree of contamination, and to determine the necessity to conduct remedial actions. During the Phase II study, additional investigations were performed at the eight sites recommended for monitoring in the Phase I report, as well as two of the other thirteen originally-identified sites. Operable Unit 7 was included in this investigation.

During the Phase II investigation, two shallow monitoring wells (I-15 and I-16) were installed at the site (Figure 2-2). Groundwater samples were collected and analyzed for 17 specific pesticides, including insecticides and herbicides (Table 2-2). None of these pesticides were detected at levels above their respective detection limits. A complete discussion of the methods and the results of the study are detailed in the Phase II - Confirmation/Quantification Report (SAIC, 1986).

The Phase II report recommended that no additional work be performed at the site except for periodic monitoring of the two wells (1-16, HS-16) located at OU-7.

2.3.3 IRP Phase III - Technology Base Development

The IRP Phase III is a research phase and involves technology development for an assessment of environmental impacts. There have been no Phase III tasks conducted at the site to date.

2.3.4 IRP Phase IV - Additional Investigations

2.3.4.1 IRP Phase IV-A. The IRP Phase IV investigations consist of two areas of work activity. Phase IV-A involved additional site investigations necessary to meet the Phase II objectives, a review of all management methods and technologies that could possibly remedy site problems, and preparation of a baseline risk assessment to address the potential hazards to human health and the environment associated with the constituents detected at the site.

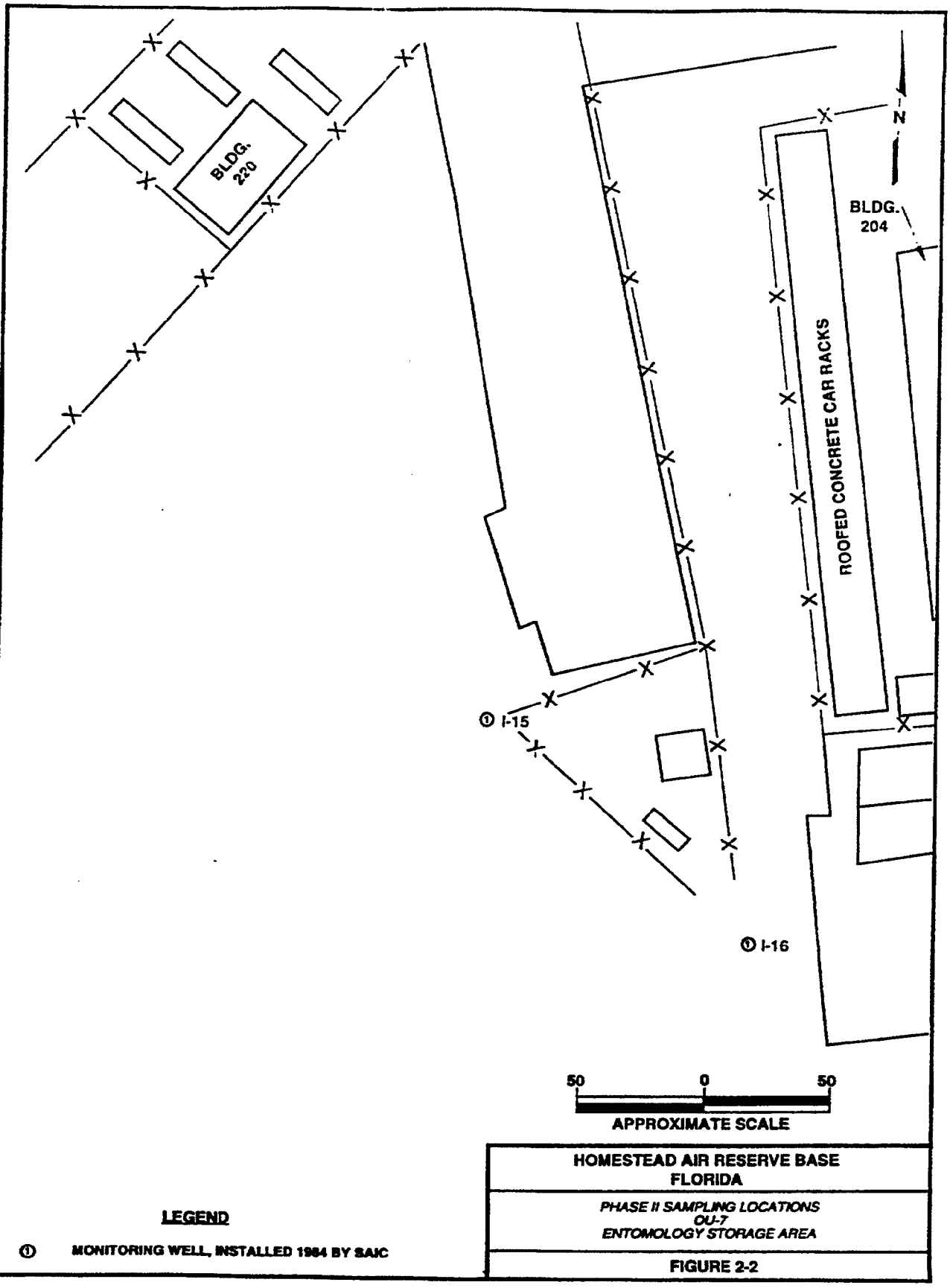

BLDG. 220
BLDG. 204
ROOFED CONCRETE CAR RACKS
N
① I-15
① I-16
50
0
50
APPROXIMATE SCALE
LEGEND
① MONITORING WELL, INSTALLED 1984 BY SAIC
HOMESTEAD AIR RESERVE BASE
FLORIDA
PHASE II SAMPLING LOCATIONS
OU-7
ENTOMOLOGY STORAGE AREA
FIGURE 2-2

TABLE 2-2
ANALYTICAL RESULTS OF GROUNDWATER SAMPLES
COLLECTED DURING PHASE II INVESTIGATIONS
AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
SAIC, 1984

	LOCATION	
CONSTITUTENTS	**I-15**	**I-16**
PESTICIDES ug/L		
Aldrin	<0.02	<0.02
DDD	<0.02	<0.02
DDT	<0.02	<0.02
Dieldrin	<0.02	<0.02
Endrin	<0.02	<0.02
Heptachlor	<0.02	<0.02
Heptachlor Epoxide	<0.02	<0.02
Lindane	<0.01	<0.01
Methoxychlor	<0.20	<0.20
Toxaphene	<1.00	<1.00
Diazinon	<0.02	<0.02
Malathion	<0.10	<0.10
Parathion	<0.02	<0.02
2,4-D	<0.06	<0.06
2,4,5-T	<0.06	<0.06
2,4,5-TF (Silvex)	<0.06	<0.06
Sevin	<1.00	<1.00

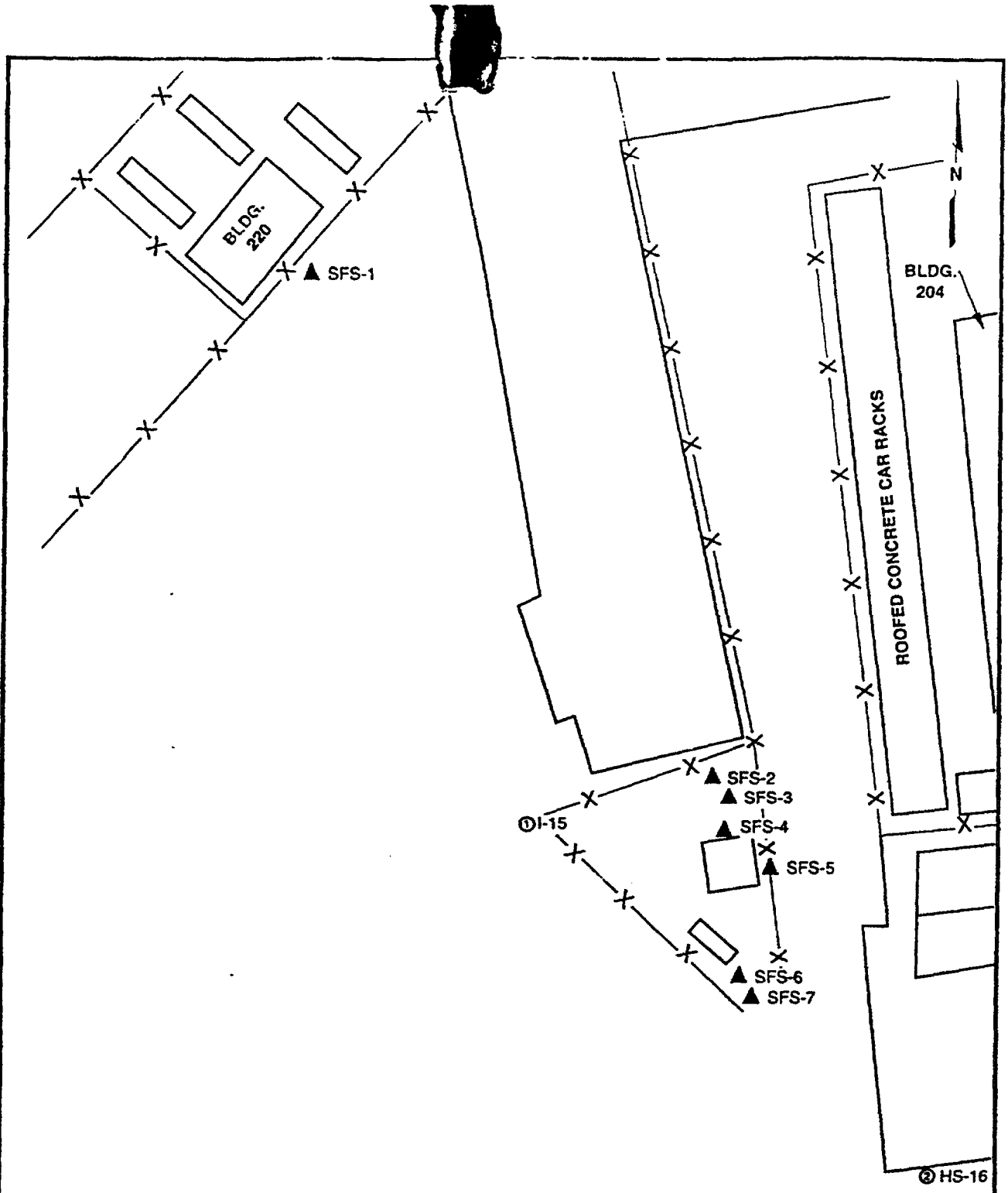
Source: Geraghty & Miller, Inc., 1992

Detailed alternatives were developed and evaluated, and a preferred alternative was selected. The preferred alternative was then described in sufficient detail to serve as a baseline document for initiation of Phase IV-B.

2.3.4.2 1988 Investigation. The Phase IV 1988 field investigation included the collection and analysis of seven surface-soil samples (SFS- 1 through SFS-7) from the top four inches of the soil profile (Figure 2-3). Surface-soil sample SFS-1 was collected from outside the fenced compound near Building 220 to establish background concentrations. These samples were analyzed for organochlorine pesticides, chlorinated herbicides, volatile organic compounds (VOCs), base/neutral and acid extractable compounds (BNAs), and total Resource Conservation and Recovery Act (RCRA) metals (Table 2-3). Arsenic, barium, chromium, and lead were detected in all seven samples. Additionally, cadmium and mercury were detected in SFS-4 and SFS-7 and mercury was also detected in sample SFS-l. Six of the seven samples contained quantifiable concentrations of pesticides including beta-BHC; delta-BHC; 4,4'-DDE; 4,4'-DDD; 4,4-DDT; and technical chlordane. Surface-soil samples SFS-1 (the background sample) and SFS-7 contained detectable concentrations of polynuclear aromatic hydrocarbons (PAHs). In 1988, groundwater samples were collected from two wells, 1-16 and HS-16, and analyzed for VOCs, BNAs, total recoverable petroleum hydrocarbons (TRPH) and total lead (Table 2-4). An estimated concentration of lead (1.6 micrograms per liter µg/L]), was detected in HS-16. Field parameters of pH, conductivity, temperature, and appearance/odor were measured during sampling and are presented in Table 2-5.

2.3.4.3 1989 Investigation. Sixteen shallow (approximately 6 feet below land surface [ft blsj) soil borings (P2-SS1 and P2-SB1 through P2-SB15) were drilled during the Phase IV 1989 field investigation (Figure 2-4). Continuous split-spoon samples were collected and screened for organic vapor concentrations using an organic vapor analyzer (OVA) and a total ionization potential (TIP) meter (Table 2-6). The highest organic vapor concentration of 900 parts per million (ppm) was measured in the four to six foot bls interval sample collected from soil boring P2-SB8. This sample was collected near the groundwater interface and may represent groundwater contamination.

Following the OVA screening, the shallow (0 to 2 ft b1s) and deep (2 to 4 ft b1s) split-spoon intervals were retained in thirteen of the sixteen soil borings for chemical analysis. These samples were analyzed for BNAs, organochlorine pesticides, total metals, and C_8-C_{20} hydrocarbons (Table 2-7). Detectable concentrations of PAHs were found in four (P2-SB5, P2-SB9, P2-SB10, and P2-SB11) of the thirteen soil samples. Various degrees of



LEGEND

① MONITORING WELL, INSTALLED 1984 BY SAIC

② MONITORING WELL INSTALLED BY GERAGHTY & MILLER, 1988

▲ SOIL BORING LOCATION

HOMESTEAD AIR RESERVE BASE
FLORIDA

PHASE IV 1988 SAMPLING LOCATIONS
OU-7
ENTOMOLOGY STORAGE AREA

FIGURE 2-3

TABLE 2-3
ANALYTICAL RESULTS OF PHASE IV SOIL/BEDROCK SAMPLES COLLECTED IN 1988
AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
Geraghty & Miller, 1988

LOCATION / CONSTITUENTS 1/	SFS-1 2/	SFS-2	SFS-3	SFS-4	SFS-5	SFS-6	SFS-7
Volatile Organics (ug/kg)	ND	ND	ND	ND	ND	ND	ND
Base/Neutral and Acid Extractable Organics(ug/kg)							
Benzo(a)anthracene	[714]	<556	<538	<1,060	<602	<5,500	[560]
Benzo(a)pyrene	[735]	<556	<538	<1,060	<602	<5,500	<1,110
Benzo(b)fluoranthene	[749]	<556	<538	<1,060	<602	<5,500	[698]
Benzo(g,h,i)perylene	<1,160	<556	<538	<1,060	<602	<5,500	2,100
Benzo(k)fluoranthene	[849]	<556	<538	<1,060	<602	<5,500	[540]
Chrysene	[1,000]	<556	<538	<1,060	<602	<5,500	[513]
bis(2-ethylhexyl)phthalate	<1,160	<556	967	<1,060	<602	<5,500	<1,110
Fluoranthene	[1,150]	<556	<538	<1,060	<602	<5,500	[531]
Naphthalene	<1,160	<556	<538	<1,060	<602	<5,500	1,420
Phenanthrene	[602]	<556	<538	<1,060	<602	<5,500	1,560
Pyrene	[1,020]	<556	<538	<1,060	<602	<5,500	[624]
Organochlorine Pesticides (ug/kg)							
Beta-BHC	<37	<65	<320	<320	204	<33,000	<13,000
Delta-BHC	<37	[20]	<320	<320	160	<33,000	<13,000
4,4'-DDE	[58]	[54]	730	1,300	590	70,000	[26,000]
4,4'-DDD	[30]	[94]	5,400	3,400	1,000	83,000	52,000
4,4'-DDT	250	[52]	6,300	1,800	2,100	1,600,000	140,000
Technical Chlordane	[300]	[590]	<3,200	9,000	6,000	<33,000	<13,000
Chlorinated Herbicides (ug/kg)	ND	ND	ND	ND	ND	ND	ND
Total metals (mg/kg)							
Arsenic	11	4.3	3.0	17	96	4.6	23
Barium	320	229	66	21	14	17	24
Cadmium	<0.19	<0.15	[0.19]	0.83	<0.19	<0.18	0.67
Chromium	16	12	7.8	40	27	8.3	14
Lead	174	80	46	222	78	53	69
Mercury	0.063	<0.022	<0.022	0.27	[0.029]	<0.024	0.052

Source: Geraghty & Miller, Inc., 1992

Explanation:

1/ Constituents not detected in any samples are in an analyte group not shown.

2/ Surficial soil samples were collected within 0 to 4 inches below land surface.

[ ] Value is between level of quantitation and instrument detection limit.

ND Not detected. None of the constituents in this group were detected above their respective detection limits.

Shading denotes sample collected from soils later excavated and removed during 1994 Interim Removal Action (data no longer representative of site conditions).

TABLE 2-4
ANALYTICAL RESULTS FOR PHASE IV GROUNDWATER SAMPLES
COLLECTED IN 1988 AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Based, Florida
Geraghty & Miller, 1988

Constituents 1/	I-16	HS-16
Volatile Organic Compounds (ug/L)	ND	ND
Base/Neutral Extractable Compounds (ug/L)	ND	ND
TRPH (mg/L) 2/	<0.20	<0.20
Total Lead (ug/L)	<1.0	[1.6]

Source: Geraghty & Miller Inc., 1992

ND Not detected. None of the constituents in this group were detected above their respective detection limits.

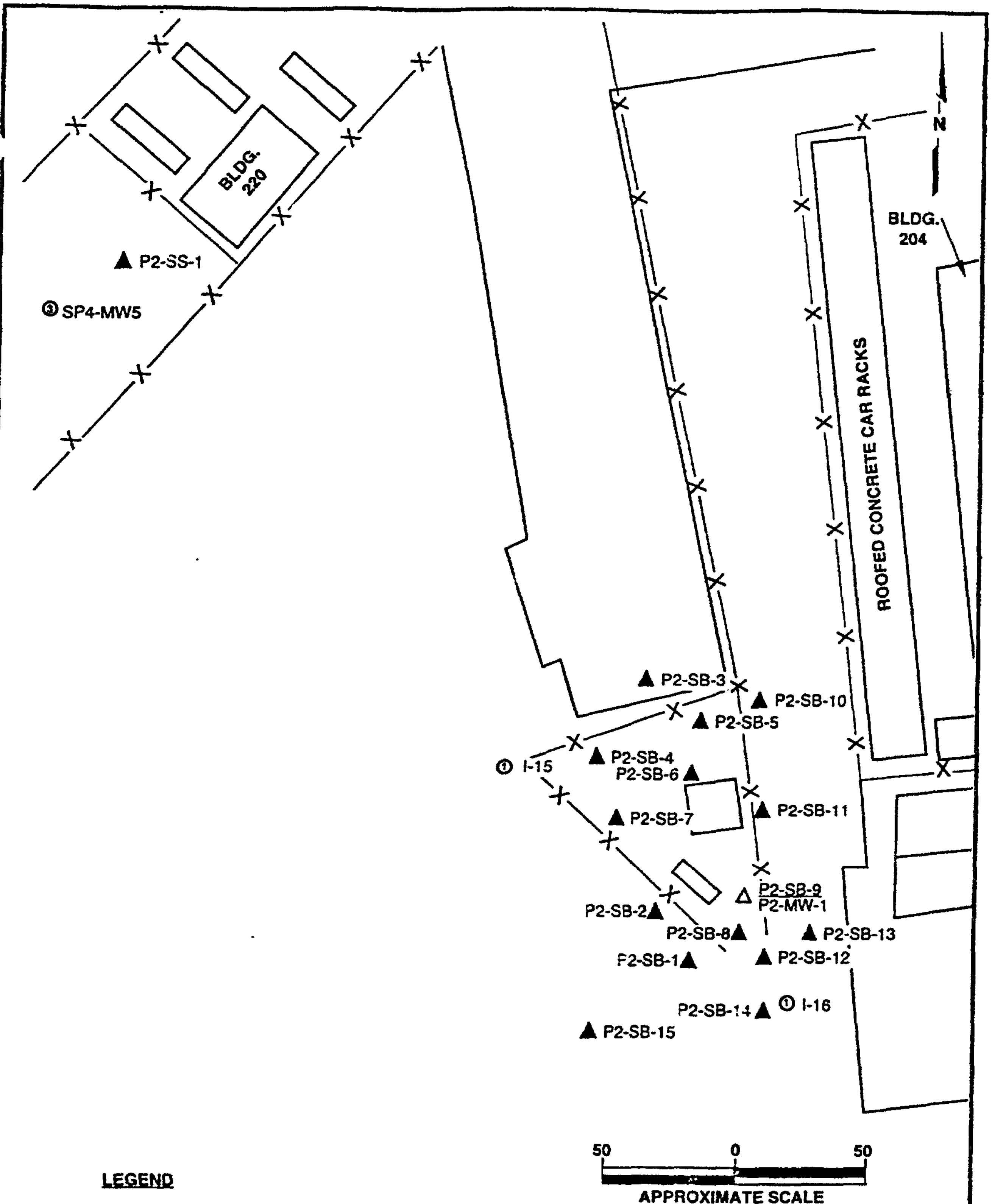
1/ Constituents not detected in any samples in an analytical group are not shown.

2/ Total recoverable petroleum hydrocarbons.

TABLE 2-5
RESULTS OF FIELD ANALYSES OF PHASE IV GROUNDWATER SAMPLES COLLECTED IN 1988 AND 1989 AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
Geraghty & Miller, 1988 & 1989

Sample Location	Date Sample	pH (standard units)	Conductivity (umhos/cm)	Temperature (degrees Centigrade)	Appearance/Odor
HS-16	3/1/88	6.96/6.98	370/380	25.1	Clear/None
I-16	3/1/88	7.55/7.48	350/350	25.1	Slightly Turbid/Slight
P2-MW1	4/25/89	6.8	600	25.7	Clear/Strong
I-15	4/24/89	6.8	520	25.2	Clear/Slight
1-16	4/24/89	6.8	420	25.1	Slightly Turbid/None
SP4-MW5	4/24/89	6.7	540	25.2	Clear/Moderate

Source: Geraghty & Miller, Inc., 1992



LEGEND

- ① MONITORING WELL, INSTALLED 1984 BY SAIC
- ③ MONITORING WELL, INSTALLED 1989 BY GERAGHTY & MILLER
- ▲ SOIL BORING LOCATION
- △ SOIL BORING CONVERTED TO MONITORING WELL

HOMESTEAD AIR RESERVE BASE
FLORIDA

PHASE IV 1989 SAMPLING LOCATIONS
OU-7
ENTOMOLOGY STORAGE AREA

FIGURE 2-4

TABLE 2-6
RESULTS OF ORGANIC VAPOR ANALYSES OF PHASE IV SOIL/BEDROCK SAMPLES
COLLECTED IN 1989 AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
Geraghty & Miller, 1989

ANALYSIS / SAMPLE DEPTH / BORING NUMBER	TIP (a) 0 - 2'	OVA (b) 0 - 2'	TIP 2 - 4'	OVA 2 - 4'	TIP 4 - 6'	OVA 4 - 6'
	Concentrations in parts per million (ppm)					
SS1-PP2 (Background)	6.7	<1	3.2	<1	3.9	<1
P2-SB1	0	<1	32.3	60	90 (c)	300 (c)
P2-SB2	0.1	<1	0.1	<1	6.1 (c)	<1 (c)
P2-SB3	0.5	<1	0.7	<1	0.7	<1
P2-SB4	0.2	<1	0.2 (c)	<1 (c)	0.2	<1
P2-SB5	18.9	<1	2.8 (c)	<1 (c)	3.5	<1
P2-SB6	2.6	<1	1.8 (c)	<1 (c)	2.3	<1
P2-SB7	1.7	<1	2.1 (c)	<1 (c)	2.0	<1
P2-SB8	2.5	<1	1.9	<1	385 (c)	900 (c)
P2-SB9 (P2-MW1)	2.1	<1	119	25	89 (c)	50 (c)
P2-SB10	0.8	<1	1.5	<1	1.8	<1
P2-SB11	1.0	<1	0.8	<1	2.1	<1
P2-SB12	2.0	<1	1.3	<1	1.1	<1
P2-SB13	0.7	<1	1 (c)	<1 (c)	1.2	<1
P2-SB14	0.9	<1	1.9	<1	15.3	4
P2-SB15	1.2	<1	2.6	<1	12.1	<1

EXPLANATION:

Shading denotes sample collected from soils later excavated and removed during 1994 Interim Removal Action (data no longer representative of site conditions).
(a) Total ionizables present measured with a photoionization detector.
(b) Organic Vapor Analyzer measured with a flame ionization detector.
(c) Sample collected from depth interval partially excavated during 1994 Interim Removal Action (data may still be valid).

Source: Geraghty & Miller, Inc. 1992

TABLE 2-7
ANALYTICAL RESULTS OF PHASE IV SOIL/BEDROCK SAMPLES COLLECTED IN 1989
AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, florida
Geraghty & Miller, 1989

LOCATION	P2SB-1		P2SB-2		P2SB-3		P2SB-4		P2SB-5		PWSB-6		P2SB-7	
	S 2/	D 3/	S	D	S	D	S	D 6/	S	D 6/	S	D 6/	S	D 6/
CONSTITUENTS 1/														
Base/Neutral and Acid Extractable Organics (ug/kg)														
Acenaphthene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Acenaphthylene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Anthracene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Benzo(a)anthracene	<602	<641	<602	<602	<581	<602	<562	<610	[541]	<649	<617	<549	<602	<617
Benzo(a)pyrene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Benzo(b)fluoranthene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Benzo(g,h,i)perylene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Benzo(k)fluoranthene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Chrysene	<602	<641	<602	<602	<581	<602	<562	<610	646	<649	<617	<549	<602	<617
Di-n-butylphthalate	[572] 5/	662 5/	[305] 5/	606 5/	1,010 5/	<602	[466] 5/	677 4/	759	<649	637	<549	<602	<617
Bis(2-Ethylhexyl)phthalate	<602	<641	<602	<602	<581	<602	<562	<610	2,270 5/	<649	<617	<549	<602	<617
Fluoranthene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Fluorene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Ideno(1,2,3-cd)pyrene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Naphthalene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
Phenanthrene	<602	<641	<602	<602	<581	<602	<562	<610	952	<649	<617	<549	<602	<617
Pyrene	<602	<641	<602	<602	<581	<602	<562	<610	<610	<649	<617	<549	<602	<617
C8-C20 Hydrocarbons (total) (ug/kg)	<11,900	<12,700	<11,900	<11,900	<11,500	<11,900	<11,100	<12,100	62,400	<12,900	<12,200	<10,900	44,200	<12,200
Organochlorine Pesticides (ug/kg)														
4,4'-DDE	[770]	[460]	[2,900]	55	370	54	[990]	79	[140]	<15	[1,400]	[4.1]	580	<730
4,4'-DDD	<2,900	<1,500	[1,800]	[13]	390	[6.6]	<1,300	[6.9]	310	<15	3,800	[3.0]	6,400	<730
4,4'-DDT	5,600	3,400	48,000	590	710	95	2,800	24	<290	<15	5,000	[7.8]	1,000	<730
Endosulfan sulfate	<2,900	<1,500	<7,200	<14	540	<14	<1,300	<15	<290	<15	<1,500	<3	<140	<730
Endrin keton	<2,900	<1,500	<7,200	<14	1,200	<14	<1,300	<15	330	<15	<1,500	<13	<140	<730
alpha-Chlordane	<14,000	<7,600	<36,000	<72	[74]	[8.6]	<6,700	<73	<1,500	<77	<7,400	<65	4,100	[940]
gamma-Chlordane	<14,000	<7,600	<36,000	<72	[69]	[8.1]	<6,700	<73	<1,500	<77	<7,400	<65	4,000	[950]
Toxaphene	<29,000	<15,000	<72,000	<140	<2,800	<140	<13,000	<150	<2,900	<150	<15,000	<130	<1,400	<7,300
beta-BHC	<1400	<760	<3600	<7.2	<140	<7.2	<670	<7.3	<150	<7.7	<740	<6.5	<72	<370
Total Metals (mg/kg)														
Antimony	<2.8	<2.9	<2.9	<3.0	<2.7	<2.8	[3.1]	<2.9	<2.8	<2.9	<2.8	<3.0	<2.8	<2.9
Arsenic	4.3	2.7	26.0	2.2	3.7	1.6	35.0	<1.2	19.0	<1.2	20.0	15.0	18.0	8.2
Barium	[8.4]	[7.9]	[8.1]	[5]	[7.7]	[4.5]	[7.2]	[4.0]	[17]	[4.0]	[6.6]	[5.7]	[8.8]	[4.9]
Beryllium	[0.15]	<0.12	[0.22]	<0.13	[0.12]	0.12	[0.14]	<0.12	[0.16]	<0.12	[0.12]	<0.13	[0.14]	<0.12
Cadmium	0.81	<.60	<0.61	<0.64	<0.57	<0.59	<0.56	<0.60	<0.58	<0.60	<0.59	<0.63	<0.59	<0.60
Chromium	11.0	9.6	15.0	4.7	8.0	5.2	12.0	4.5	9.4	3.7	4.9	3.4	11.0	3.8
Copper	4.6	4.8	[2.1]	<0.38	9.7	[1.8]	18.0	[0.5]	9.2	[0.41]	8.6	[0.5]	10.0	[1.3]
Lead	194.0	173.0	22.0	20.0	7.7	3.1	57.0	<0.61	11.0	<0.61	3.3	<0.63	17.0	2.4
Nickel	[2.5]	[2.0]	[3.1]	<1.3	[1.6]	<1.2	[2.2]	<1.2	[1.7]	<1.2	<1.2	<1.3	[2.7]	<1.2
Thallium	<17	21	<18	<19	<17	<18	<17	<18	<17	<18	<18	<19	<18	<18
Zinc	95	81	35.0	13	5	[1.8]	14	0.51	22	[0.49]	3.6	[0.43}	21	2.5

1/ Constituents not detected in any samples in an analytical group are not shown.
2/ Shallow (0-2 feet below land surface).
3/ Deep (2-4 feet below land surface).
4/ Below Instruments Detection Limit.
5/ Constituent detected in lab blank.
6/ Sample collected from depth interval partially excavated during 1994 Removal Action (data may still be valid).
[ ] Value is between level of quantitation and instrument detection limit.
Shading denotes sample collected from soils later excavated removed during 1994 Interim Removal Action (data no longer representative of site conditions).
Source: Geraghty & Miller, Inc., 1992

TABLE 2-7
ANALYTICAL RESULTS OF PHASE IV SOIL SAMPLES COLLECTED IN 1989
AT 08-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
Geraghty & Miller, 1989

LOCATION	P-2SB-8		P-2SB-9		P2SB-10		P2SB-11		P2SB-12		SS1-P2 (BACKGROUND)	
	S	D	S	D	S	D	S	D	S	D	S	D
CONSTITUENTS 1/												
Base/Neutral and Acid Extractable Organics (ug/kg)												
Acenaphthene	<769	<625	<588	655	<607	<694	1,210	<556	<617	<633	<1,200	<641
Acenaphthylene	<769	<625	<588	<641	<607	<694	1,280	<556	<617	<633	<1,200	<641
Anthracene	<769	<625	<588	<641	<607	<694	2,050	<556	<617	<633	<1,200	<641
Benzo(a)anthracene	<769	<625	<588	<641	<607	<694	3,980	<556	<617	<633	<1,200	<641
Benzo(a)pyrene	<769	<625	<588	<641	<607	<694	2,440	<556	<617	<633	<1,200	<641
Benzo(b)fluoranthene	<769	<625	<588	<641	<607	<694	2,000	<556	<617	<633	<1,200	<641
Benzo(g,h,i)perylene	<769	<625	<588	<641	<607	<694	1,550	<556	<617	<633	<1,200	<641
Benzo(k)fluoranthene	<769	<625	<588	<641	<607	<694	2,140	<556	<617	<633	<1,200	<641
Chrysene	<769	<625	<588	<641	[374]	<694	4,280	<556	<617	<633	<1,200	<641
Di-n-butylphthalate	[654]	<625	<588	[378]	[504]	<694	<1,160	<556	<617	<633	<1,200	<641
Bis(2-Ethylhexyl)phthalate	<769	<625	<588	<641	2,630 5/	<694	<1,160	944 5/	<617	<633	<1,200	<641
Fluoranthene	<769	<625	<588	<641	<607	<694	4,880	<556	<617	<633	<1,200	<641
Fluorene	<769	<625	<588	892	<607	<694	2,770	<556	<617	<633	<1,200	<641
Ideno(1,2,3-cd)pyrene	<769	<625	<588	<641	<607	<694	2,230	<556	<617	<633	<1,200	<641
Naphthalene	[546]	<625	<588	879	1,920	<694	2,610	<556	<617	<633	<1,200	<641
Phenanthrene	<769	<625	<588	1,970	837	<694	13,000	<556	<617	<633	<1,200	<641
Pyrene	<769	<625	<588	<641	<607	<694	7,930	<556	<617	<633	<1,200	<641
C8-C20 Hydrocarbons(total) (ug/kg)	<15,200	<12,400	<11,600	687,000	37,100	<13,800	75,600	<11,000	<12,000	<12,500	<23,700	<12,700
Organochlorine Pesticides (ug/kg)												
4,4'-DDE	[1,100]	31	5,400	[440]	370	[12]	2,000	[6.7]	1,000	[8.2]	4,200	43
4,4'-DDD	26,000	71	16,000	7,900	<140	[2.5]	[960]	[3.9]	[270]	<15	4,000	25
4,4'-DDT	83,000	64	66,000	11,000	240	17	6,200	29	1,800	[14]	12,000	190
Endosulfan sulfate	<1,800	<15	<1,400	<1,500	<140	<15	<1,400	<15	<300	<15	<1,400	<15
Endrin keton	<1,800	<15	<1,400	<1,500	<140	<15	<1,400	<15	<300	<15	<1,400	<15
alpha-Chlordane	<9,200	[13]	[2,800]	<7,700	<720	<75	<7,000	<74	[450]	[38]	[4,200]	89
gamma-Chlordane	<9,200	[9.2]	[2,700]	<7,700	<720	<75	<7,000	<74	[370]	[34]	[4,200]	90
Toxaphene	<18,000	670	<14,000	<15,000	<1,400	<150	<14,000	<150	<3,000	<150	<14,000	<150
Beta-BHC	<920	<7.4	<710	<770	<72	<7.5	<700	<7.4	<150	<7.5	<710	<7.6
Total Metals (mg/kg)												
Antimony	<2.8	<2.8	<2.9	<2.7	<2.8	<2.9	<2.8	<2.9	<2.8	<3.0	[5.0]	<3.3
Arsenic	3.3	<1.2	12.0	5.0	47.0	8.2	41.0	<1.2	20.0	2.7	51.0	1.5
Barium	[8.1]	[4.0]	[5.0]	[5.2]	[11]	[4.7]	38.0	[4.7]	[8.5]	[5.6]	[20]	[6.2]
Beryllium	<0.12	<0.12	<0.12	<0.11	[0.22]	[0.13]	[0.19]	<0.12	[0.13]	<0.12	[0.47]	<0.24
Cadmium	<0.59	<0.59	<0.60	<0.56	<0.58	<0.60	<0.57	<0.61	<0.60	<0.63	1.4	<0.48
Chromium	4.8	2.7	4.1	3.8	14.0	3.3	6.8	3.1	10.0	4.5	18.0	4.7
Copper	[1.6]	<0.36	[0.55]	[0.59]	3.0	[0.54]	6.50	<0.36	3.4	<0.38	36.0	4.4
Lead	4.9	<0.59	<0.60	0.77	13.0	<0.60	14.0	<0.61	16.0	<0.63	37.0	<0.50
Nickel	[1.3]	<1.2	<1.2	<1.1	[2.3]	<1.2	[1.7]	<1.2	[2.2]	[1.5]	[2.4]	<1.5
Thallium	<18	<18	<18	<17	<17	<18	<17	<18	<18	<19	<7.8	<8.1
Zinc	9.8	[0.33]	[1.4]	2.5	9.1	[0.43]	10	[0.46]	12	[0.73]	38	3.4

1/ Constituents not detected in any samples in an analyti
2/ Shallow (0-2 feet below land surface).
3/ Deep (2-4 feet below land surface).
4/ Below Instruments Detection Limit.
5/ Constituent detected in lab blank.
6/ Sample collected from depth interval partially excava
[ ] Value is between level of quantitation and instrument
Shading denotes sample collected from soils later excava
Source: Geraghty & Miller, Inc., 1992

organochlorine pesticide and heavy metal contamination were found in all of the soil samples.

Soil boring P2-SB9 was converted to a shallow (approximately 13 ft b1s) monitoring well (P2-MW1) (Figure 2-4). The groundwater from this well, the existing wells (I-15 and I-16), and a background well (SP4-MW5) were sampled and analyzed for BNAs, organochlorine pesticides, and total C_8-C_{20} hydrocarbons (Table 2-8). No detectable concentrations of BNAs were found in these samples. The pesticides that were quantifiable, 4,4'-DDE, 4,4'-DDD, 4,4'-DDT, alpha chlordane and beta chlordane, ranged in concentration from 0.19 µg/L to 2.0 µg/L. The groundwater sample from P2-MW1 was the only sample with a detectable concentration of C_8-C_{20} hydrocarbons (156 µg/L).

In 1989, a topographic survey was conducted at OU-7. The survey was referenced to the National Geodetic Vertical Datum of 1929 (NGVD). The location and measuring point elevation of each permanent monitoring well was determined. A water-level survey from the permanent t monitoring wells indicates that no hydraulic gradient is present and that the potential for downward migration of constituents is minimal.

2.3.5 1991 Remedial Investigation

In 1991, an RI was conducted at OU-7 by G&M. During the 1991 investigation, 15 surface and 15 subsurface soil/bedrock samples were collected from soil borings P2-SL-0016 through P2-SL-0030 (Figure 2-5). All soil/bedrock samples were analyzed for organochlorine pesticides. The soil/bedrock samples from three borings (P2-SL-0022, P2-SL-0023, and P2-SL-0028) were additionally analyzed for target compound list (TCL) VOCs, TCL, BNAs, and target analyte list (TAL) metals. The results of these analyses are discussed in Section 2.6.1.3.

Groundwater samples were collected from I-15, I-16, HS-16, and P2-MW1 and analyzed for TCL VOCs, BNAs, TAL metals, organochlorine pesticides, and TRPH (Figure 2-5). Additionally, the groundwater sample collected from HS-16 was analyzed for total dissolved solids (TDS). Groundwater samples collected from four monitoring wells (SP10-MW-0003 through SP10-MW-0006) at Site ST-18 and two monitoring wells (SP4-MW4 and SP4-MW5) at Site SS-2 were analyzed for volatile organic halocarbons, PAHs, benzene, toluene, ethylbenzene, and xylene (BTEX), methyl t-butyl ether (MTBE), 1,2-dibromoethane (EDB), total lead, and TRPH. The groundwater quality results from these monitoring wells were utilized in the characterization of OU-7 in the 1991 investigation. Analytical

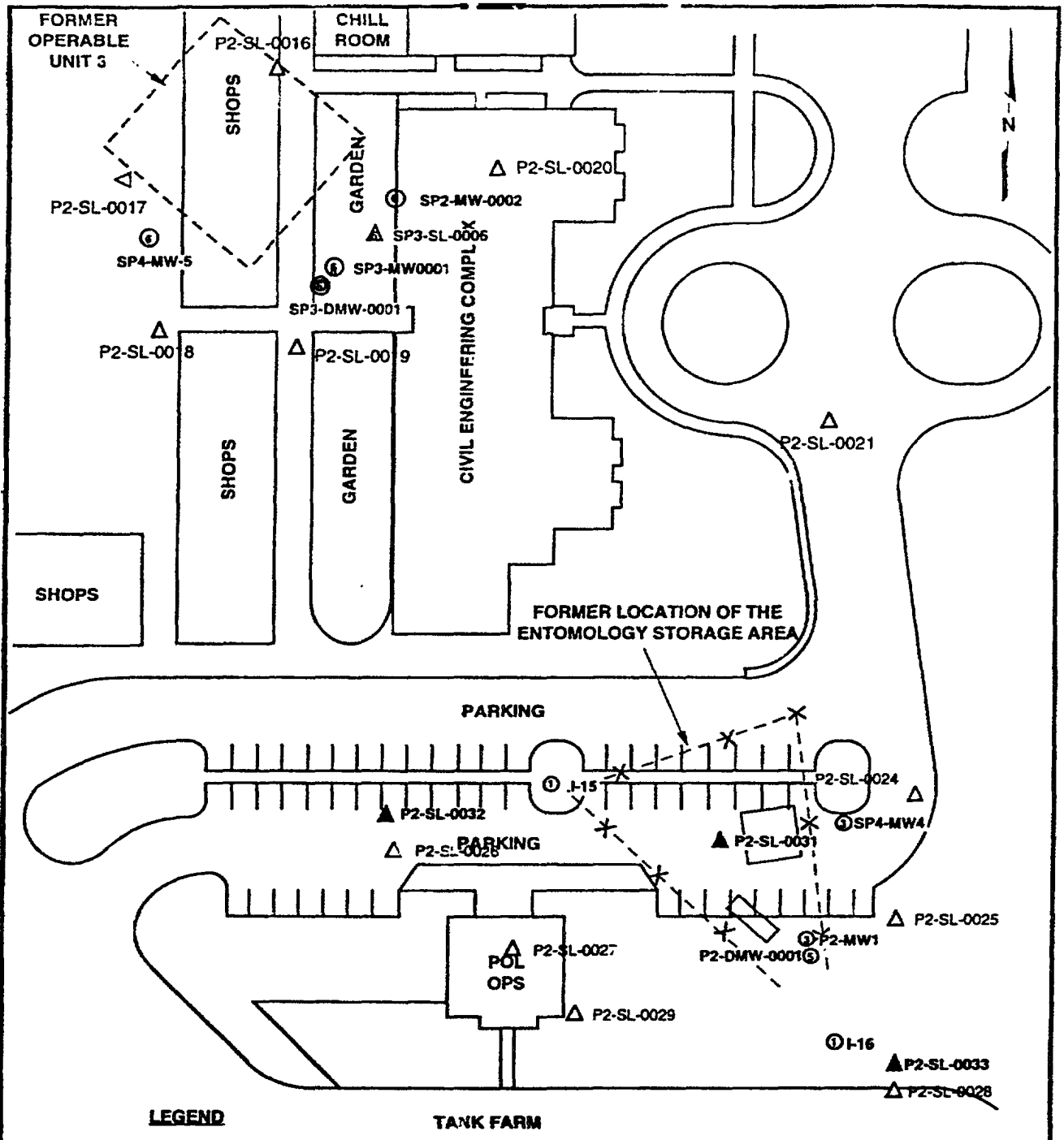
TABLE 2-8
SUMMARY OF ANALYTICAL RESULTS FOR PHASE IV GROUNDWATER SAMPLES
COLLECTED IN 1989 AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
Geraghty & Miller, 1988

LOCATION / CONSTITUENTS 1/	P2-MW1	I-15	1-16	SP4-MW5 (BACKGROUND)
Base/Neutral Extractable Compounds (ug/L	ND	ND	ND	ND
C8-C20 Hydrocarbons (total) (ug/L)	156	<100	<100	<100
Organochlorine Pesticides (ug/L)				
4,4'-DDE	[0.062]	<0.10	[0.051]	0.21
4,4'-DDD	1.5	<0.10	<0.10	0.19
4,4'-DDT	2.0	<0.10	[0.017]	0.98
alpha-Chlordane	[0.045]	<0.50	[0.22]	[0.19]
gamma-Chlordane	[0.025]	<0.50	[0.15]	[0.19]

EXPLANATION:

1/ Constituents not detected in any samples in an analytical group are not shown.
ND Not detected. None of the constituents in this group were detected above their detection limits.
[ ] Value is between level of quantitation and instrument detection limit.

Source: Geraghty & Miller, Inc., 1992



HOMESTEAD AIR RESERVE BASE
FLORIDA

1991 AND 1993 SOIL/BEDROCK SAMPLE LOCATIONS, OU-7, ENTOMOLOGY STORAGE AREA

FIGURE 2-5

methodologies used for sample analysis in 1991 were those specified in USEPA SW 846. The results of these analyses are presented in Section 2.6.1.5. Complete results of the 1991 RI are presented in G&M's report titled *Remedial Investigation Report for Site SS-7 Entomology Storage Area (Former Site P-2), Homestead AFB, Florida (G&M, 1992).*

2.3.6 1993 Remedial Investigation Addendum

The purpose of the 1993 RI Addendum was to evaluate the current soil/bedrock and groundwater quality at OU-7 with respect to the USEPA TCL/TAL employing Contract Laboratory Program (CLP) methodologies and documentation and to fill data gaps from the previous field investigations.

Three soil borings (P2-SL-0031, P2-SL-0032, and P2-SL-0033) (Figure 2-5) were advanced to the water table. Two samples were collected from each borehole. All soil/bedrock samples were analyzed for TCL organochlorine pesticides and PCBs and cyanide. The two samples from P2-SL-0031 were additionally analyzed for TCL VOCs, TCL BNAs, and TAL metals.

One new deep monitoring well (P2-DMW-0001) (Figure 2-5) was installed at 40 ft bls to determine vertical migration of contaminants. This new deep well was sampled as were four shallow monitoring wells (P2-MW1, I-15, I-16, and SP4-MW4). All groundwater samples were analyzed for TCL organochlorine pesticides and PCBs and cyanide. Additionally, groundwater samples from wells P2-MW-1 and P2-DMW-001 were analyzed for TCL VOCs, TCL BNAs, and TAL metals (total and dissolved).

Complete results of the 1993 RI are presented in Montgomery Watsons' report titled *Remedial Investigation Report Addendum for Operable Unit Site SS-7, Entomology Storage Area (Former Site SP-2), Homestead Air Reserve Base, Florida* (MW, 1996).

2.3.7 1994 Investigation

In 1994, an Interim Removal Action (ERA) was conducted at OU-7 by IT under contract with the U.S. Army Corps of Engineers (USACE) Mobile District. The remedial activities included delineation and profiling of contaminated soil/bedrock, determination of appropriate soil disposal methods, excavation and disposal of contaminated soil/bedrock, and analysis of confirmation samples collected from within the excavation limits. Also performed as part of the remedial activities was the disposal of miscellaneous debris and decontamination

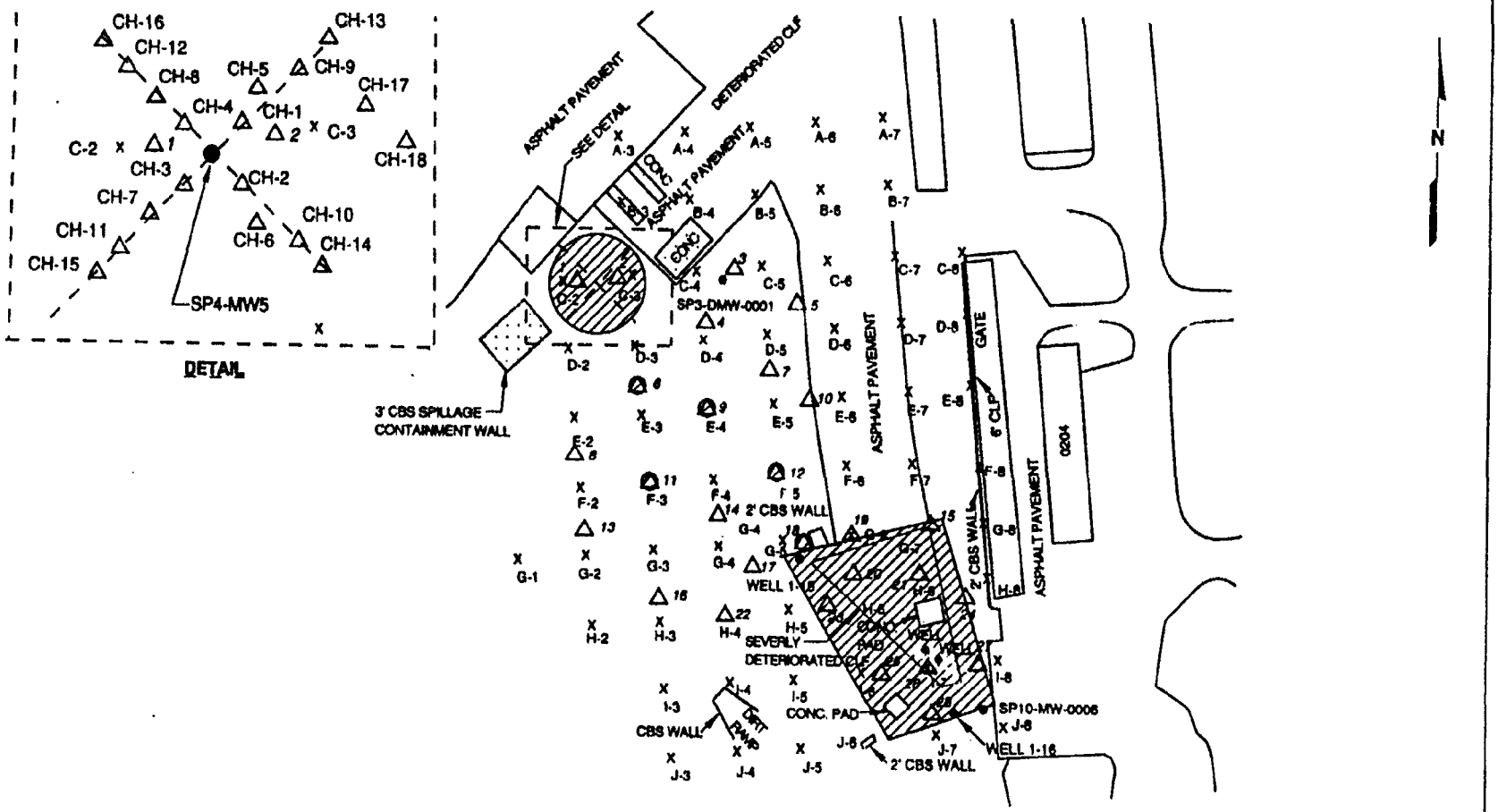
materials from the site. Extensive sampling throughout the CE Storage Area and Pesticide Storage Area identified two areas with elevated arsenic and pesticide contaminated soils. The north excavation area (North Area) consisted of a roughly circular area with a diameter of approximately 55 feet and an area of approximately 2,400 square feet. The south excavation area (South Area) was trapezoidal in shape and encompassed an area of approximately 12,300 square feet.

Prior to the removal of contaminated soilfbedrock from OU-7, limited delineation sampling was performed to provide additional information concerning the concentrations and extent of selected contaminants in the soil/bedrock. The OU-7 delineation sampling program included the collection of samples on a 50-foot grid between the North Area and the South Area (Figure 2-6). The soil/bedrock samples were analyzed for total arsenic, and selected samples on the grid were also analyzed for pesticides. Additionally, samples were collected from the North Area to further define the limits of arsenic and pesticide contamination.

In addition to the delineation sampling performed in the OU-7 area, profile samples were also collected to provide information for the completion of waste disposal profiles for off-site disposal of contaminated soil/bedrock. Since data collected during the profile sampling program were used to characterize soil/bedrock removed during the Interim Removal Action, that information is not sumniarized in this document. Further details on the profile sampling program are found in Sections 3.0 and 4.0 of *The Interim Action Report: Entomology Storage Area (SS-7),* (IT, September 30, 1994).

Upon completion of excavation activities, confirmatory samples were collected from the excavation limits of the North and South Areas. Sampling locations are shown in Figures 2-7 and 2-8. The final excavation limits are presented on Figure 2-9. The samples were analyzed using CLP methodologies for total arsenic and/or TCL VOCs, TCL sernivolatile organic compounds, TCL pesticides/PCBs, TAL metals, and total cyanide. A summary of the confirmatory sampling results from areas not subsequently excavated is presented in Section 2.6.1.3. A summary list of detected analytes and their corresponding Removal Action Levels is provided in Table 2-9.

The soil/bedrock excavated from the ESA were transported to USPCI's Clive, Utah, incineration facility for disposal. A total of 1,538 tons and 2,809 tons of soil were removed form the North and South Areas, respectively. According to USPCI representatives, incineration of the soils was scheduled for January 1995, as part of a trial bum program associated with startup of the incinerator facility. In addition, approximately 61 tons of



LEGEND

- ● SHALLOW MONITORING WELL
- CLF CHAIN LINK FENCE
- SOIL BORING
- I-5 SCIENCE APPLICATION INTERNATIONAL CORP., 1994
- SP3-DMW-0001 GERAGHTY & MILLER, 1991
- AREA OF EXCAVATION

GRAPHIC SCALE

50' 25' 0 50' 100' 150'

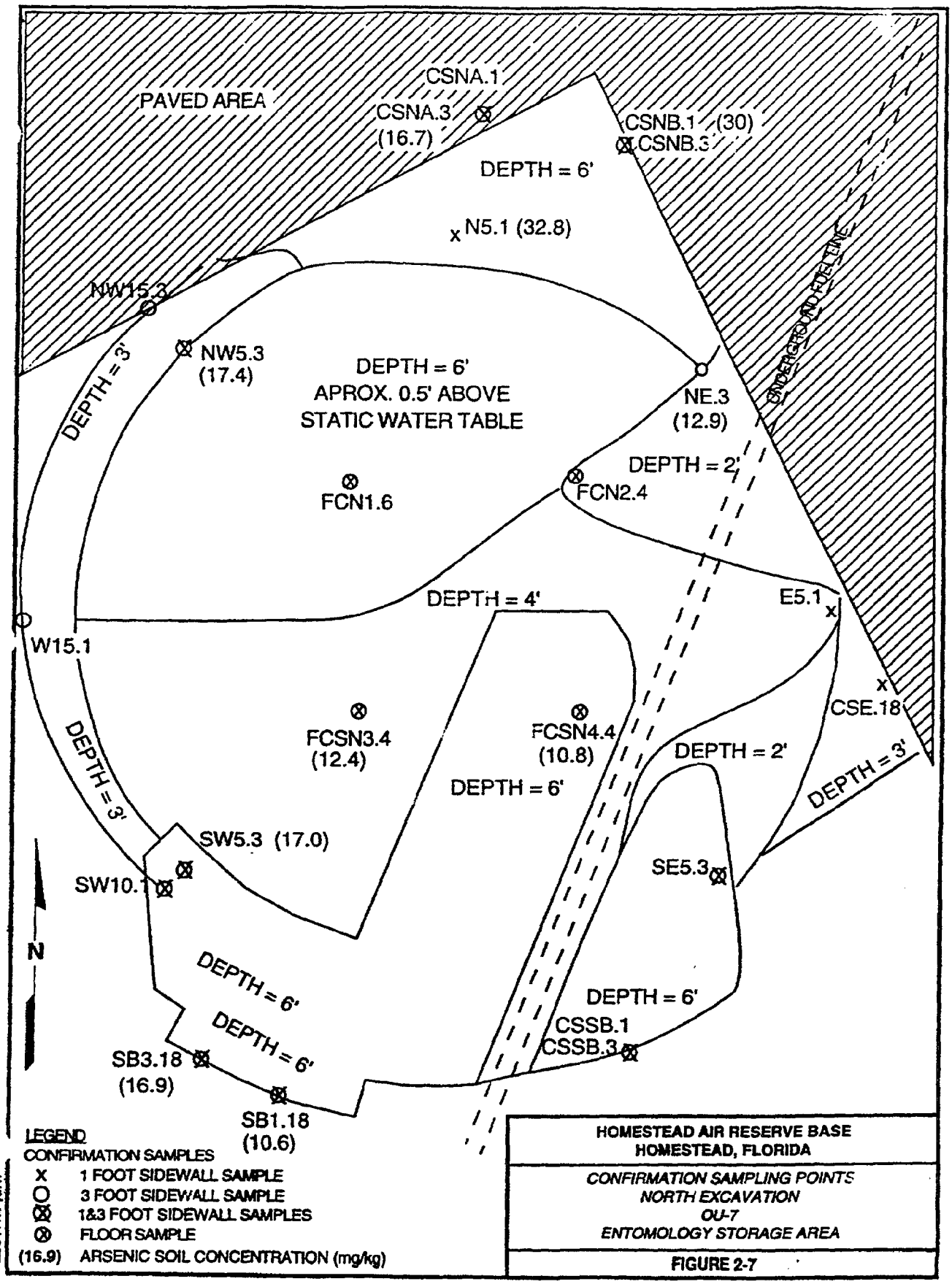
SCALE IN FEET
1"=50'

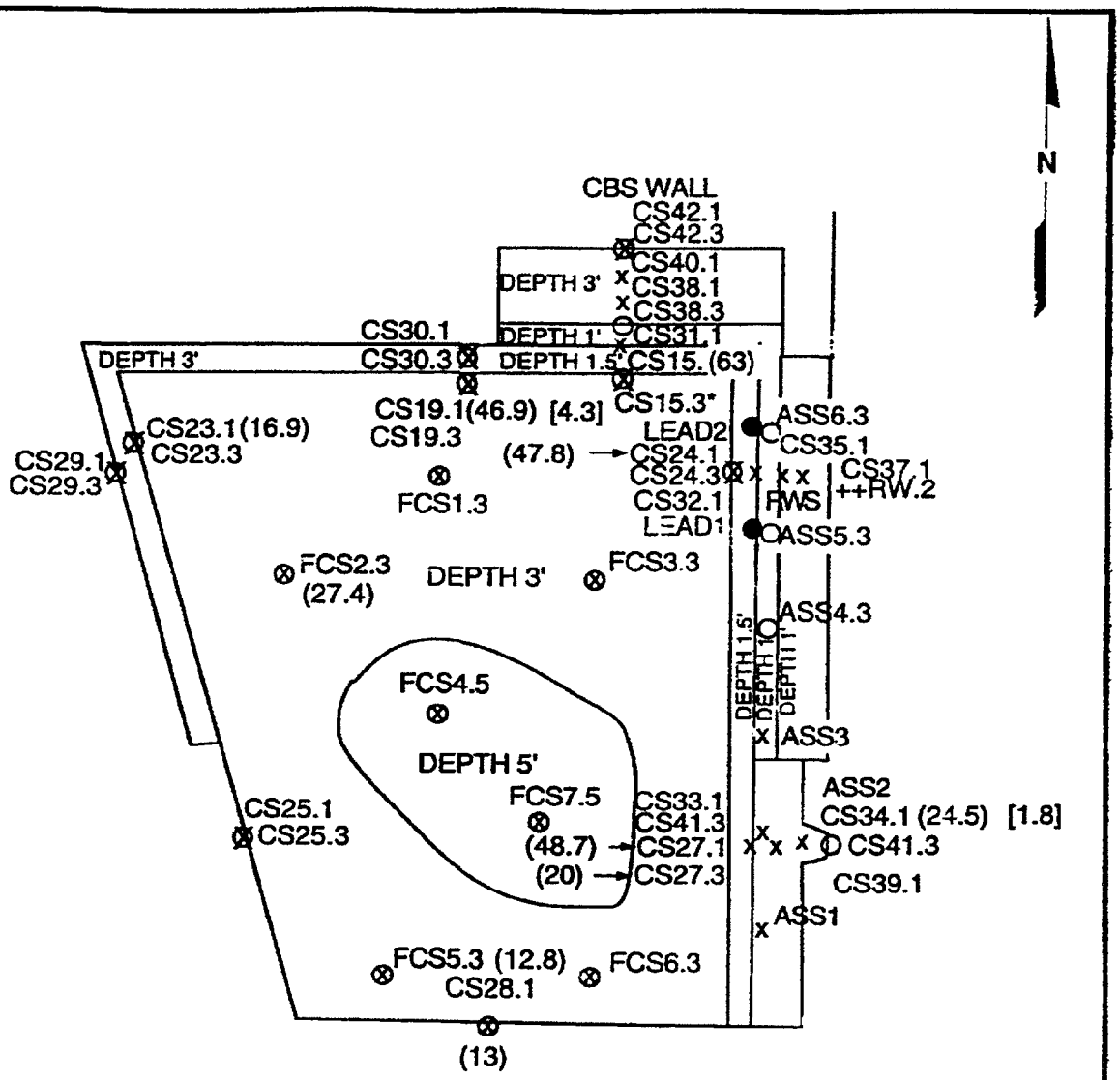
MONTGOMERY WATSON

HOMESTEAD AIR RESERVE BASE
HOMESTEAD, FLORIDA

DELINEATION SAMPLING GRID
OU-7
ENTOMOLOGY STORAGE AREA

FIGURE 2-6


PAVED AREA
CSNA.1
CSNA.3
(16.7)
CSNB.1 (30)
CSNB.3
DEPTH = 6'
N5.1 (32.8)
NW15.3
NW5.3
(17.4)
DEPTH = 3'
DEPTH = 6'
APROX. 0.5' ABOVE
STATIC WATER TABLE
NE.3
(12.9)
UNDERGROUND PIPELINE
DEPTH = 2'
FCN1.6
FCN2.4
DEPTH = 4'
E5.1
W15.1
FCSN3.4
(12.4)
FCSN4.4
(10.8)
CSE.18
DEPTH = 3'
DEPTH = 6'
DEPTH = 2'
DEPTH = 3'
SW5.3 (17.0)
SW10.1
SE5.3
N
DEPTH = 6'
DEPTH = 6'
DEPTH = 6'
CSSB.1
CSSB.3
SB3.18
(16.9)
SB1.18
(10.6)
LEGEND
CONFIRMATION SAMPLES
X 1 FOOT SIDEWALL SAMPLE
O 3 FOOT SIDEWALL SAMPLE
1&3 FOOT SIDEWALL SAMPLES
FLOOR SAMPLE
(16.9) ARSENIC SOIL CONCENTRATION (mg/kg)
HOMESTEAD AIR RESERVE BASE
HOMESTEAD, FLORIDA
CONFIRMATION SAMPLING POINTS
NORTH EXCAVATION
OU-7
ENTOMOLOGY STORAGE AREA
FIGURE 2-7



LEGEND

15 10 0 20

- X 1 FOOT SIDEWALL SAMPLE
- ○ 3 FOOT SIDEWALL SAMPLE
- ⊠ 1&3 FOOT SIDEWALL SAMPLES
- ⊗ FLOOR SAMPLE
- * DENOTES SECOND SAMPLE
- (48.7) ARSENIC SOIL CONCENTRATION (mg/kg)
- [4.3] BENZO(a) PYRENE SOIL CONCENTRATION (mg/kg)

ab318nol.drw

HOMESTEAD AIR RESERVE BASE
HOMESTEAD, FLORIDA

CONFIRMATION SAMPLING POINTS
SOUTH EXCAVATION
OU-7
ENTOMOLOGY STORAGE AREA

FIGURE 2-8

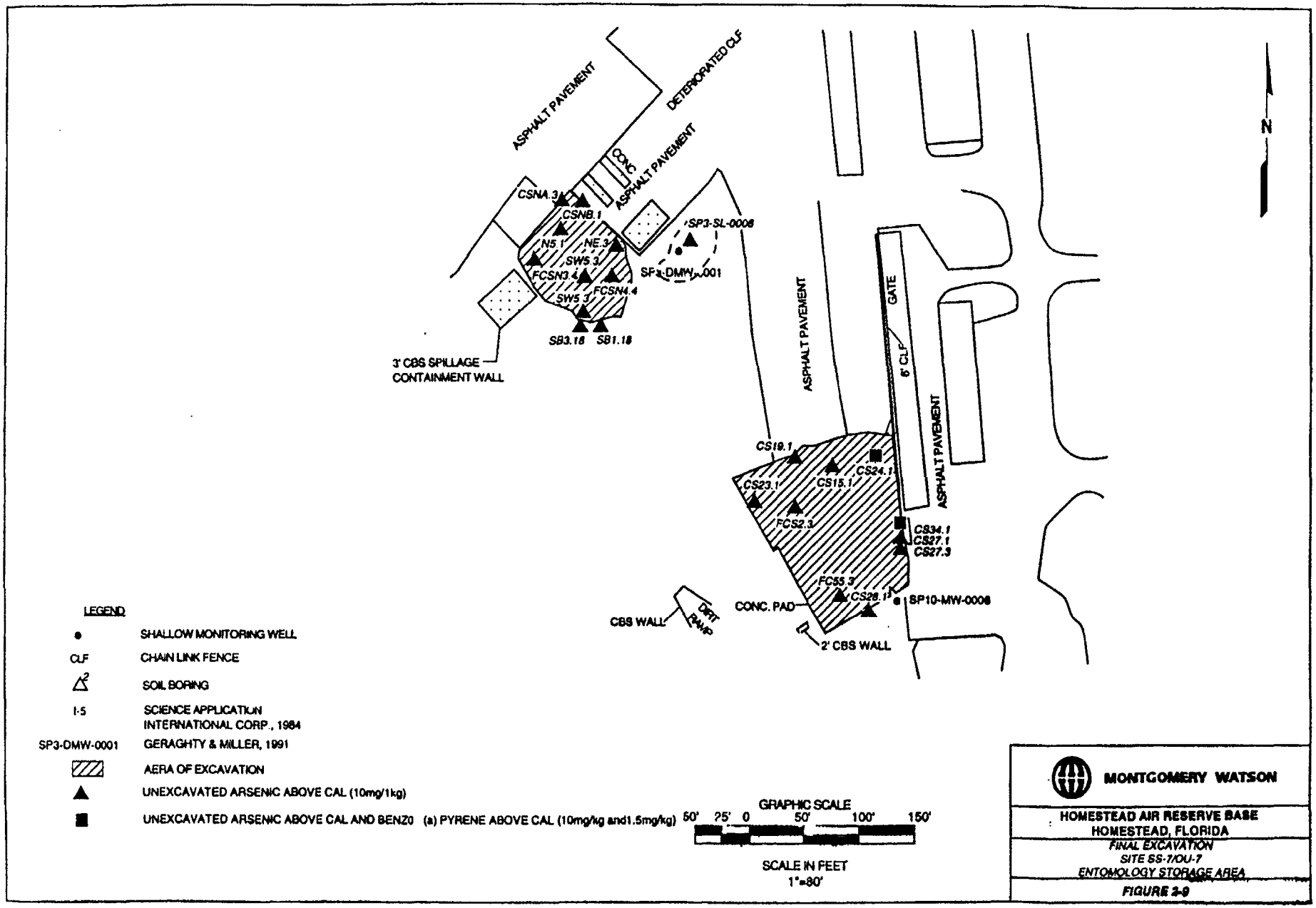

ASPHALT PAVEMENT
DETERIORATED CLF
CONC.
ASPHALT PAVEMENT
CSNA.3
CSNB.1
N5.1
NE.3
SW5.3
FCSN3.4
FCSN4.4
SW5.3
SB3.18
SB1.18
SP3-SL-0006
SP3-DMW-0001
3' CBS SPILLAGE CONTAINMENT WALL
ASPHALT PAVEMENT
GATE
6' CLF
ASPHALT PAVEMENT
CS19.1
CS24.1
CS23.1
CS15.1
FCS2.3
CS34.1
CS27.1
CS27.3
FCS5.3
CS28.1
SP10-MW-0006
CONC. PAD
CBS WALL
DIRT RAMP
2' CBS WALL
N
LEGEND
SHALLOW MONITORING WELL
CLF CHAIN LINK FENCE
SOIL BORING
I-5 SCIENCE APPLICATION INTERNATIONAL CORP., 1984
SP3-DMW-0001 GERAGHTY & MILLER, 1991
AERA OF EXCAVATION
UNEXCAVATED ARSENIC ABOVE CAL (10mg/1kg)
UNEXCAVATED ARSENIC ABOVE CAL AND BENZ0 (a) PYRENE ABOVE CAL (10mg/kg and1.5mg/kg)
GRAPHIC SCALE
50' 25' 0 50' 100' 150'
SCALE IN FEET
1"=80'
MONTGOMERY WATSON
HOMESTEAD AIR RESERVE BASE
HOMESTEAD, FLORIDA
FINAL EXCAVATION
SITE SS-7/OU-7
ENTOMOLOGY STORAGE AREA
FIGURE 2-9

TABLE 2-9
CONFIRMATION SAMPLING PARAMETERS
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
IT Corporation, 1994

Detected Parameter (a)	Removal Action Level (a)	Detected Parameter (a)	Removal Action Level (a)	Detected Parameter (a)	Removal Action Level (a)	Detected Parameter (a)	Removal Action Level (a)
VOLATILES		SEMI-VOLATILES		PESTICIDES/PCBs		METALS	
Acetone	NL (b)	Naphthalene	1 (e)	alpha-BHC	NL (b)	Aluminum	NL (b)
Benzoic Acid	NL (b)	2-Methylnaphthalene	1 (e)	beta-BHC	NL (b)	Arsenic	3.16
Bromomethane	NL (b)	Acenaphthene	1 (e)	delta-BHC	NL (b)	Barium	2,750
Chlorobenzene	0.050 (c)	Dibenzofuran	1 (e)	gamma-BHC (Lindane)	NL (b)	Beryllium	NL (b)
Methylene Chloride	42.2	Fluorene	1 (e)	Aldrin	NL (b)	Calcium	NL (b)
Toluene	0.1 (d)	Phenanthrene	1 (e)	Heptachlor	NL (b)	Chromium	160
Trichloromethane	0.050 (c)	Acenaphthylene	1 (e)	Heptachlor epoxide	0.101	Copper	NL (b)
Xylenes (total)	0.1 (d)	Anthracene	1 (e)	Dieldrin	0.269	Iron	NL (b)
		Carbazole	224	4,4'-DDE	12.4	Lead	108 (c)
		Di-*n* -butylphthalate	NL (b)	Endrin	NL (b)	Magnesium	NL (b)
		Fluoranthene	1 (e)	Endosulfan II	NL (b)	Manganese	NL (b)
		Benzo(a)anthracene	5.04	4,4'-DDD	17.5	Mercury	23 (c)
		Butylbenzylphthalate	1.000	Endosulfan sulfate	NL (b)	Nickel	3.24
		Pyrene	1 (e)	4,4'-DDT	11.3	Potassium	NL (b)
		Chrysene	50.3	Methoxychlor	NL (b)	Selenium	389 (c)
		bis(2-Ethylhexyl)phthalate	NL (b)	Endrin ketone	NL (b)	Silver	165 (c)
		Benzo(b)fluoranthene	5.01	Endrin aldehyde	NL (b)	Sodium	NL (b)
		Benzo(k)fluoranthene	4.97	alpha-Chlordane	3.21	Vanadium	NL (b)
		Benzo(a)pyrene	0.504	gamma-Chlordane	3.21	Zinc	NL (b)
		Indeno(1,2,3-cd)pyrene	5.04	Arochlor	NL (b)	OTHER PARAMETERS	
		Dibenzo(a,h)anthracene	0.505			Total Cyanide	Not Reported
		Benzo(g,h,i)perylene	1 (e)				

NOTES:

Source: *Interim Action Report: Entomology Storage Area (SS-7)*. IT Corporation (September 30, 1994).
Boldface values exceed the corresponding Removal Action Level value.
(a) Unless otherwise indicated, values are shown in mg/kg units.
(b) Not Listed. Analyte either was not listed on the February 15, 1994 FDEP "Soil Target Level" table; was listed but qualified with an "ND;" or was not listed in Chapter 62-775 of the FAC.
(c) Analyte was not fined on the February 15, 1994 FDFP "Soil Target Level" table, but was listed in Chapter 62-775 of the FAC.
(d) Analyte was not listed on the February 15,1994 FDEP "Soil Target Level" table. However, a maximum concentration of 100 ppb (0. 100 mg/kg) was lived in Chapter 62-775 of the FAC under "Total Volatile Organic Aromatics (VOA)."
(e) Analyte was not listed on "Soil Target Level" table. However. a maximum concentration of 1 ppm (1 mg/kg) was lived in Chapter 62-775 of The FAC under "Polynuclear Aromatic Hydrocarbons (PAH)."
(f) Not Detected.

debris were removed from the site prior to excavation and transported to USPCI's Lone Mountain landfill facility in Oklahoma for micro-encapsulation and final disposal in a hazardous waste landfill. The debris consisted of a variety of materials including wood, concrete, metal and plastic. Micro-encapsulation was perfonned by coating the debris with Portland cement grout prior to landfilling.

The excavations created as a result of the IRA undertaken at OU-7 were backfilled with imported crushed limestone fill material. Prior to import, the fill was analyzed to verify the lack of chemical contaminants. Samples of the fill material were analyzed for volatile organic aromatic hydrocarbons, chlorinated hydrocarbons, PAHs, total petroleum hydrocarbons, and TCLP chromium, lead, and cadmium. Field density testing was also performed after backfilling to verify compaction of the backfill material.

As a result of the OU-7 IRA, 35 Soil Sampling points from previous investigations were excavated and removed. Seven soil sample points from the 1989 G&M investigation and three sample points from the 1991 G&M investigation were collected at or below the IRA excavation limits. A summary list of soil samples collected from the excavated areas, including sample identifiers and interval depths, is presented as Table 2- 10.

Delineation Sampling and Analysis. Prior to the removal of affected soils from the OU-7 area, limited delineation sampling was performed to provide additional information concerning the concentrations and extent of selected contaminants in the soil/bedrock. The OU-7 delineation sampling program was performed in accordance with directions received by IT in a USACE-Mobile District letter dated February 3, 1994. The directions in the letter were based on recommendations made in the Engineering Evaluation Cost Analysis (EECA) and on requirements of the Base Conversion Team. The delineation sampling program included the collection of samples on a 50-foot grid between the North and South Areas of included excavation (Figure 2-6). The soil/bedrock samples were analyzed for total arsenic according to EPA SW-846 Method 6010. Selected samples on the grid were also analyzed for pesticides in accordance with EPA SW-846, Method 8080. The delineation analyses were performed in accordance with EPA SW-846 methodologies. In addition to the sampling program directed in the February 3, 1993 letter, samples were collected in the planned North Area excavation to further define the limits of arsenic- and pesticide-affected areas.

The soil/bedrock samples were collected using split-spoon sampling procedures in accordance with methods detailed in the project work plan. The soil/bedrock samples were composited from a depth of zero to approximately two feet below land surface (ft bls).

TABLE 2-10

SUMMARY OF SOIJJBEDROCK SAMPLES FROM EXCAVATED AREAS
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
IT Corporation, 1994

Sample Location	Depth Interval	IRA Excavation Depth	Investigation	Comments
NORTH AREA (a)				
P2-SS-1-2	0' - 2'	4'	1989 (Geraghty & Miller)	Excavated (b)
P2-SS-1-4	2' - 4'	4'	1989 (Geraghty & Miller)	Excavated (b)
P2-SL-0017-2	0' - 2'	6'	1991 (Geraghty & Miller)	Excavated (b)
P2-SL-0018-2	0' - 2'	4' - 6'	1991 (Geraghty & Miller)	Excavated (b)
P2-SL-0017-4	2' - 4'	6'	1991 (Geraghty & Miller)	Excavated (b)
P2-SL-0018-4	2' - 4'	4' - 6'	1991 (Geraghty & Miller)	Excavated (b)
ESA302/CH1; CH3 through CH5; CH7; CH8; CH12; and CH16	0' - 2'	6'	1994 (IT Corporation)	Excavated (b)
ESA302/CH2 and CH6	0' - 2'	4'	1994 (IT Corporation)	Excavated (b)
ESA302/CH11	0' - 2'	4' - 6'	1994 (IT Corporation)	Excavated (b)
ESA302/CH15	0' - 2'	3'	1994 (IT Corporation)	Excavated (b)
ESA302/CH17	0' - 2'	2'	1994 (IT Corporation)	Excavated (b)
ESA302/CH18	0' - 2'	2' - 3'	1994 (IT Corporation)	Excavated (b)
ESA302/CH9; CH10; CH13; CH14; and Delineation Points 1&2	0' - 2'	(b,f)	1994 (IT Corporation)	(b,f)
SOUTH AREA (a)				
SFS-2 through -5	0' - 0.33'	3'	1988 (Geraghty & Miller)	Excavated (b)
SFS-6, SFS-7	0' - 0.33'	5'	1988 (Geraghty & Miller)	Excavated (b)
P2-SB-1; -2; -8; -9; and -12	0' - 2'	5'	1989 (Geraghty & Miller)	Excavated (b)
P2-SB-4 through -7; -10; -11; and -13	0' - 2'	3'	1989 (Geraghty & Miller)	Excavated (b)
P2-SB-1; -2; -8; -9; and -12	2' - 4'	5'	1989 (Geraghty & Miller)	Excavated (b)
P2-SB-4 through -7; -10; and -11	2' - 4'	3'	1989 (Geraghty & Miller)	PARTIAL REMOVAL (d)
P2-SB-13	2' - 4'	1.5' - 3'	1989 (Geraghty & Miller)	PARTIAL REMOVAL (d)
P2-SL-0022-2; P2-SL-0024-2 and P2-SL-0024-2 (c)	0' - 2'	3'	1991 (Geraghty & Miller)	Excavated (b)
P2-SL-0025-2	0' - 2'	1.5' - 3'	1991 (Geraghty & Miller)	PARTIAL REMOVAL (d)
P2-SL-0022-4 and P2-SL-0024-4	0' - 4'	3'	1991 (Geraghty & Miller)	PARTIAL REMOVAL (d)
P2-SL-0025-4	0' - 4'	1.5' - 3'	1991 (Geraghty & Miller)	PARTIAL REMOVAL (d)
P2-SL-0028-2	0' - 2'	(g)	1991 (Geraghty & Miller)	REMOVAL STATUS UNKNOWN
P2-SL-0028-4	2' - 4'	(g)	1991 (Geraghty & Miller)	REMOVAL STATUS UNKNOWN
P2-SL-0031; and P2-SL-0031 (c)	0' - 1'	3'	1993 (Montgomery Watson)	Excavated (b)
P2-SL-0031	1' - 2'	3'	1993 (Montgomery Watson)	Excavated (b)
P2-SL-0033	0' - 2'	3'	1993 (Montgomery Watson)	REMOVAL STATUS UNKNOWN
P2-SL-0033	2' - 4'	3'	1993 (Montgomery Watson)	REMOVAL STATUS UNKNOWN
ESA302/15; 19; 20; 23; through 25	0' - 2'	3'	1994 (IT Corporation)	Excavated (b,f)
ESA302/26	0' - 2'	5'	1994 (IT Corporation)	Excavated (b,f)
ESA302/27	0' - 2'	1.5' - 3'	1994 (IT Corporation)	PARTIAL REMOVAL (e,f)
ESA302/28	0' - 2'	3'	1994 (IT Corporation)	Excavated (b,f)
ESA302/CS34.1; and CS37.1	3'	3'	1994 (IT Corporation)	Excavated (b)

NOTES:

(a) Area of excavation (1994 Interim Removal Action).
(b) *Interim Action Report: Entomology Storage Area (SS-7)*. IT Corporation (September 30, 1994)
(c) QA/QC duplicate sample.
(d) Sampling depth interval was not fully excavated. Analytical data associated with this sample may still be valid.
(e) Limit of excavation lies over sampling point location. Analytical data associated with this sample may still be valid.
(f) No data reported.
(g) Soils from which ample was collected may have been excavated during die Site ST-18 underground storage tank (UST) removal action. Validity of analytical data associated with data sample is not known.

Confirmatory Sampling. Confirmation soil/bedrock samples were collected from the limits of the excavation for analysis of TCL VOCs; TCL semivolatile organic compounds; TCL pesticides/PCBs; TAL metals; and total cyanide. The confirmation samples were analyzed using CLP methodologies. Each sample was initially analyzed for arsenic using expedited laboratory turnaround. Samples which were found to contain arsenic in concentrations below the approved action level of 15 mg/kg were analyzed for the full confirmation analytical program. Samples with arsenic concentrations greater than or equal to the approved action level indicated that further excavation was necessary. These areas were presented to the USACE-Mobile District for direction, with the general course of action to be additional excavation. Additional information regarding the progress and delineation of the excavation limits is provided in Section 2.3.7 of this ROD and the September 1994 *IT Interim Action Report: Entomology Storage Area (SS-7)*. Confirmatory sampling locations are presented in Figures 2-7 and 2-8.

2.4 COMMUNITY RELATIONS HISTORY

The Remedial Investigation/Baseline Risk Assessment, Feasibility Study and Proposed Plan for Homestead ARB, OU-7 were released to the public in April 1996, November 1997, and November 1997, respectively. These documents were made available to the public in both the administrative record and an information repository maintained at the Air Force Base Conversion Agency OL-Y office.

The public comment period was held from November 20, 1997 to December 22, 1997 as part of the community relations plan for OU-7. Additionally, a public meeting was held on November 20, 1997 at 7:00 p.m. at South Dade Senior High School. Public Notices were published in the Miami Herald on November 16, 1997, and in the South Dade News Leader and The Courier on November 17, 1997. At this meeting, officials from the U.S. Air Force Reserves and Dade County Environmental Resource Management (DERM), were prepared to discuss the Remedial Investigation, the Baseline Risk Assessment the Feasibility Study, and the Preferred Alternative for this OU as described in the Proposed Plan and Record Of Decision. A court reporter was present at the meeting and prepared a transcript of the meeting. A copy of the transcript and all written comments received during the comment period will be placed in the Administrative Record. A response to the comments received during this period will be included in the Responsiveness Summary section of a later version of ROD. This decision document presents the selected remedial action for OU-7 at Homestead ARB, chosen in accordance with CERCLA, as amended by SARA and, to the

extent practicable, the National Contingency Plan. The decision on the selected remedy for the site is based on the administrative record.

2.5 SCOPE AND ROLE OF RESPONSE ACTION

The U.S. Air Force, with concurrence from the FDEP and USEPA, has elected to define Operable Unit 7 as the former Entomology Storage Area and a large portion of the Civil Engineering Storage Compound found to have arsenic and pesticide contaminated soils. The remedial actions planned at each of the operable units at Homestead ARB are, to the extent practicable, independent of one another. However, with respect to OU-3, OU-7, and FAC 62-770 Site ST-18, the close proximity of these areas has resulted in some physical overlap of site boundaries.

OU-3 was defined as the PCB spill area and associated potential PCB contamination only. This site was closed with a No Further Action ROD in 1994. Site ST-18 was regulated as a petroleum contaminated site under FAC 62-770 and closed with a Contamination Assessment Report in 1993. As a result, any constituents other than PCBs at OU-3 and the FAC 62-770 mixed product analytical group at ST-18 were evaluated as part of OU-7. This response action addresses the contamination identified at OU-7. Operable Unit 7 is located in the Cantonment Area retained by the Air Force Reserves and as such an industrial use scenario has been deemed appropriate for evaluating site risk. Under both the current and future industrial use scenario, the risk levels present at OU-7 are below the USEPA remediation-based benchmarks. This response action will be the final action at OU-7. This alternative offers a permanent solution for the site because the remnant pockets of contaminated soil have been capped, eliminating the risk to current and future base workers.

2.6 SUMMARY OF SITE CHARACTERISTICS

The former Entomology Storage Area is located in the west-central portion of the Facility. The Entomology Storage Area was a fenced, sheltered area of approximately 0.13 areas in the southeast corner of the Civil Engineering Storage Compound that was used in the 1960s as a storage area for bulk quantities of pesticide compounds. Diesel fuel was also reportedly stored in the southern portion of the site. The dates and quantities of pesticides and diesel fuel stored at the site are not available. Operable Unit 7 was later expanded to include a large portion of the Civil Engineering Storage Compound, A former petroleum contaminated site, Building 207 (Former Site ST-18) and OU-3 (Former PCB Spill Area), increasing the total area to approximately 4 acres.

The OU-7 area has been retained by the 482nd Air Force Reserve as part of the cantonment area. Expansion of this area by the Air Force Reserves included rebuilding as part of the new Base Supply, Civil Engineering, and POL Operations area. Operable Unit 7 is now occupied by a new civil engineering complex, three shops, a storage area, miscellaneous buildings and expanded parking areas, and grassways.

2.6.1 Nature and Extent of Contamination

This section describes the nature and extent of contamination identified in the soil and groundwater at OU-7. As discussed previously, the soils at OU-7 are relatively thin to absent. Where present, they may be as much as 12-inches thick, with bedrock limestone the dominate feature exposed at the surface. Because of the absence of a significant soil layer at the site, the term soil/bedrock has been used to describe the media being sampled during the various investigations completed at this site.

The site has been characterized by evaluating the data obtained by G&M, Montgomery Watson, and IT Corporation between 1991 and 1994. Soil/bedrock characterization was completed by evaluating analytical results from the 1991 and 1993 RI samples that were not located within the IRA excavation limits as well as the 1994 IRA delineation and confirmation samples that were not excavated during removal activities. Data from samples locations excavated during the IRA were not considered representative of current site conditions and were eliminated from site characterization activities.

Subsurface investigations at the site were initiated in 1986 by SAIC (SAIC, 1986). Further soil/bedrock and groundwater investigations as part of the RI/BRA process were conducted by G&M in 1988, 1989 and 1991 and by Montgomery Watson in 1993. RI/BRA activities were interrupted in 1994 when an IRA, completed by IT under the direction of the USACE-Mobile District, excavated and disposal of arsenic and pesticide contaminated soil/bedrock from two areas at OU-7. Remedial Investigation/Baseline Risk Assessment activities resumed at the conclusion of the IRA in 1994.

IT Corporation, under contract to the USACE-Mobile District, completed the delineation and IRA program in 1994. Delineation soil/bedrock samples were obtained by IT from within the site limits to determine excavation boundaries, as well as to provide waste disposal profiling information. Excavation activities were restricted to two areas, a North Area, located adjacent to the former PCB Storage Area, and a South Area, located at the site of the

pesticide storage yard. The North Area excavation was circular in shape with a surface area of approximately 2,400 sq. ft. The South Area was approximately trapezoidal in shape and encompasses an area of approximately 12,300 sq. ft. A total of 1,538 tons and 2,809 tons of soil/bedrock were removed from the North and South Areas, respectively, and disposed of in accordance with applicable regulations.

At the conclusion of the IRA, the site was re-evaluated in an RI/BRA to characterize the nature and extent of contamination subsequent to the removal activities. The IRA was not effective in removing soil/bedrock contamination immediately adjacent to buildings or underlying asphalt paved areas. As a result, four arsenic impacted (>15 mg/kg) areas remain on-site. However, the RI/BRA took into account the fact that buildings, parking areas, or grassways now cover the site and have reduced potential future direct and indirect exposures to the underlying soil/bedrock.

Site characterization activities evaluated data from 14 monitoring wells and 75 soil/bedrock samples. No groundwater samples have been collected from OU-7 subsequent to the IRA. However, pre-IRA groundwater impacts indicated arsenic and pesticide contamination exists at moderate levels. Contaminants identified in the soil/bedrock subsequent to the IRA were primarily remnant pockets of arsenic that were left in place due to their proximity to asphalt covered areas or buildings. The PAHs identified in site soil/bedrock have been attributed to anthropogenic sources.

2.6.1.1 Summary of Soil/Bedrock Investigations

Seven surface soil/bedrock samples (SFS-1 through SFS-7), collected between 0 to 4 inches bgs, were collected at OU-7 during the 1988 installation restoration program (IRP) Phase IV investigation and analyzed for volatile organic compounds (VOCs), base/neutral and acid extractable compounds (BNAs), RCRA metals, organochlorine pesticides, and chlorinated herbicides. With the exception of sample SFS-1, these sample locations were later excavated and removed during the 1994 IRA.

Then, in 1989, a Phase IV investigation was completed at OU-7 that included the completion of 15 soil borings and the installation of one monitoring well. Soil samples were obtained from the 0-2 ft and 2-4 ft interval at each soil boring location, plus one background location. Soil borings completed during this investigation were located within approximately 50 ft of the former pesticide storage building. With the exception of SB-3, all these sample locations fall within the limits of the IRA excavation and are not considered representative data points.

However, several of the 2-4 ft bgs samples may still be representative of site conditions, given that the sample collection depth may be greater than the excavation depth. A summary of soil/bedrock sample locations excavated during the IRA are provided in Table 2- 10.

Similarly, in 1991, G&M began a CERCLA RI sampling program for OU-7 that included the completion of 16 soil borings and the installation of three monitoring wells. Soil samples were again obtained from the 0-2 ft and 2-4 ft bgs interval from each soil boring location. Eleven of the soil boring locations during this investigation were installed at the perimeter of the storage compound to delineate the horizontal extent of contamination. Five of the soil borings were located north of the entomology storage compound, near the former OU-3 PCB Spill Area.

A total of 26 soil/bedrock samples were collected in 1991 for chemical analyses from the 0 to 2 ft bls interval and the 2 to 4 ft bls interval bringing the total number of soil/bedrock samples collected as part of the 1989 IRP Phase IV and 1991 CERCLA investigations to 52. The 1989 soil/bedrock samples were designated as SB-1 through SB-15, and SS-1; and the 1991 soil/bedrock samples were designated as P2-SL-0016 through P2-SL-0030.

In 1993, Montgomery Watson performed an extended RI of the OU-7 site to fill data gaps from previous investigations. The Montgomery Watson investigation included the completion of three borings (P2-SL-0031 through P2-SL-0033) and the collection of surface (0-1 or 0-2 ft bgs) and subsurface (1 to 2 or 2 to 4 ft bgs) soil/bedrock samples from each boring. Samples were analyzed using USEPA Contract Laboratory Program (CLP) protocols for Target Compound List (TCL) organochlorine pesticides/PCBs and cyanide. The samples from P2-SL-0031 were additionally analyzed for TCL VOCs, BNAs, and target analyte list (TAL) metals.

In 1994, an IRA was recommended for OU-7 to remove and properly dispose of arsenic and pesticide contaminated soil/bedrock. Prior to completing the IRA, an engineering evaluation/cost analysis (EE/CA) was completed by the USACE to evaluate remedial alternatives while ensuring protection to the public health or welfare and the environment. The IRA was performed in accordance with Section 300.415(b) of the National Contingency Plan (NCP) under CERCLA.

During the IRA, a 50-ft grid was established throughout the civil engineering storage compound. Soil/bedrock delineation samples were collected from selected locations and

analyzed for arsenic and pesticides. Two areas were identified for excavation activities, a North Area and South Area.

During excavation activities confirmation samples were collected from the edges and floor of the excavation to further define the contamination limits. The confirmation samples were initially analyzed for total arsenic. Corrective Action Levels (CALs) for soil/bedrock removal activities were established for chlordane, 4,4'-DDD; 4,4'-DDE; 4,4'-DDT; and arsenic based on Florida Health Based Soil Target Levels for an excess cancer risk of 1E-06 for a general worker or for an industrial scenario. The arsenic CAL was subsequently revised by the Base Closure Team (BCT), which is comprised of representatives from the USEPA, FDEP, Dade County Environmental Resource Management (DERM), USAF, and the USACE in April 1994, indicating that a higher (15 mg/kg) level would be acceptable for termination of the excavation activities. Samples that were found to contain less than the 15 mg/kg arsenic action level were analyzed for TCL VOCs, TCL BNAs, TCL pesticides/PCBs, TAL metals, and total cyanide. However, remedial boundaries were primarily established based on arsenic concentrations found in the floor and external sidewalls of the excavation as it progressed. A summary of the Corrective Action Levels (CALs) established for OU-7 are provided in Table 2-11. However, as stated previously, four areas with elevated arsenic concentrations (>15 mg/kg) were left in place due to proximity to buildings or asphalt covered areas.

Background Soil/Bedrock Concentrations. Early investigations at Homestead ARB delineated soil/bedrock contamination based on levels of constituents found in background samples collected from throughout the base. Background levels at Homestead ARB for surface (0-2 ft bls) and subsurface (2-4 ft and 4-6 ft b1s) soils/bedrock were presented in the OU-7 report prepared by G&M (G&M, 1992). Background levels were established based on the concentrations of constituents found in soil/bedrock samples obtained from four CERCLA sites and one RCRA site at Homestead ARB. These values, as well as the common ranges of inorganic constituents found in soil/bedrock in the eastern U.S., the average value of inorganics found in carbonates and typical values of both organic and inorganic constituents found in uncontaminated soil/bedrock are shown in Table 2-12. These values were used in earlier studies in conjunction with the background boring P2-SL-0023 (199 1), as a basis for evaluating the OU-7 soil/bedrock samples.

TABLE 2-11

SUMMARY OF
CORRECTIVE ACTION LEVELS
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Chemical	Corrective Action level	1995 FDEP Health Based Soil Target Levels
Chlordane	3.21 mg/kg[1]	3.00 mg/kg[3]
4,4'-DDD	17.5 mg/kg[1]	17.0 mg/kg[3]
4,4'-DDE	12.4 mg/kg[1]	11.0 mg/kg[3]
4,4'-DDT	11.3 mg/kg[1]	12.0 mg/kg[3]
Arsenic	15 mg/kg[2]	3.1 mg/kg[3]

[1] Based on FDEP Soil Target Levels, Excess Cancer Risk of 1E-06 (General Worker)
[2] Revised April 1994 by BCT
[3] Revised FDEP Soil Target Levels, Excess Cancer Risk of 1E-06 (Industrial), September, 1995
mg/kg Milligrams per kilogram

TABLE 2-12

BACKGROUND SOIL CONCENTRATIONS
Homestead Air Force Base, Florida

Compound	Average Carbonate Composition Hem (1989)	Homestead AFB Background Soil(a) 0-2 ft bls	Homestead AFB Background Soil(b) 4-6 ft bls	Typical Values for Uncontaminated Soils (c) (mg/kg)	Common Range (d) (mg/kg)	Average (d) (mg/kg)
Volatile Organic Compounds (µg/kg)						
Acetone		119.2				
Chlorobenzene		3.8				
Methylene Chloride		4				
Total PAHs (µg/kg)		738.55 µg/kg		10 - 1300 forest (d) 10 - 1000 rural 60 - 5800 urban 8000-336,000 road dust		
Base/Neutral and Acid Extractable Organic Compounds (µg/kg/dw)						
Acenaphthene		ND				
Benzo(a)anthracene		67				
Benzo(a)pyrene		66				
Benzo(b)fluorantene		69				
Benzo(g,h,i)perylene		44				
Benzo(k)fluoranthane		66				
Bis(2-Ethylhexyl)phthalate		100				
Chrysene		79				
Dibenzofuran		ND				
Fluoranthene		52.4				
Fluorene		ND				
2-Methylnaphthalene		84				
Naphthalene		50				
Phenanthrene		50				
Pyrene		49.15				
1,2-Dichlorobenzene		ND				
1,4-Dichlorobenzene		ND				
Total Phthalates (µg/kg)		126	515			
Aluminum	8970	2400	425		100 ->10,000	57000
Antimony	--	<28 - 30	<7.4 - <160	0 - 30	2 - 10(f)	- -(fag)
Arsenic	1.8	1.6	<1.4 - <2.9	0 - 30	<0.1 - 73	7.4
Barium	30	42.9	5	0 - 500	10 - 1,500	420
Beryllium	--	<2.8 - 2.9	<0.63 - <0.74	0 - 5	<1 - 7	0.85
Cadmium	0.048	<2.8 - 3.0	<0.74 - <16	0 - 1	0.01 - 0.1(f)	0.06(f)
Calcium	272,000	345,000	400,000		10 - 28,000	630
Chromium	>0.1	11.5	3.9	0 - 100	1 - 1,000	52
Cobalt	0.12	<1.1 - 1.2	<1.3 - <1.5	7	<0.3 - 70	9.2
Copper	4.4	<2.7 - 3.0	<3.2 - <3.7	30	<1 - 7,000	22
Iron	8,190	1650	260		10 - 10,000	2,500
Lead	16	4.05	1.4	0 - 500	<10 - 300	17
Magnesium	45,300	1050	875	0 - 500	5 - 5,000	460
Manganese	842	23	5.4	0 - 500	<2 - 7,000	640
Mercury	0.046	0.014	<0.013 - <0.014	0 - 1	<0.01 - 3.4	0.12
Nickel	13	<4.5 - 4.7	<5.1 - <5.9	15	<5 - 700	18
Potassium	2,390	<110 - 120	<130 - <150		5 - 3,700	- -(g)
Selenium	--	<5.6 - 5.7	<2.9 - <7.1	0 - 1	<0.01 - 3.9	0.45
Silver	--	<1.1 - 1.2	<1.3 - <1.5	0.15	0.01 - 5.0(f)	0.05(f)
Sodium	398	555	910		<500 - 50,000	7,800
Thallium	--	<1.1 - 5.6	<1.3 - <6.8		2.2 - 23	8.6
Vanadium	13	<5.7 - 5.9	2.3	0 - 100	<7 - 300	66
Zinc	16	20	<2.9 - 63	60	<5 - 2,900	5.2

(a) Source: Based on 5 background samples as reported in Geraghty & Miller, 1992.
(b) Source: Based on 2 background samples as reported in Geraghty & Miller, 1992.
(c) Source: Gas Research Institute, 1987.
(d) U.S. Geologcal Survey Professional Paper 1270, Element Concentrations in Soils and Other Surficial Material of the Conterminous United States Page 4, Table 1 (unless indicated otherwise).
(e) Source: Manse, et al, 1992.
(f) Data for these metals were not included in the USGS Paper. Concentrations were obtained from the USEPA Office of Solid Waste and Emergency Response, Hazardous Waste Land Treatment, SW-974, April 1983, Page 273, Table 6.45.
(g) Average not established.

2.6.1.2 Nature and Extent of Soil/Bedrock Contamination

The OU-7 RI/BRA completed by Montgomery Watson in May 1996 presented the analytical results for soil/bedrock samples collected prior to, during, and subsequent to the 1994 IRA. However, characterization of the site regarding potential human and ecological health hazards were evaluated based on the concentration of IRA confirmation/delineation samples and previous soil/bedrock samples that were not considered within the confines (vertically or horizontally) of the removal excavation limits. The nature and extent of contamination found in the soil/bedrock of OU-7 presented in this report focuses only on the locations deemed representative of the post IRA site conditions. This consists of 75 samples of which 20 were collected during the 1991 G&M OU-7 RI, 4 from the 1993 Montgomery Watson OU-7 RI, 2 from the 1993 Montgomery Watson OU-3 RI, and 49 from the delineation/confirmation samples from the 1994 IT removal action. Results from the samples considered representative of site conditions have been summarized and are presented in Table 2-13. A more detailed discussion of the soil sampling methodologies and sample results from each investigation can be found in the OU-7 Entomology Storage Area RI/BR (Montgomery Watson, 1996a,b).

Volatile Organic Compounds. Fifty-one of the 75 soil/bedrock samples used to characterize the site were analyzed for VOCs. Of the 51 samples analyzed, there were none that contained concentrations of a VOC that exceeded the FDEP Health Based Soil Target Levels or the Removal Action Levels. Six soil/bedrock samples had no detection of compounds above the method detection limit, while methylene chloride and/or acetone were identified in 29 of the 51 samples. Detections of methylene chloride and acetone compounds in soil samples from at Homestead ARB have been attributed to laboratory or field decontamination artifacts and are not considered representative of site conditions. Xylene was detected above the method detection level in five soil/bedrock samples, each obtained from within the North Area excavation. Concentrations of xylene ranged from 1.0 microgram per kilogram (ug/kg) to 200 ug/kg. Sample CSSB.1, also obtained from the North Area excavation, had detectable concentrations of 1,1-dichlorethene (25 ug/kg), trichloroethene (19 ug/kg), toluene (23 ug/kg), and chlorobenzene (19 ug/kg). Table 2-13 presents a summary of the VOC analytical results. Maps depicting the soil/bedrock sampling locations are provided in Figures 2-5, 2-6, 2-7, and 2-8.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	P2-SL-0016 0-2	P2-SL-0016 2-4	P2-SL-0019 0-2	P2-SL-0019 2-4	P2-SL-0020 0-2	P2-SL-0020 2-4	P2-SL-0021 0-2	P2-SL-0021 2-4
VOA TCL Compounds											
Bromomethane	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	23,000	42,200	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	1,800,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	100	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	15,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	3,500,000	100(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	300,000	50(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes, Total	92,000,000	100(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
BNA TCL Compounds											
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	12,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	30,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	300,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	120,000	224,000	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	41,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Anthracene	4,900	5040	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	500,000	50,300	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Pyrene	500	540	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(A,H)Anthracene	500	505	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Total PAHs			(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/PCB TCL Compounds											
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Heptachlor	500	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Aldrin	200	ND(1)	(ug/kg)	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
Heptachlor Epoxide	300	101	(ug/kg)	<4.8	<4.8	<48	<4.9	<4.9	<4.8	<4.8	<4.9
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<4.8	<4.8	<48	<4.9	<4.9	<4.8	<4.8	<4.9
Dieldrin	300	296	(ug/kg)	<4.8	<4.8	<48	<4.9	<4.9	<4.8	<4.8	<4.9
4,4'-DDE	11,000	12,400	(ug/kg)	15	<4.8	420	<4.9	<4.9	<4.8	<4.8	<4.9
Endrin	470,000	ND(1)	(ug/kg)	<4.8	<4.8	<48	<4.9	<4.9	<4.8	<4.8	<4.9
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<12	<12	<120	<12	<12	<12	<12	<12
4,4'-DDD	17,000	17,500	(ug/kg)	<4.8	<4.8	430	<4.9	<4.9	<4.8	<4.8	<4.9
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<19	<19	<190	<20	<19	<19	<19	<20
4,4'-DDT	12,000	11,300	(ug/kg)	24	14	890	<12	<12	<12	<12	<12
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<96	<96	<960	<98	<97	<96	<95	<98
Endrin Ketone	470,000	ND(1)	(ug/kg)	<19	<19	<190	<20	<19	<19	<19	<20
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	3,000	3,210	(ug/kg)	4.6	3.3	90	<2.4	<2.4	<2.4	<2.4	<2.4
Gamma-Chlordane	3,000	3,210	(ug/kg)	5.1	3.5	100	<2.4	<2.4	<2.4	<2.4	<2.4
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
TAL Metals											
Aluminum	+	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	3	15(3)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Barium	4,000	4,940	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	1	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	600	1,070	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Total	430	160	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	110,000	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Copper	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Iron	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Lead	1,000	108	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	5,500	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	480	23	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	2,600	3.24	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	9,900	389	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Silver	9,000	353	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	4,800	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	560,000	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

<num detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Soc SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bl.	P2-SL-0023 0-2	P2-SL-0023 2-4	P2-SL-0024 2-4	P2-SL-0025 2-4	P2-SL-0026 0-2	P2-SL-0026 2-4	P2-SL-0027 0-2	P2-SL-0027 2-4
VOA TCL Compounds											
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Methylene Chloride	23,000	42,200	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Acetone	1,800,000	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
2-Butanone	15,000,000	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Tetrachloroethene	28,000	ND(1)	(ug/kg)	<12	4800	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Toluene	3,500,000	100(2)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
BNA TCL Compounds											
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<1900	<1900	NA	NA	NA	NA	NA	NA
Naphthalene	12,000,000	1,000(2)	(ug/kg)	50	<390	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	84	<390	NA	NA	NA	NA	NA	NA
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Fluorene	30,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Anthracene	300,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Carbazole	120,000	224,000	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	97	27	NA	NA	NA	NA	NA	NA
Pyrene	41,000,000	1,000(2)	(ug/kg)	92	26	NA	NA	NA	NA	NA	NA
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Benzo(a)Anthracene	4,900	5040	(ug/kg)	67	18	NA	NA	NA	NA	NA	NA
Chrysene	500,000	50,300	(ug/kg)	79	<390	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	130	78	NA	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	69	<390	NA	NA	NA	NA	NA	NA
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	66	<390	NA	NA	NA	NA	NA	NA
Benzo(a)Pyrene	500	540	(ug/kg)	66	14	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	45	<390	NA	NA	NA	NA	NA	NA
Dibenz(A,H)Anthracene	500	505	(ug/kg)	17	<390	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	44	<390	NA	NA	NA	NA	NA	NA
Total PAHs			(ug/kg)	642	85	NA	NA	NA	NA	NA	NA
Pesticide/PCB TCL Compounds											
Alpha BHC	ND(1)	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Beta BHC	ND(1)	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Delta BHC	ND(1)	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Heptachlor	500	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Aldrin	200	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Heptachlor Epoxide	300	101	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Endosulfan I	5,900,000	ND(1)	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Dieldrin	300	296	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
4,4'-DDE	11,000	12,400	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Endrin	470,000	ND(1)	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Endosulfan II	ND(1)	ND(1)	(ug/kg)	NA	NA	13	<12	<11	<12	<11	<13
4,4'-DDD	17,000	17,500	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	NA	NA	20	<19	<18	<19	<18	<21
4,4'-DDT	12,000	11,300	(ug/kg)	NA	NA	13	<12	<11	<12	<11	<13
Methoxychlor	7,800,000	ND(1)	(ug/kg)	NA	NA	100	<95	<90	<94	<91	<110
Endrin Ketone	470,000	ND(1)	(ug/kg)	NA	NA	200	<19	<18	<19	<18	<21
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	3,000	3,210	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Gamma-Chlordane	3,000	3,210	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
TAL Metals											
Aluminum	+	ND(1)	(mg/kg)	3800	1700	NA	NA	NA	NA	NA	NA
Arsenic	3	15(3)	(mg/kg)	2.2	<1.2	NA	NA	NA	NA	NA	NA
Barium	4,000	4,940	(mg/kg)	80	5.8	NA	NA	NA	NA	NA	NA
Beryllium	1	ND(1)	(mg/kg)	<2.8	<2.8	NA	NA	NA	NA	NA	NA
Cadmium	600	1,070	(mg/kg)	<2.8	<2.8	NA	NA	NA	NA	NA	NA
Calcium	ND(1)	ND(1)	(mg/kg)	330000	290000	NA	NA	NA	NA	NA	NA
Chromium, Total	430	160	(mg/kg)	14	8	NA	NA	NA	NA	NA	NA
Cobalt	110,000	ND(1)	(mg/kg)	<1.1	<1.1	NA	NA	NA	NA	NA	NA
Copper	ND(1)	ND(1)	(mg/kg)	4.9	<2.6	NA	NA	NA	NA	NA	NA
Iron	ND(1)	ND(1)	(mg/kg)	3200	970	NA	NA	NA	NA	NA	NA
Lead	1,000	108	(mg/kg)	8.1	1.9	NA	NA	NA	NA	NA	NA
Magnesium	ND(1)	ND(1)	(mg/kg)	1200	1100	NA	NA	NA	NA	NA	NA
Manganese	5,500	ND(1)	(mg/kg)	48	19	NA	NA	NA	NA	NA	NA
Mercury	480	23	(mg/kg)	0.21	<0.12	NA	NA	NA	NA	NA	NA
Nickel	2,600	3.24	(mg/kg)	<4.5	<4.7	NA	NA	NA	NA	NA	NA
Potassium	ND(1)	ND(1)	(mg/kg)	<110	<110	NA	NA	NA	NA	NA	NA
Selenium	9,900	389	(mg/kg)	<5.4	<5.8	NA	NA	NA	NA	NA	NA
Silver	9,000	353	(mg/kg)	<1.1	<1.1	NA	NA	NA	NA	NA	NA
Sodium	ND(1)	ND(1)	(mg/kg)	550	550	NA	NA	NA	NA	NA	NA
Vanadium	4,800	ND(1)	(mg/kg)	6.4	<5.6	NA	NA	NA	NA	NA	NA
Zinc	560,000	ND(1)	(mg/kg)	20	<11	NA	NA	NA	NA	NA	NA

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND.

Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC.

Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT

PR - Previously reported and evaluated during the Soil SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	P2-SL-0029 0-2	P2-SL-0029 2-4	P2-SL-0030 0-2	P2-SL-0030 2-4	P2-SL-0032 0-2	P2-SL-9032 2-4	P2-SL-0033 0-2	P2-SL-0033 2-4
VOA TCL Compounds											
Bromomethane	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	23,000	42,200	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	1,800,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	100	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	15,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	3,500,000	100(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	300,000	50(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes, Total	92,000,000	100(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
BNA TCL Compounds											
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	12,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	30,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	300,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	120,000	224,000	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	41,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Anthracene	4,900	5040	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	500,000	50,300	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Pyrene	500	540	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(A,H)Anthracene	500	505	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Total PAHs			(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/PCB TCL Compounds											
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Heptachlor	500	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Aldrin	200	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Heptachlor Epoxide	300	101	(ug/kg)	<4.5	<4.8	<4.6	<4.9	<2.0	<2.1	<2.0	<2.0
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<4.5	<4.8	<4.6	<4.9	<2.0	<2.1	<2.0	<2.0
Dieldrin	300	296	(ug/kg)	<4.5	<4.8	<4.6	<4.9	<3.8	<4.0	<3.8	<3.9
4,4'-DDE	11,000	12,400	(ug/kg)	43	9.5	5.6	15	5.7	2.1 J	0.71 JP	0.66 J
Endrin	470,000	ND(1)	(ug/kg)	<4.5	<4.8	<4.6	<4.9	<3.8	<4.0	<3.8	<3.9
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<11	<12	<12	<12	<3.8	<4.0	<3.8	<3.9
4,4'-DDD	17,000	17,500	(ug/kg)	12	4.9	<4.6	<4.9	4.8 P	2.4 JP	2.0 J	2.4 JP
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<18	<19	<19	.20	<3.8	<4.0	<3.8	<3.9
4,4'-DDT	12,000	11,300	(ug/kg)	99	39	<12	12	30 B	23 B	2.8 BJ	2.5 BJP
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<91	<96	<93	<98	<20	<21	<20	<20
Endrin Ketone	470,000	ND(1)	(ug/kg)	<18	<19	<19	.20	<3.8	<4.0	<3.8	<3.9
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	NA	NA	NA	NA	<3.8	<4.0	<3.8	<3.9
Alpha-Chlordane	3,000	3,210	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	0.69 JP	<2.0
Gamma-Chlordane	3,000	3,210	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	1.3 J	<2.0
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	<38	<40	<38	<39
TAL Metals											
Aluminum	+	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	3	15(3)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Barium	4,000	4,940	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	1	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	800	1,070	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Total	430	160	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	110,000	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Copper	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Iron	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Lead	1,000	108	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	5,500	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	480	23	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	2,600	3.24	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	9,900	389	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Silver	9,000	353	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	4,800	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	560,000	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

<not detected at specified detection limit

<DL, detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data, analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	SP3-SL-0006 0-1	SP3-SL9006 0-1	NE3 3	SB1.18 1	SB3.18 1	FCN2.4 4	CSNA.1 1
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Methylene Chloride	23,000	42,200	(ug/kg)	PR	PR	<1500	5BJ	5BJ	720BJ	4BJ
Acetone	1,800,000	ND(1)	(ug/kg)	PR	PR	<1500	9BJ	3BJ	500BJ	10BJ
1,1-Dichloromethene	100	ND(1)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
2-Butanone	15,000,000	ND(1)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Toluene	3,500,000	100(2)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Chlorobenzene	300,000	50(2)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Xylenes, Total	92,000,000	100(2)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	11
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Naphthalene	12,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Fluorene	30,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	300J	430J	<2100
Anthracene	300,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	110J	<2100
Carbazole	120,000	224,000	(ug/kg)	PR	PR	<400	<1900	<1900	59J	<2100
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	74J	<2100
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	PR	PR	<400	210J	830J	640	<2100
Pyrene	41,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	790J	540	<2100
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Benzo(a)Anthracene	4,900	5040	(ug/kg)	PR	PR	<400	<1900	490J	330J	<2100
Chrysene	500,000	50,300	(ug/kg)	PR	PR	<400	<1900	560J	390J	<2100
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	96J	<2100
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	PR	PR	<400	<1900	660J	330J	240J
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	PR	PR	<400	<1900	510J	370J	<2100
Benzo(a)Pyrene	500	540	(ug/kg)	PR	PR	<400	<1900	500J	250J	<2100
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	PR	PR	<400	<1900	<1900	230J	<2100
Dibenz(A,H)Anthracene	500	505	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Total PAHs			(ug/kg)	NA	NA	ND	210	4640	3620	240
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Beta BHC	ND(1)	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Delta BHC	ND(1)	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Heptachlor	500	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	4.9	<2.2
Aldrin	200	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Heptachlor Epoxide	300	101	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	4.5P	<2.2
Endosulfan I	5,900,000	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Dieldrin	300	296	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
4,4'-DDE	11,000	12,400	(ug/kg)	PR	PR	<3.9	61	220	98	5.1P
Endrin	470,000	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
Endosulfan II	ND(1)	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
4,4'-DDD	17,000	17,500	(ug/kg)	PR	PR	4.1	23	63	48	8.5
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
4,4'-DDT	12,000	11,300	(ug/kg)	PR	PR	11	110	350	180	69
Methoxychlor	7,800,000	ND(1)	(ug/kg)	PR	PR	<20	<20	<19	<27	<22
Endrin Ketone	470,000	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
Alpha-Chlordane	3,000	3,210	(ug/kg)	PR	PR	11	17	64	150	4.3
Gamma-Chlordane	3,000	3,210	(ug/kg)	PR	PR	9.3	15P	55P	140P	3.3
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	PR	PR	<39	<39	<37	<52	<42
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	2610	3120	384	1570	1030	2060	3660
Arsenic	3	15(3)	(mg/kg)	123	109	12.9	10.6	16.9	<44.5	<40.5
Barium	4,000	4,940	(mg/kg)	11.4	9.8	4.5B	451	156	8.5B	14.8B
Beryllium	1	ND(1)	(mg/kg)	<0.20	<0.20	<0.22	<0.23	<0.23	<0.20	<0.25
Cadmium	600	1,070	(mg/kg)	1.4	1.3	<1.1	<1.2	<1.2	<1.0	1.60 B
Calcium	ND(1)	ND(1)	(mg/kg)	270000	261000	383000	322000	307000	283000	321000
Chromium, Total	430	160	(mg/kg)	8.5	9.5	6.2	6.8	5.6	10	19.1
Cobalt	110,000	ND(1)	(mg/kg)	0.81	<0.41	<11.2	<2.3	<2.3	<10	<12.6
Copper	ND(1)	ND(1)	(mg/kg)	7.6	10.2	<2.2	4.1B	25	8.5 B	8.10 B
Iron	ND(1)	ND(1)	(mg/kg)	1830	2050	204	1090	804	1200	2490
Lead	1,000	108	(mg/kg)	27.4	20.5	2.1	29.9	36.4	17	40.8
Magnesium	ND(1)	ND(1)	(mg/kg)	971	875	797B	1250	1480	924B	1210B
Manganese	5,500	ND(1)	(mg/kg)	69.9	39.2	4.4B	23.7	27.1	22.6	47.2
Mercury	480	23	(mg/kg)	<0.12	<0.12	<0.12	<0.12	<0.10	<0.08	NR
Nickel	2,600	3.24	(mg/kg)	2.2B	1.8B	<22.4	<4.6	<4.6	<20.0	<25.1
Potassium	ND(1)	ND(1)	(mg/kg)	545B	554B	<224	<231	<231	<200	<251
Selenium	9,900	389	(mg/kg)	<4.0	<4.0	<0.44	<0.47	<0.45	<0.40	<0.49
Silver	9,000	353	(mg/kg)	<0.40	<0.40	<5.6	<1.2	<1.2	<5.0	<6.3
Sodium	ND(1)	ND(1)	(mg/kg)	430B	443B	830	598B	423B	607B	653B
Vanadium	4,800	ND(1)	(mg/kg)	5.7B	5.5B	<2.2	4.0B	4.0B	<10.0	<12.6
Zinc	560,000	ND(1)	(mg/kg)	34.4	38.8	9.9B	92.2	18.3	33.6	222

Notes:

< not detected at specified detection limit

<DL detection limit not specidfied

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs

3 - Removal Action Level As Determined by BCT

PR - Previously reported and evaluated during the Site SS-13(OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	CSNA.3 3	CSNB.1 1	CSNB.3 3	CSE.18 1	CSSB.1 1	CSSB.3 3	NW15.1 1
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<13	<12	<12	<55	<58	350J
Methylene Chloride	23,000	42,200	(ug/kg)	3BJ	3BJ	2BJ	3BJ	11BJ	12BJ	300BJ
Acetone	1,800,000	ND(1)	(ug/kg)	31B	29B	<12	<12	<55	200B	780BJ
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<13	<12	<12	25J	<58	<1500
2-Butanone	15,000,000	ND(1)	(ug/kg)	<12	<13	<12	<12	<55	<58	<1500
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<13	<12	<12	<55	<58	<1500
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<13	<12	<12	19J	<58	<1500
Toluene	3,500,000	100(2)	(ug/kg)	<12	<13	<12	<12	23J	<58	<1500
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<13	<12	<12	19J	<58	<1500
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<13	<12	<12	<55	<58	<1500
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Fluorene	30,000,000	1,000(2)	(ug/kg)	56J	<2100	<2000	<410	<730	<380	<400
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	140J	<2100	<2000	<410	110J	73J	<400
Anthracene	300,000,000	1,000(2)	(ug/kg)	140J	<2100	<2000	<410	220J	<380	<400
Carbazole	120,000	224,000	(ug/kg)	310J	<2100	<2000	<410	92J	<380	<400
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	47J	<2100	<2000	<410	<730	<380	<400
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	270J	<2100	<2000	110J	190J	300J	51J
Pyrene	41,000,000	1,000(2)	(ug/kg)	260J	<2100	<2000	100J	220J	360J	47J
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Benzo(a)Anthracene	4,900	5040	(ug/kg)	150J	<2100	<2000	65J	140J	240J	<400
Chrysene	500,000	50,300	(ug/kg)	130J	<2100	<2000	88J	130J	250J	43J
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	89J
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	200J	<2100	<2000	160J	200J	300J	44J
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<400	<2100	<2000	<410	<730	240J	47J
Benzo(a)Pyrene	500	540	(ug/kg)	100J	<2100	<2000	79J	97J	230J	43J
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	83J	<2100	<2000	59J	63J	180J	<400
Dibenz(A,H)Anthracene	500	505	(ug/kg)	35J	<2100	<2000	<410	28J	69J	<400
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	81J	<2100	<2000	130J	55J	160J	52J
Total PAHs			(ug/kg)	17286	ND	ND	7991	12550	2402	416
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	83	12	<2.0
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Heptachlor	500	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	37	6.9	<2.0
Aldrin	200	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Heptachlor Epoxide	300	101	(ug/kg)	<2.0	<2.1	<2.1	<2.1	94	<4.0	<2.0
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Dieldrin	300	296	(ug/kg)	<3.9	<4.1	<4.1	<2.1	<37	<7.8	<4.0
4,4'-DDE	11,000	12,400	(ug/kg)	<3.9	<4.1	<4.1	53	2200	460	<4.0
Endrin	470,000	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
4,4'-DDD	17,000	17,500	(ug/kg)	<3.9	<4.1	<4.1	13P	890	170	<4.0
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
4,4'-DDT	12,000	11,300	(ug/kg)	7.1P	<4.1	6.0P	100	4600	1000	<4.0
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<20	<21	<21	<21	<190	<40	<20
Endrin Ketone	470,000	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
Alpha-Chlordane	3,000	3,210	(ug/kg)	<2.0	<2.1	3.5P	7.1	1800	290	<2.0
Gamma-Chlordane	3,000	3,210	(ug/kg)	<2.0	<2.1	3.6P	5.4	1700P	290	<2.0
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<39	<41	<41	<41	<370	<78	<40
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	2750	3790	1330	4240	3260	4340	537
Arsenic	3	15(3)	(mg/kg)	16.7	30.0 B	<21.7 W	<6.8	6.4	7.9	<3.5
Barium	4,000	4,940	(mg/kg)	6.1B	9.1 B	10.7B	10.2B	11.5B	8.0B	4.0B
Beryllium	1	ND(1)	(mg/kg)	<0.24	<0.24	<0.25	<0.24	0.23B	0.26B	<0.24
Cadmium	600	1,070	(mg/kg)	<1.2	<1.2	<1.2	<6.0	<5.4	<5.6	<1.2
Calcium	ND(1)	ND(1)	(mg/kg)	333000	343000	340000	313000	303000	329000	338000
Chromium, Total	430	160	(mg/kg)	13.6	17.6	10.7	16.3	18.1	17.5	6.1
Cobalt	110,000	ND(1)	(mg/kg)	<12.2	<11.8	<12.3	<11.9	<10.9	<11.1	<12.0
Copper	ND(1)	ND(1)	(mg/kg)	<2.4	<14.90	<6.70	<22.80	26.5	15.1	<2.4
Iron	ND(1)	ND(1)	(mg/kg)	1510 E	2570 E	<1040.00	3510	1960	2370	340
Lead	1,000	108	(mg/kg)	14.3 S	6.60	16.6	<9.30	43.4	26.8	<5.30
Magnesium	ND(1)	ND(1)	(mg/kg)	1050B	1120B	1080B	1180B	1190B	1130	513B
Manganese	5,500	ND(1)	(mg/kg)	22.3 E	72.4 E	119	53.7 B	46.8	66.7	9.5
Mercury	480	23	(mg/kg)	NR	NR	NR	NR	0.39	0.21	<0.12
Nickel	2,600	3.24	(mg/kg)	<24.5	<23.6	<24.5	23.9 B	<21.8	<22.3	<24.1
Potassium	ND(1)	ND(1)	(mg/kg)	<245	<236	<245	330B	<218	<223	<241
Selenium	9,900	389	(mg/kg)	<0.48	<0.48	<0.50	<0.49	<0.41	<0.43	<0.46
Silver	9,000	353	(mg/kg)	<6.1	<5.9	8.4B	7.7B	7.2B	<5.6	<6.0
Sodium	ND(1)	ND(1)	(mg/kg)	688B	484B	751B	548B	525B	630B	709B
Vanadium	4,800	ND(1)	(mg/kg)	<12.2	<11.8	<12.3	<11.9	<10.9	<11.1	<12.0
Zinc	560,000	ND(1)	(mg/kg)	42.3	53.1	52.5 B	139.0 B	41.4	24	6.4B

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bbl.	NW15.3 3	FCN1.6 6	SW10.1 1	E5.1 1	SW5.3 3	CS37.1 1	FCS4.5 5
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Methylene Chloride	23,000	42,200	(ug/kg)	380BJ	<1600	<1500	<1500	<1600	210BJ	260BJ
Acetone	1,800,000	ND(1)	(ug/kg)	340BJ	<1600	<1500	210BJ	420BJ	470BJ	560BJ
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
2-Butanone	15,000,000	ND(1)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Toluene	3,500,000	100(2)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Chlorobenzene	300,000	50(2)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Xylenes, Total	92,000,000	100(2)	(ug/kg)	160BJ	<1600	<1500	<1500	<1600	<1600	<1600
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<2100	<2000	<1900	<2100	470J	<41000
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	3100J
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	8100J
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	<8400
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	1700J
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	2600J
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	3400J
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	430J	<2100	5800J
Anthracene	300,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	6300J
Carbazole	120,000	224,000	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	<8400
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	<400	<2100	<2000	<1900	<2100	380J	<8400
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	87J	<2100	200J	280J	510J	410J	<8400
Pyrene	41,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	260J	350J	450J	<8400
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<2100	<2000	<1900	<2100	3700	<8400
Benzo(a)Anthracene	4,900	5040	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	<8400
Chrysene	500,000	50,300	(ug/kg)	<400	<2100	<2000	340J	310J	390J	<8400
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	190BJ	<2100	<2000	<1900	<2100	2200	<8400
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	67J	<2100	<2000	<1900	<2100	770J	<8400
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	49J	<2100	<2000	500J	<2100	<2100	<8400
Benzo(a)Pyrene	500	540	(ug/kg)	<400	<2100	<2000	240J	350J	320J	<8400
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	64J	<2100	<2000	<1900	<2100	600J	<8400
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<400	<2100	<2000	<1900	<2100	220J	<8400
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	59J	<2100	<2000	<1900	<2100	900J	<8400
Total PAHs			(ug/kg)	516	ND	200	1620	1950	4060	31,000
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	15	<2.1	<2.2	<2.2
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	9.0P
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Heptachlor	500	ND(1)	(ug/kg)	3	<2.1	<2.1	5.6	<2.1	<2.2	18P
Aldrin	200	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Heptachlor Epoxide	300	101	(ug/kg)	3.9	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Dieldrin	300	296	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	<4.2	11P
4,4'-DDE	11,000	12,400	(ug/kg)	23	<4.2	8	250	10	<4.2	43
Endrin	470,000	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	11P	11P
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	8.5P	<4.2
4,4'-DDD	17,000	17,500	(ug/kg)	10	3.6	5.9	110	8.4	11P	650
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	7.4P	<4.2
4,4'-DDT	12,000	11,300	(ug/kg)	62	16	20	420	24	110P	870
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<20	<21	<21	<20	<21	120P	<22
Endrin Ketone	470,000	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	38P	<4.2
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	26	<4.2
Alpha-Chlordane	3,000	3,210	(ug/kg)	110	6.5	21	200	25	15	72P
Gamma-Chlordane	3,000	3,210	(ug/kg)	110	6.9	22	200	26	30P	96P
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	56	<42	<42	<39	<42	<42	<42
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	1040	391	681	7270	1610	5290	291
Arsenic	3	15(3)	(mg/kg)	<10.6	3.8 B	<6.8	11	17.0 B	<12.9	8.8 B
Barium	4,000	4,940	(mg/kg)	5.5B	52B	5.2B	13.4B	6.6B	482.0 B	5.9B
Beryllium	1	ND(1)	(mg/kg)	<0.24	<0.24	<0.24	<0.23	<0.25	0.42B	<0.25
Cadmium	600	1,070	(mg/kg)	<1.2	<1.2	<1.2	<1.1	<1.2	<27.10	<1.3
Calcium	ND(1)	ND(1)	(mg/kg)	353000	357000	350000	270000	363000	261000	398000
Chromium, Total	430	160	(mg/kg)	9.4	5.5	7.6	27.4	9.7	124	6.3
Cobalt	110,000	ND(1)	(mg/kg)	<12.0	<12.2	<11.8	<11.5	<12.5	<12.7	<12.5
Copper	ND(1)	ND(1)	(mg/kg)	<11.30	<2.4	<2.4	<9.80	3.6B	308.0 B	<2.5
Iron	ND(1)	ND(1)	(mg/kg)	1190	<203	484	4650	960	20400	132 E
Lead	1,000	108	(mg/kg)	31.6	3.7	6.7	17.4	13.9	6050.0	7.2
Magnesium	ND(1)	ND(1)	(mg/kg)	553B	857B	844B	1490B	1160B	3130B	1160B
Manganese	5,500	ND(1)	(mg/kg)	27.3	5.6B	9.8B	81.5	29.1	191	<2.5
Mercury	480	23	(mg/kg)	<0.11	<0.12	<0.10	<0.12	<0.12	<0.14	<0.10
Nickel	2,600	3.24	(mg/kg)	<24.0	<24.4	<23.6	<22.9	<24.9	37.3B	<25.1
Potassium	ND(1)	ND(1)	(mg/kg)	<240	<244	<236	<229	<249	341B	<251
Selenium	9,900	389	(mg/kg)	<0.48	<0.50	<0.48	<0.46	<0.49	0.50B	<0.49
Silver	9,000	353	(mg/kg)	<6.0	<6.1	<5.9	<5.7	<6.2	<6.3	<6.3
Sodium	ND(1)	ND(1)	(mg/kg)	722B	846B	724B	356B	706B	537B	1100B
Vanadium	4,800	ND(1)	(mg/kg)	<12.0	<12.2	<11.8	11.6 B	<12.5	<12.7	<2.5
Zinc	560,000	ND(1)	(mg/kg)	59.3 B	8.8 B	12.6B	39.5 B	18.2	1460	18.7B

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	FCS7.5 5	FCSN3.4 4	FCSN4.4 4	NS.1 1	NW5.3 3	SE5.3 3	CS15.1 1
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Methylene Chloride	23,000	42,200	(ug/kg)	470BJ	370BJ	260BJ	490BJ	270BJ	490BJ	6J
Acetone	1,800,000	ND(1)	(ug/kg)	<1600	670J	<2000	<1500	230BJ	<1500	4J
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
2-Butanone	15,000,000	ND(1)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Toluene	3,500,000	100(2)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Chlorobenzene	300,000	50(2)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<1600	200J	<2000	<1500	160BJ	<1500	<12
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<2100	<8100	<1100	<2000	<8000	<770	<380
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	49J
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	44J	<8100	<1100	<2000	<8000	<770	61
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Fluorene	30,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	110J
Anthracene	300,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Carbazole	120,000	224,000	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	47J	<8100	<1100	<2000	<8000	<770	100BJ
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	350J	140J
Pyrene	41,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	180J
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Benzo(a)Anthracene	4,900	5040	(ug/kg)	<430	<8100	<1100	<2000	<8000	380J	100J
Chrysene	500,000	50,300	(ug/kg)	<430	<8100	<1100	<2000	<8000	260J	150J
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	63J	<8100	<1100	<2000	<8000	<770	<380
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	<430	<8100	<1100	<2000	<8000	130J	330J
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<430	<8100	<1100	<2000	<8000	180J	<380
Benzo(a)Pyrene	500	540	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	130J
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	100J
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	41J
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Total PAHs			(ug/kg)	44	ND	ND	ND	ND	1290	1381
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.2	<2.1	<2.8	<DL	<2.0	<2.0	<3.9
Beta BHC	ND(1)	ND(1)	(ug/kg)	4.4P	4.1	<2.8	<DL	<2.0	<2.0	<3.9
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.2	<2.1	<2.8	<DL	4.4	<2.0	<3.9
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	10P	<2.1	<2.8	<DL	<2.0	<2.0	<3.9
Heptachlor	500	ND(1)	(ug/kg)	450P	<2.1	<2.8	<DL	4.9	<2.0	4.7P
Aldrin	200	ND(1)	(ug/kg)	38P	<2.1	<2.8	<DL	<2.0	<2.0	<3.9
Heptachlor Epoxide	300	101	(ug/kg)	<2.2	3.8	<2.8	7.7	13	<2.0	<3.9
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.2	<2.1	<2.8	<DL	<2.0	<2.0	<3.9
Dieldrin	300	296	(ug/kg)	50P	<4.1	<5.4	<DL	<4.0	8.2	<7.7
4,4'-DDE	11,000	12,400	(ug/kg)	120	30	7.2	21	30	350	960
Endrin	470,000	ND(1)	(ug/kg)	230P	<4.1	<5.4	<DL	36	18	<7.7
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<4.2	<4.1	<5.4	<DL	8.0	<4.0	<7.7
4,4'-DDD	17,000	17,500	(ug/kg)	290P	31	10	<DL	33	340	180P
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<4.2	<4.1	<5.4	<DL	5.8	<4.0	<7.7
4,4'-DDT	12,000	11,300	(ug/kg)	700	120	17	<DL	170	750	1100
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<22	<21	<28	<DL	<20	<20	<39
Endrin Ketone	470,000	ND(1)	(ug/kg)	<4.2	<4.1	<5.4	<DL	23	11	<7.7
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<4.2	<4.1	<5.4	<DL	18	<4.0	<7.7
Alpha-Chlordane	3,000	3,210	(ug/kg)	570P	70	12	99	250	46	91P
Gamma-Chlordane	3,000	3,210	(ug/kg)	610P	84	16	130	350	96	90
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<42	<41	<54	<DL	<40	<40	<77
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	199	785	52800	1860	1520	2830	2940
Arsenic	3	15(3)	(mg/kg)	0.88B	12.4	10.8	32.8	17.4	4	63.0
Barium	4,000	4,940	(mg/kg)	5.5B	6.8B	133	12.8B	9.5B	9.8B	206B
Beryllium	1	ND(1)	(mg/kg)	<0.25	<0.24	2.5	<0.24	<0.23	<0.23	0.53B
Cadmium	600	1,070	(mg/kg)	<1.3	<6.0	<1.6	<1.2	<5.7	<1.1	<5.7
Calcium	ND(1)	ND(1)	(mg/kg)	408000	370000	48400	355000	337000	294000	274000
Chromium, Total	430	160	(mg/kg)	6.3	13.7	145	10.7	11.9	11.3	17.2
Cobalt	110,000	ND(1)	(mg/kg)	<12.6	<12.0	10.0B	<12.2	<11.4	<11.4	<11.4
Copper	ND(1)	ND(1)	(mg/kg)	<2.5	2.7B	10.5	4.6B	13.6	13	14.2B
Iron	ND(1)	ND(1)	(mg/kg)	86.5	512	46200	1380	2200	1760	4660
Lead	1,000	108	(mg/kg)	2.7	5.4	114	15.6	67.1	14.6	19.4
Magnesium	ND(1)	ND(1)	(mg/kg)	1160B	1180B	2880	1080B	884B	1110B	1020
Manganese	5,500	ND(1)	(mg/kg)	<2.5	56.2	167	39	51.7	32.1	48.1
Mercury	480	23	(mg/kg)	<0.11	<0.12	<0.16	<0.12	<0.11	<0.11	<0.11
Nickel	2,600	3.34	(mg/kg)	<25.2	<23.9	22.9	<24.3	<22.8	<22.9	<22.8
Potassium	ND(1)	ND(1)	(mg/kg)	<252	<239	1320B	<243	<228	<229	<1140
Selenium	9,900	389	(mg/kg)	<0.52	49	<0.63	<0.46	<0.46	<0.47	<0.46
Silver	9,000	353	(mg/kg)	<6.3	<6.0	<1.6	<6.1	<5.7	<5.7	<5.7
Sodium	ND(1)	ND(1)	(mg/kg)	1170B	872B	336B	518B	588B	442B	695B
Vanadium	4,800	ND(1)	(mg/kg)	<2.5	<12.0	109	<12.2	<11.4	<11.4	<11.4
Zinc	560,000	ND(1)	(mg/kg)	14.3B	13.7B	43.6	175	129	38.2	79.4

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value. <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	CS15.3 3	CS19.1 1	CS19.3 3	CS23.1 1	CS23.3 3	CS24.1 1	CS24.3 3
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Methylene Chloride	23,000	42,200	(ug/kg)	6J	6J	7J	6J	10J	8J	8J
Acetone	1,800,000	ND(1)	(ug/kg)	4J	3200E	830E	<12	22	75	4J
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
2-Butanone	15,000,000	ND(1)	(ug/kg)	<12	<12	<12	<12	2J	3J	<13
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Toluene	3,500,000	100(2)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	46J	120J	<410	<1900	<820	580J	<830
Anthracene	300,000,000	1,000(2)	(ug/kg)	45J	<390	<410	<1900	<820	1400J	<830
Carbazole	120,000	224,000	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	61BJ	110BJ	61BJ	<1900	97BJ	<4100	110BJ
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	100J	140J	<410	<1900	<820	3900J	340J
Pyrene	41,000,000	1,000(2)	(ug/kg)	130J	140J	<410	<1900	<820	6600	430J
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<390	<410	<1900	<820	720J	<830
Benzo(a)Anthracene	4,900	5040	(ug/kg)	75J	69J	<410	<1900	<820	4900	340J
Chrysene	500,000	50,300	(ug/kg)	100J	81J	<410	<1900	<820	5300	400J
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	50BJ	58BJ	65BJ	<1900	<820	<4100	<830
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	190J	150J	<410	<1900	<820	7400	910
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<400	<390	<410	190J	<820	7400	<830
Benzo(a)Pyrene	500	540	(ug/kg)	82J	49J	<410	<1900	<820	4300	350J
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	73J	<390	<410	<1900	<820	3200	280J
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<400	<390	<410	<1900	<820	1600	120J
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Total PAHs			(ug/kg)	586	599	ND	190	ND	43,380	3,170
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Heptachlor	500	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	5.5P	NR	20P
Aldrin	200	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Heptachlor Epoxide	300	101	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Dieldrin	300	296	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	<4.2
4,4'-DDE	11,000	12,400	(ug/kg)	180P	64	76P	NR	170	NR	120
Endrin	470,000	ND(1)	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	<4.2
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	<4.2
4,4'-DDD	17,000	17,500	(ug/kg)	32P	13P	12P	NR	48P	NR	77P
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	<4.2
4,4'-DDT	12,000	11,300	(ug/kg)	270	190	80	NR	310PZ	NR	340
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<21	<21	<21	NR	<21	NR	<21
Endrin Ketone	470,000	ND(1)	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	5.9P
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<4.1	6.6P	<4.1	NR	<4.2	NR	2.7
Alpha-Chlordane	3,000	3,210	(ug/kg)	20P	11P	10.0	NR	38PZ	NR	170
Gamma-Chlordane	3,000	3,210	(ug/kg)	18P	13P	7.5P	NR	44Z	NR	170
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<41	48P	<41	NR	62P	NR	<42
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	1590	3320	1160	4510	21500	4220	1280
Arsenic	3	15(3)	(mg/kg)	<47.3	46.9	7.4	16.9	6.3	47.8	7.2
Barium	4,000	4,940	(mg/kg)	9.5B	12.1B	8.9B	12.8B	12.5B	64.2B	16.0B
Beryllium	1	ND(1)	(mg/kg)	0.44B	0.57B	0.3B	0.69B	1.4	0.73B	0.45B
Cadmium	600	1,070	(mg/kg)	<6.1	<5.9	<5.8	22.6	10.9	<6.0	<6.3
Calcium	ND(1)	ND(1)	(mg/kg)	350000	345000	356000	334000	240000	286000	369000
Chromium, Total	430	160	(mg/kg)	11.8	18.3	9.7	18.0	58.4	21.9	10.1
Cobalt	110,000	ND(1)	(mg/kg)	<12.2	<11.9	<11.7	<11.9	<12.5	<12.0	<12.6
Copper	ND(1)	ND(1)	(mg/kg)	<12.2	12.0B	<11.7	<11.9	<12.5	22.1B	<12.6
Iron	ND(1)	ND(1)	(mg/kg)	1660	2280	689	2450	14400	4350	889
Lead	1,000	108	(mg/kg)	<8.80	27.1	7.2	8.0	16.5	317	68.6
Magnesium	ND(1)	ND(1)	(mg/kg)	1090B	1340B	1030B	1170B	2330	1550B	1420B
Manganese	5,500	ND(1)	(mg/kg)	21.5 B	110	29.7	61.4	199	67.2	21.5
Mercury	480	23	(mg/kg)	<0.12	<0.11	<0.12	<0.12	<0.13	<0.12	<0.13
Nickel	2,600	3.24	(mg/kg)	<24.3	<23.7	<23.4	<23.8	<24.9	<23.9	<25.3
Potassium	ND(1)	ND(1)	(mg/kg)	<1220	<1190	<1170	<1190	<1250	<1200	<1260
Selenium	9,900	389	(mg/kg)	<0.47	<0.46	<0.46	<0.46	<0.48	<0.48	<0.51
Silver	9,000	353	(mg/kg)	<6.1	<5.9	<5.8	6.0B	<6.2	<6.0	<6.3
Sodium	ND(1)	ND(1)	(mg/kg)	913B	682B	865B	885B	358B	811B	1090B
Vanadium	4,800	ND(1)	(mg/kg)	<12.2	<11.9	<11.7	<11.9	26.7B	<12.0	<12.6
Zinc	560,000	ND(1)	(mg/kg)	39.0 B	26.6	20.2	18.6B	11.0B	80.7	28.2

Notes:

<not detected at specified detection limit

<DL detection limit not specidified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data, analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND.
Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC.
Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bl.	CS25.1 1	CS25.3 3	CS27.1 1	CS27.3 3	CS29.1 1	CS29.3 3	CS30.1 1
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
Methylene Chloride	23,000	42,200	(ug/kg)	7J	8J	8J	7J	<1400	<1500	160J
Acetone	1,800,000	ND(1)	(ug/kg)	4J	11J	7J	5J	140J	1600	560J
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
2-Butanone	15,000,000	ND(1)	(ug/kg)	3J	<13	3J	3J	<1400	<1500	<1500
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
Toluene	3,500,000	100(2)	(ug/kg)	1J	<13	<12	<12	<1400	<1500	<1500
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	43J	<430	<2000	<400	<1800	<400	<780
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<430	310J	41J	<1800	<400	<780
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<400	<430	240J	310J	<1800	<400	<780
Anthracene	300,000,000	1,000(2)	(ug/kg)	<400	<430	330J	94J	<1800	<400	<780
Carbazole	120,000	224,000	(ug/kg)	<400	<430	<2000	50J	<1800	<400	<780
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	56BJ	86BJ	<2000	70BJ	<1800	59J	<780
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	<400	<430	780J	360BJ	<1800	<400	<780
Pyrene	41,000,000	1,000(2)	(ug/kg)	<400	<430	1400J	430	<1800	<400	<780
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Benzo(a)Anthracene	4,900	5040	(ug/kg)	<400	<430	780J	320J	<1800	<400	<780
Chrysene	500,000	50,300	(ug/kg)	<400	<430	1000J	240J	<1800	<400	<780
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	<400	45J	<2000	45BJ	<1800	<400	<780
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	<400	<430	2300	420	<1800	<400	<780
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Benzo(a)Pyrene	500	540	(ug/kg)	<400	<430	870J	150J	<1800	<400	<780
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Total PAHs			(ug/kg)	43	ND	8,010	1,945	ND	ND	ND
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Heptachlor	500	ND(1)	(ug/kg)	<2.1	<2.2	2.2P	2IP	<1.9	<2.1	4.6
Aldrin	200	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Heptachlor Epoxide	300	101	(ug/kg)	6.8	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Dieldrin	300	296	(ug/kg)	<4.1	<4.2	<4.0	<7.9	<1.9	<4.0	<3.9
4,4'-DDE	11,000	12,400	(ug/kg)	10P	<4.2	8.0	23P	7.8	<4.0	170P
Endrin	470,000	ND(1)	(ug/kg)	<4.1	<4.2	<4.0	<7.9	<3.6	<4.0	<3.9
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<4.1	<4.2	<4.0	<7.9	<3.6	<4.0	<3.9
4,4'-DDD	17,000	17,500	(ug/kg)	<4.1	<4.2	49	9B	10	4.6P	41P
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<4.1	<4.2	<4.0	<7.9	<3.6	<4.0	<3.9
4,4'-DDT	12,000	11,300	(ug/kg)	41	16	170	800P	160	30	180P
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<21	<20	<20	<41	<19	<21	<20
Endrin Ketone	470,000	ND(1)	(ug/kg)	<4.1	<4.2	8.5	<7.9	<3.6	<4.0	<3.9
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<4.1	<4.2	5.1P	<7.9	8.5	<4.0	<3.9
Alpha-Chlordane	3,000	3,210	(ug/kg)	61P	6.1	13P	7B	6.3	3.0	31P
Gamma-Chlordane	3,000	3,210	(ug/kg)	56	5.3P	13	32	6.6P	2.6P	31
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<41	<42	<40	<79	<36	<40	<39
TAL Metals										
Aluminum	*	ND(1)	(mg/kg)	17700	2410	2710	2680	5130	1020	2970
Arsenic	3	15(3)	(mg/kg)	4.3	1.7B	48.7	20	2.9	0.62B	8.8
Barium	4,000	4,940	(mg/kg)	10.1B	5.9B	17.4B	11.1B	10.3B	5.9B	7.9B
Beryllium	1	ND(1)	(mg/kg)	1.1B	0.71	0.64B	0.6	0.41B	0.26B	0.25B
Cadmium	600	1,070	(mg/kg)	<5.9	<6.3	<5.8	<5.6	<5.1	<1.2	<1.2
Calcium	ND(1)	ND(1)	(mg/kg)	241000	358000	331000	357000	324000	395000	380000
Chromium, Total	430	160	(mg/kg)	61.5	12.7	12.7	13.1	19.9	8.0	13.4
Cobalt	110,000	ND(1)	(mg/kg)	<11.7	<12.6	<11.7	<11.2	<10.8	<12.1	<11.9
Copper	ND(1)	ND(1)	(mg/kg)	<11.7	<12.6	<11.7	<11.2	<10.8	<12.1	3.4B
Iron	ND(1)	ND(1)	(mg/kg)	15500	1250	1770	2010	3670	575	2210
Lead	1,000	108	(mg/kg)	17.3	6.0	48.8	30.1	16.7	0.86	10.1
Magnesium	ND(1)	ND(1)	(mg/kg)	16508	1200B	1560B	1310B	1090B	1170B	1180B
Manganese	5,500	ND(1)	(mg/kg)	101	12.4B	232	33.3	119	16.8B	39
Mercury	480	23	(mg/kg)	<0.12	<0.13	<0.11	<0.12	<0.10	<0.11	<0.11
Nickel	2,600	3.24	(mg/kg)	<23.4	<25.3	<23.2	<22.4	<21.5	<24.2	<23.8
Potassium	ND(1)	ND(1)	(mg/kg)	<1170	<1260	<1170	<1120	<215	<242	<238
Selenium	9,900	389	(mg/kg)	<0.49	<0.49	<0.48	<0.47	<0.43	<0.48	<0.47
Silver	9,000	353	(mg/kg)	<5.9	<6.3	6.0B	<5.6	5.8B	<6.0	6.4B
Sodium	ND(1)	ND(1)	(mg/kg)	508B	739B	695B	796B	807B	1040B	904B
Vanadium	4,800	ND(1)	(mg/kg)	26.5B	<12.6	<11.7	<11.2	<2.2	<12.1	<11.9
Zinc	560,000	ND(1)	(mg/kg)	16.4B	8.0B	26.0	28.1	16.9B	14.4B	21.1B

Notes:

<not detected at specified detection limit

<DL, detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bbl.	CS30.3 3	FCS1.3 3	FCS2.3 3	FCS3.3 3	FCS5.3 3	FCS6.3 3	CS28.3 3
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Methylene Chloride	23,000	42,200	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Acetone	1,800,000	ND(1)	(ug/kg)	400J	1300J	<1500	430J	<1500	380J	3BJ
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
2-Butanone	15,000,000	ND(1)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Toluene	3,500,000	100(2)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Chlorobenzene	300,000	50(2)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<400	<390	110J	<410	63J	63J	<410
Anthracene	300,000,000	1,000(2)	(ug/kg)	<400	<390	130J	<410	<390	<390	<410
Carbazole	120,000	224,000	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	<400	130J	130J	<410	<390	72J	97BJ
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	<400	<390	680	<410	210J	54J	<410
Pyrene	41,000,000	1,000(2)	(ug/kg)	<400	<390	560	54J	280J	84J	<410
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Benzo(a)Anthracene	4,900	5040	(ug/kg)	<400	<390	150	<410	200J	<390	<410
Chrysene	500,000	50,300	(ug/kg)	<400	<390	120J	<410	220J	<390	<410
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<400	<390	120J	<410	370J	<390	<410
Benzo(a)Pyrene	500	540	(ug/kg)	<400	<390	54J	<410	170J	55J	<410
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	<400	<390	<390	<410	140J	<390	<410
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<400	<390	<390	<410	60J	<390	<410
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	<400	<390	<390	<410	140J	44J	<410
Total PAHs			(ug/kg)	ND	ND	1,924	54	1,853	300	ND
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Heptachlor	500	ND(1)	(ug/kg)	<2.1	4.6	13	5.9	29	20	<2.1
Aldrin	200	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Heptachlor Epoxide	300	101	(ug/kg)	<2.1	<2.0	<2.0	<2.1	7.1	<DL	<2.1
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Dieldrin	300	296	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
4,4'-DDE	11,000	12,400	(ug/kg)	11	6.2	15	13	150	28	6.9
Endrin	470,000	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
4,4'-DDD	17,000	17,500	(ug/kg)	4.9P	13	38P	100	23	97	<4.1
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
4,4'-DDT	12,000	11,300	(ug/kg)	28	60	140P	460P	260	380	12P
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<21	<20	<20	<21	<DL	<DL	<21
Endrin Ketone	470,000	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
Alpha-Chlordane	3,000	3,210	(ug/kg)	4.0	8.7	47	30.0	270	130	8.0
Gamma-Chlordane	3,000	3,210	(ug/kg)	3.5P	7.3P	43P	26	220	120	7.2
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<41	<39	<39	<41	<DL	<DL	<41
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	725	380	1530	727	1340	688	699
Arsenic	3	15(3)	(mg/kg)	2.2B	1.4B	27.4	8.4	12.8	1.1B	1.3B
Barium	4,000	4,940	(mg/kg)	5.3B	4.5B	5.5B	5.4B	6.6B	7.8B	11.8B
Beryllium	1	ND(1)	(mg/kg)	<0.23	<0.23	<0.24	0.26B	0.25B	0.25B	<2.3
Cadmium	600	1,070	(mg/kg)	<1.1	<1.2	<5.9	<1.2	<5.9	<5.8	<11.5
Calcium	ND(1)	ND(1)	(mg/kg)	370000	385000	380000	388000	343000	365000	726000
Chromium, Total	430	160	(mg/kg)	7.0	5.9	8.7	7.7	9.7	8.1	<23.1
Cobalt	110,000	ND(1)	(mg/kg)	<11.5	<11.6	<11.8	<12.3	<11.8	<11.6	<23.1
Copper	ND(1)	ND(1)	(mg/kg)	<11.5	<2.3	<11.8	<2.5	<2.4	<2.3	<23.1
Iron	ND(1)	ND(1)	(mg/kg)	365	197	862	377	749	408	322
Lead	1,000	108	(mg/kg)	3.6	1.0	1.7	0.79	38.5	11.0	0.85
Magnesium	ND(1)	ND(1)	(mg/kg)	864B	1090	1130B	998B	898B	1130B	2200B
Manganese	5,500	ND(1)	(mg/kg)	5.6B	4.6B	10.9B	3.0B	13.5	12.3B	10.2B
Mercury	480	23	(mg/kg)	<0.11	<0.11	<0.12	<0.12	<0.12	<0.10	<0.12
Nickel	2,600	3.24	(mg/kg)	<22.9	<23.2	<23.5	<24.5	<23.6	<23.3	<46.1
Potassium	ND(1)	ND(1)	(mg/kg)	<229	<232	<235	<245	<236	<233	<2310
Selenium	9,900	389	(mg/kg)	<0.46	<0.47	<0.47	<0.47	<0.45	<0.46	<0.48
Silver	9,000	353	(mg/kg)	6.9B	7.9B	6.8B	<6.1	<5.9	5.6B	19.7B
Sodium	ND(1)	ND(1)	(mg/kg)	978B	901B	833B	998B	952	953B	1700B
Vanadium	4,800	ND(1)	(mg/kg)	<2.3	<11.6	<11.8	<12.3	<11.8	<11.6	<23.1
Zinc	560,000	ND(1)	(mg/kg)	11.7B	13.0B	<5.9	<6.1	16.6B	<16.0B	13.7B

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data, analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC.

Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs

3 - Removal Action Level As Determined by BCT

PR - Previously reported and evaluated during the Site SS-11(XX)-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	CS28.1 1	CS34.1 1
VOA TCL Compounds					
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<1400
Methylene Chloride	23,000	42,200	(ug/kg)	<12	<1400
Acetone	1,800,000	ND(1)	(ug/kg)	4BJ	<1400
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<1400
2-Butanone	15,000,000	ND(1)	(ug/kg)	<12	<1400
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<1400
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<1400
Toluene	3,500,000	100(2)	(ug/kg)	<12	<1400
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<1400
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<1400
BNA TCL Compounds					
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<1900
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<1900
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<1900
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	57J	<1900
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<1900
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<1900
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<1900
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<400	400J
Anthracene	300,000,000	1,000(2)	(ug/kg)	<400	190J
Carbazole	120,000	224,000	(ug/kg)	<400	250J
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	180BJ	<1900
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	150J	220J
Pyrene	41,000,000	1,000(2)	(ug/kg)	210J	270J
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	240J
Benzo(a)Anthracene	4,900	5040	(ug/kg)	170J	150J
Chrysene	500,000	50,300	(ug/kg)	170J	190J
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	52J	<1900
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	220J	250J
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	220J	200J
Benzo(a)Pyrene	500	540	(ug/kg)	170J	180J
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	150J	120J
Dibenz(A,H)Anthracene	500	505	(ug/kg)	78J	<1900
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	120J	110J
Total PAHs			(ug/kg)	1,715	19,450
Pesticide/PCB TCL Compounds					
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<1.9
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<1.9
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<1.9
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.0	<1.9
Heptachlor	500	ND(1)	(ug/kg)	<2.0	<1.9
Aldrin	200	ND(1)	(ug/kg)	<2.0	<1.9
Heptachlor Epoxide	300	101	(ug/kg)	<2.0	<1.9
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.0	<1.9
Dieldrin	300	296	(ug/kg)	<3.9	<1.9
4,4'-DDE	11,000	12,400	(ug/kg)	120	11
Endrin	470,000	ND(1)	(ug/kg)	<3.9	<3.6
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<3.9	<3.6
4,4'-DDD	17,000	17,500	(ug/kg)	16	22P
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<3.9	<3.6
4,4'-DDT	12,000	11,300	(ug/kg)	150	74
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<20	<19
Endrin Ketone	470,000	ND(1)	(ug/kg)	<3.9	10
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<3.9	<3.6
Alpha-Chlordane	3,000	3,210	(ug/kg)	32	7.5
Gamma-Chlordane	3,000	3,210	(ug/kg)	28	6.7
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<39	97P
TAL Metals					
Aluminum	+	ND(1)	(mg/kg)	4020	3200
Arsenic	3	15(3)	(mg/kg)	13.0	24.5
Barium	4,000	4,940	(mg/kg)	18.0B	32.1B
Beryllium	1	ND(1)	(mg/kg)	<2.4	<0.22
Cadmium	800	1,070	(mg/kg)	<11.9	1.6
Calcium	ND(1)	ND(1)	(mg/kg)	716000	250000
Chromium, Total	430	160	(mg/kg)	32.8	19.1
Cobalt	110,000	ND(1)	(mg/kg)	<23.8	<10.8
Copper	ND(1)	ND(1)	(mg/kg)	<23.8	30.7
Iron	ND(1)	ND(1)	(mg/kg)	2860	3710
Lead	1,000	108	(mg/kg)	14.2	209
Magnesium	ND(1)	ND(1)	(mg/kg)	<2320B	1040B
Manganese	5,500	ND(1)	(mg/kg)	85.4	56.4
Mercury	480	23	(mg/kg)	<0.10	<0.09
Nickel	2,600	3.24	(mg/kg)	<47.6	<21.6
Potassium	ND(1)	ND(1)	(mg/kg)	<2380	<216
Selenium	9,900	389	(mg/kg)	<0.44	<0.43
Silver	9,000	353	(mg/kg)	20.0B	<5.4
Sodium	ND(1)	ND(1)	(mg/kg)	1480B	556B
Vanadium	4,800	ND(1)	(mg/kg)	<23.8	<10.8
Zinc	560,000	ND(1)	(mg/kg)	13.4B	84.7

Notes:

<not detected at specified detection limit
<DL detection limit not specified
J - Estimated value, <CRQL
P - >25% difference in detected value between columns
B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples
NR - Not Reported
1 - ND - No data, analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.
2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.
3 - Removal Action Level As Determined by BCT.
PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA
Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	P2-SL-0016 0-2	P2-SL-0016 2-4	P2-SL-0019 0-2	P2-SL-0019 2-4	P2-SL-0020 0-2	P2-SL-0020 2-4	P2-SL-0021 0-2	P2-SL-0021 2-4
VOA TCL Compounds											
Bromomethane	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	23,000	42,200	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	1,800,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	100	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	15,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	3,500,000	100(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	300,000	50(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes, Total	92,000,000	100(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
BNA TCL Compounds											
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	12,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	30,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	300,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	120,000	224,000	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	41,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Anthracene	4,900	5040	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	500,000	50,300	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Pyrene	500	540	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(A,H)Anthracene	500	505	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Total PAHs			(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/PCB TCL Compounds											
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Heptachlor	500	ND(1)	(ug/kg)	<2.4	<2.4	<24	<2.4	<2.4	<2.4	<2.4	<2.4
Aldrin	200	ND(1)	(ug/kg)	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4	<2.4
Heptachlor Epoxide	300	101	(ug/kg)	<4.8	<4.8	<48	<4.9	<4.9	<4.8	<4.8	<4.9
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<4.8	<4.8	<48	<4.9	<4.9	<4.8	<4.8	<4.9
Dieldrin	300	296	(ug/kg)	<4.8	<4.8	<48	<4.9	<4.9	<4.8	<4.8	<4.9
4,4'-DDE	11,000	12,400	(ug/kg)	15	<4.8	420	<4.9	<4.9	<4.8	<4.8	<4.9
Endrin	470,000	ND(1)	(ug/kg)	<4.8	<4.8	<48	<4.9	<4.9	<4.8	<4.8	<4.9
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<12	<12	<120	<12	<12	<12	<12	<12
4,4'-DDD	17,000	17,500	(ug/kg)	<4.8	<4.8	430	<4.9	<4.9	<4.8	<4.8	<4.9
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<19	<19	<190	<20	<19	<19	<19	<20
4,4'-DDT	12,000	11,300	(ug/kg)	24	14	890	<12	<12	<12	<12	<12
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<96	<96	<960	<98	<97	<96	<95	<98
Endrin Ketone	470,000	ND(1)	(ug/kg)	<19	<19	<190	<20	<19	<19	<19	<20
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	3,000	3,210	(ug/kg)	4.6	3.3	90	<2.4	<2.4	<2.4	<2.4	<2.4
Gamma-Chlordane	3,000	3,210	(ug/kg)	5.1	3.5	100	<2.4	<2.4	<2.4	<2.4	<2.4
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
TAL Metals											
Aluminum	+	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	3	15(3)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Barium	4,000	4,940	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	1	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	600	1,070	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Total	430	160	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	110,000	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Copper	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Iron	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Lead	1,000	108	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	5,500	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	480	23	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	2,600	3.24	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	9,900	389	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Silver	9,000	353	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	4,800	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	560,000	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

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1 - ND - No data, analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND.
Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC.
Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	P2-SL-0023 0-2	P2-SL-0023 2-4	P2-SL-0024 2-4	P2-SL-0025 2-4	P2-SL-0026 0-2	P2-SL-0026 2-4	P2-SL-0027 0-2	P2-SL-0027 2-4
VOA TCL Compounds											
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Methylene Chloride	23,000	42,200	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Acetone	1,800,000	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
2-Butanone	15,000,000	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Tetrachloroethene	28,000	ND(1)	(ug/kg)	<12	4800	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Toluene	3,500,000	100(2)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<730	NA	NA	NA	NA	NA	NA
BNA TCL Compounds											
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<1900	<1900	NA	NA	NA	NA	NA	NA
Naphthalene	12,000,000	1,000(2)	(ug/kg)	50	<390	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	84	<390	NA	NA	NA	NA	NA	NA
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Fluorene	30,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Anthracene	300,000,000	1,000(2)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Carbazole	120,000	224,000	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	97	27	NA	NA	NA	NA	NA	NA
Pyrene	41,000,000	1,000(2)	(ug/kg)	92	26	NA	NA	NA	NA	NA	NA
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<390	<390	NA	NA	NA	NA	NA	NA
Benzo(a)Anthracene	4,900	5040	(ug/kg)	67	18	NA	NA	NA	NA	NA	NA
Chrysene	500,000	50,300	(ug/kg)	79	<390	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	130	78	NA	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	69	<390	NA	NA	NA	NA	NA	NA
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	66	<390	NA	NA	NA	NA	NA	NA
Benzo(a)Pyrene	500	540	(ug/kg)	66	14	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	45	<390	NA	NA	NA	NA	NA	NA
Dibenz(A,H)Anthracene	500	505	(ug/kg)	17	<390	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	44	<390	NA	NA	NA	NA	NA	NA
Total PAHs			(ug/kg)	642	85	NA	NA	NA	NA	NA	NA
Pesticide/PCB TCL Compounds											
Alpha BHC	ND(1)	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Beta BHC	ND(1)	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Delta BHC	ND(1)	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Heptachlor	500	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Aldrin	200	ND(1)	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Heptachlor Epoxide	300	101	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Endosulfan I	5,900,000	ND(1)	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Dieldrin	300	296	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
4,4'-DDE	11,000	12,400	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Endrin	470,000	ND(1)	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Endosulfan II	ND(1)	ND(1)	(ug/kg)	NA	NA	13	<12	<11	<12	<11	<13
4,4'-DDD	17,000	17,500	(ug/kg)	NA	NA	5.1	<4.7	<4.5	<4.7	<4.5	<5.2
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	NA	NA	20	<19	<18	<19	<18	<21
4,4'-DDT	12,000	11,300	(ug/kg)	NA	NA	13	<12	<11	<12	<11	<13
Methoxychlor	7,800,000	ND(1)	(ug/kg)	NA	NA	100	<95	<90	<94	<91	<110
Endrin Ketone	470,000	ND(1)	(ug/kg)	NA	NA	200	<19	<18	<19	<18	<21
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	3,000	3,210	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
Gamma-Chlordane	3,000	3,210	(ug/kg)	NA	NA	2.6	<2.4	<2.2	<2.4	<2.3	<2.6
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
TAL Metals											
Aluminum	+	ND(1)	(mg/kg)	3800	1700	NA	NA	NA	NA	NA	NA
Arsenic	3	15(3)	(mg/kg)	2.2	<1.2	NA	NA	NA	NA	NA	NA
Barium	4,000	4,940	(mg/kg)	80	5.8	NA	NA	NA	NA	NA	NA
Beryllium	1	ND(1)	(mg/kg)	<2.8	<2.8	NA	NA	NA	NA	NA	NA
Cadmium	600	1,070	(mg/kg)	<2.8	<2.8	NA	NA	NA	NA	NA	NA
Calcium	ND(1)	ND(1)	(mg/kg)	330000	290000	NA	NA	NA	NA	NA	NA
Chromium, Total	430	160	(mg/kg)	14	8	NA	NA	NA	NA	NA	NA
Cobalt	110,000	ND(1)	(mg/kg)	<1.1	<1.1	NA	NA	NA	NA	NA	NA
Copper	ND(1)	ND(1)	(mg/kg)	4.9	<2.6	NA	NA	NA	NA	NA	NA
Iron	ND(1)	ND(1)	(mg/kg)	3200	970	NA	NA	NA	NA	NA	NA
Lead	1,000	108	(mg/kg)	8.1	1.9	NA	NA	NA	NA	NA	NA
Magnesium	ND(1)	ND(1)	(mg/kg)	1200	1100	NA	NA	NA	NA	NA	NA
Manganese	5,500	ND(1)	(mg/kg)	48	19	NA	NA	NA	NA	NA	NA
Mercury	480	23	(mg/kg)	0.21	<0.12	NA	NA	NA	NA	NA	NA
Nickel	2,600	3.24	(mg/kg)	<4.5	<4.7	NA	NA	NA	NA	NA	NA
Potassium	ND(1)	ND(1)	(mg/kg)	<110	<110	NA	NA	NA	NA	NA	NA
Selenium	9,900	389	(mg/kg)	<5.4	<5.8	NA	NA	NA	NA	NA	NA
Silver	9,000	353	(mg/kg)	<1.1	<1.1	NA	NA	NA	NA	NA	NA
Sodium	ND(1)	ND(1)	(mg/kg)	550	550	NA	NA	NA	NA	NA	NA
Vanadium	4,800	ND(1)	(mg/kg)	6.4	<5.6	NA	NA	NA	NA	NA	NA
Zinc	560,000	ND(1)	(mg/kg)	20	<11	NA	NA	NA	NA	NA	NA

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value. <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	P2-SL-0029 0-2	P2-SL-0029 2-4	P2-SL-0030 0-2	P2-SL-0030 2-4	P2-SL-0032 0-2	P2-SL-9032 2-4	P2-SL-0033 0-2	P2-SL-0033 2-4
VOA TCL Compounds											
Bromomethane	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Methylene Chloride	23,000	42,200	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acetone	1,800,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
1,1-Dichloroethene	100	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
2-Butanone	15,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Toluene	3,500,000	100(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chlorobenzene	300,000	50(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Xylenes, Total	92,000,000	100(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
BNA TCL Compounds											
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	12,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Fluorene	30,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Anthracene	300,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Carbazole	120,000	224,000	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	41,000,000	1,000(2)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Anthracene	4,900	5040	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chrysene	500,000	50,300	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)Pyrene	500	540	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(A,H)Anthracene	500	505	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Total PAHs			(ug/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Pesticide/PCB TCL Compounds											
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Heptachlor	500	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Aldrin	200	ND(1)	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	<2.0	<2.0
Heptachlor Epoxide	300	101	(ug/kg)	<4.5	<4.8	<4.6	<4.9	<2.0	<2.1	<2.0	<2.0
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<4.5	<4.8	<4.6	<4.9	<2.0	<2.1	<2.0	<2.0
Dieldrin	300	296	(ug/kg)	<4.5	<4.8	<4.6	<4.9	<3.8	<4.0	<3.8	<3.9
4,4'-DDE	11,000	12,400	(ug/kg)	43	9.5	5.6	15	5.7	2.1 J	0.71 JP	0.66 J
Endrin	470,000	ND(1)	(ug/kg)	<4.5	<4.8	<4.6	<4.9	<3.8	<4.0	<3.8	<3.9
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<11	<12	<12	<12	<3.8	<4.0	<3.8	<3.9
4,4'-DDD	17,000	17,500	(ug/kg)	12	4.9	<4.6	<4.9	4.8 P	2.4 JP	2.0 J	2.4 JP
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<18	<19	<19	,20	<3.8	<4.0	<3.8	<3.9
4,4'-DDT	12,000	11,300	(ug/kg)	99	39	<12	12	30 B	23 B	2.8 BJ	2.5 BJP
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<91	<96	<93	<98	<20	<21	<20	<20
Endrin Ketone	470,000	ND(1)	(ug/kg)	<18	<19	<19	,20	<3.8	<4.0	<3.8	<3.9
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	NA	NA	NA	NA	<3.8	<4.0	<3.8	<3.9
Alpha-Chlordane	3,000	3,210	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	0.69 JP	<2.0
Gamma-Chlordane	3,000	3,210	(ug/kg)	<2.3	<2.4	<2.3	<2.5	<2.0	<2.1	1.3 J	<2.0
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	NA	NA	NA	NA	<38	<40	<38	<39
TAL Metals											
Aluminum	+	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	3	15(3)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Barium	4,000	4,940	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Beryllium	1	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	600	1,070	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Calcium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, Total	430	160	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Cobalt	110,000	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Copper	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Iron	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Lead	1,000	108	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Magnesium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	5,500	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Mercury	480	23	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Nickel	2,600	3.24	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Potassium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Selenium	9,900	389	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Silver	9,000	353	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Sodium	ND(1)	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	4,800	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	560,000	ND(1)	(mg/kg)	NA	NA	NA	NA	NA	NA	NA	NA

Notes:

<=not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND.

Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC.

Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	SP3-SL-0006 0-1	SP3-SL9006 0-1	NE3 3	SB1.18 1	SB3.18 1	FCN2.4 4	CSNA.1 1
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Methylene Chloride	23,000	42,200	(ug/kg)	PR	PR	<1500	5BJ	5BJ	720BJ	4BJ
Acetone	1,800,000	ND(1)	(ug/kg)	PR	PR	<1500	9BJ	3BJ	500BJ	10BJ
1,1-Dichloroethene	100	ND(1)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
2-Butanone	15,000,000	ND(1)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Toluene	3,500,000	100(2)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Chlorobenzene	300,000	50(2)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	<13
Xylenes, Total	92,000,000	100(2)	(ug/kg)	PR	PR	<1500	<12	<11	<2000	1J
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Naphthalene	12,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Fluorene	30,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	300J	430J	<2100
Anthracene	300,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	<1900	110J	<2100
Carbazole	120,000	224,000	(ug/kg)	PR	PR	<400	<1900	<1900	59J	<2100
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	74J	<2100
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	PR	PR	<400	210J	830J	640	<2100
Pyrene	41,000,000	1,000(2)	(ug/kg)	PR	PR	<400	<1900	790J	540	<2100
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Benzo(a)Anthracene	4,900	5040	(ug/kg)	PR	PR	<400	<1900	490J	330J	<2100
Chrysene	500,000	50,300	(ug/kg)	PR	PR	<400	<1900	560J	390J	<2100
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	96J	<2100
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	PR	PR	<400	<1900	660J	330J	240J
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	PR	PR	<400	<1900	510J	370J	<2100
Benzo(a)Pyrene	500	540	(ug/kg)	PR	PR	<400	<1900	500J	250J	<2100
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	PR	PR	<400	<1900	<1900	230J	<2100
Dibenz(A,H)Anthracene	500	505	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	PR	PR	<400	<1900	<1900	<510	<2100
Total PAHs			(ug/kg)	NA	NA	ND	210	4640	3620	240
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Beta BHC	ND(1)	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Delta BHC	ND(1)	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Heptachlor	500	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	4.9	<2.2
Aldrin	200	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Heptachlor Epoxide	300	101	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	4.5P	<2.2
Endosulfan I	5,900,000	ND(1)	(ug/kg)	PR	PR	<2.0	<2.0	<1.9	<2.7	<2.2
Dieldrin	300	296	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
4,4'-DDE	11,000	12,400	(ug/kg)	PR	PR	<3.9	61	220	98	5.1P
Endrin	470,000	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
Endosulfan II	ND(1)	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
4,4'-DDD	17,000	17,500	(ug/kg)	PR	PR	4.1	23	63	48	8.5
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
4,4'-DDT	12,000	11,300	(ug/kg)	PR	PR	11	110	350	180	69
Methoxychlor	7,800,000	ND(1)	(ug/kg)	PR	PR	<20	<20	<19	<27	<22
Endrin Ketone	470,000	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	PR	PR	<3.9	<3.9	<3.7	<5.2	<4.2
Alpha-Chlordane	3,000	3,210	(ug/kg)	PR	PR	11	17	64	150	4.3
Gamma-Chlordane	3,000	3,210	(ug/kg)	PR	PR	9.3	15P	55P	140P	3.3
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	PR	PR	<39	<39	<37	<52	<42
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	2610	3120	384	1570	1030	2060	3660
Arsenic	3	15(3)	(mg/kg)	123	109	12.9	10.6	16.9	<44.5	<40.5
Barium	4,000	4,940	(mg/kg)	11.4	9.8	4.5B	451	156	8.5B	14.8B
Beryllium	1	ND(1)	(mg/kg)	<0.20	<0.20	<0.22	<0.23	<0.23	<0.20	<0.25
Cadmium	600	1,070	(mg/kg)	1.4	1.3	<1.1	<1.2	<1.2	<1.0	1.6OB
Calcium	ND(1)	ND(1)	(mg/kg)	270000	261000	383000	322000	307000	283000	321000
Chromium, Total	430	160	(mg/kg)	8.5	9.5	6.2	6.8	5.6	10	19.1
Cobalt	110,000	ND(1)	(mg/kg)	0.81	<0.41	<11.2	<2.3	<2.3	<10	<12.6
Copper	ND(1)	ND(1)	(mg/kg)	7.6	10.2	<2.2	4.1B	25	8.5 B	8.10 B
Iron	ND(1)	ND(1)	(mg/kg)	1830	2050	204	1090	804	1200	2490
Lead	1,000	108	(mg/kg)	27.4	20.5	2.1	29.9	36.4	17	40.8
Magnesium	ND(1)	ND(1)	(mg/kg)	971	875	797B	1250	1480	924B	1210B
Manganese	5,500	ND(1)	(mg/kg)	69.9	39.2	4.4B	23.7	27.1	22.6	47.2
Mercury	480	23	(mg/kg)	<0.12	<0.12	<0.12	<0.12	<0.10	<0.08	NR
Nickel	2,600	3.24	(mg/kg)	2.2B	1.8B	<22.4	<4.6	<4.6	<20.0	<25.1
Potassium	ND(1)	ND(1)	(mg/kg)	545B	554B	<224	<231	<231	<200	<251
Selenium	9,900	389	(mg/kg)	<4.0	<4.0	<0.44	<0.47	<0.45	<0.40	<0.49
Silver	9,000	353	(mg/kg)	<0.40	<0.40	<5.6	<1.2	<1.2	<5.0	<6.3
Sodium	ND(1)	ND(1)	(mg/kg)	430B	443B	830	598B	423B	607B	653B
Vanadium	4,800	ND(1)	(mg/kg)	5.7B	5.5B	<2.2	4.0B	4.0B	<10.0	<12.6
Zinc	560,000	ND(1)	(mg/kg)	34.4	38.8	9.9B	92.2	18.3	33.6	222

Notes:

<nor detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data, analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-btl.	CSNA.3 3	CSNB.1 1	CSNB.3 3	CSE.18 1	CSSB.1 1	CSSB.3 3	NW15.1 1
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<13	<12	<12	<55	<58	350J
Methylene Chloride	23,000	42,200	(ug/kg)	3BJ	3BJ	2BJ	3BJ	11BJ	12BJ	300BJ
Acetone	1,800,000	ND(1)	(ug/kg)	31B	29B	<12	<12	<55	200B	780BJ
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<13	<12	<12	25J	<58	<1500
2-Butanone	15,000,000	ND(1)	(ug/kg)	<12	<13	<12	<12	<55	<58	<1500
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<13	<12	<12	<55	<58	<1500
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<13	<12	<12	19J	<58	<1500
Toluene	3,500,000	100(2)	(ug/kg)	<12	<13	<12	<12	23J	<58	<1500
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<13	<12	<12	19J	<58	<1500
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<13	<12	<12	<55	<58	<1500
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Fluorene	30,000,000	1,000(2)	(ug/kg)	56J	<2100	<2000	<410	<730	<380	<400
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	140J	<2100	<2000	<410	110J	73J	<400
Anthracene	300,000,000	1,000(2)	(ug/kg)	140J	<2100	<2000	<410	220J	<380	<400
Carbazole	120,000	224,000	(ug/kg)	310J	<2100	<2000	<410	92J	<380	<400
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	47J	<2100	<2000	<410	<730	<380	<400
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	270J	<2100	<2000	110J	190J	30J	51J
Pyrene	41,000,000	1,000(2)	(ug/kg)	260J	<2100	<2000	100J	220J	36J	47J
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	<400
Benzo(a)Anthracene	4,900	5040	(ug/kg)	150J	<2100	<2000	65J	140J	24J	<400
Chrysene	500,000	50,300	(ug/kg)	130J	<2100	<2000	88J	130J	25J	43J
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	<400	<2100	<2000	<410	<730	<380	89J
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	200J	<2100	<2000	160J	200J	30J	44J
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<400	<2100	<2000	<410	<730	24J	47J
Benzo(a)Pyrene	500	540	(ug/kg)	100J	<2100	<2000	79J	97J	23J	43J
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	83J	<2100	<2000	59J	63J	18J	<400
Dibenz(A,H)Anthracene	500	505	(ug/kg)	35J	<2100	<2000	<410	28J	6J	<400
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	81J	<2100	<2000	130J	55J	16J	52J
Total PAHs			(ug/kg)	17286	ND	ND	7991	12550	2402	416
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	83	12	<2.0
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Heptachlor	500	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	37	6.9	<2.0
Aldrin	200	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Heptachlor Epoxide	300	101	(ug/kg)	<2.0	<2.1	<2.1	<2.1	94	<4.0	<2.0
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.1	<19	<4.0	<2.0
Dieldrin	300	296	(ug/kg)	<3.9	<4.1	<4.1	<2.1	<37	<7.8	<4.0
4,4'-DDE	11,000	12,400	(ug/kg)	<3.9	<4.1	<4.1	53	2200	460	<4.0
Endrin	470,000	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
4,4'-DDD	17,000	17,500	(ug/kg)	<3.9	<4.1	<4.1	13P	890	170	<4.0
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
4,4'-DDT	12,000	11,300	(ug/kg)	7.1P	<4.1	6.0P	100	4600	1000	<4.0
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<20	<21	<21	<21	<190	<40	<20
Endrin Ketone	470,000	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<3.9	<4.1	<4.1	<4.1	<37	<7.8	<4.0
Alpha-Chlordane	3,000	3,210	(ug/kg)	<2.0	<2.1	3.5P	7.1	1800	290	<2.0
Gamma-Chlordane	3,000	3,210	(ug/kg)	<2.0	<2.1	3.6P	5.4	1700P	290	<2.0
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<39	<41	<41	<41	<370	<78	<40
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	2750	3790	1330	4240	3260	4340	537
Arsenic	3	15(3)	(mg/kg)	16.7	30.0 B	<21.7 W	<6.8	6.4	7.9	<3.5
Barium	4,000	4,940	(mg/kg)	6.1B	9.1 B	10.7B	10.2B	11.5B	8.0B	4.0B
Beryllium	1	ND(1)	(mg/kg)	<0.24	<0.24	<0.25	<0.24	0.23B	0.26B	<0.24
Cadmium	600	1,070	(mg/kg)	<1.2	<1.2	<1.2	<6.0	<5.4	<5.6	<1.2
Calcium	ND(1)	ND(1)	(mg/kg)	333000	343000	340000	313000	303000	329000	338000
Chromium, Total	430	160	(mg/kg)	13.6	17.6	10.7	16.3	18.1	17.5	6.1
Cobalt	110,000	ND(1)	(mg/kg)	<12.2	<11.8	<12.3	<11.9	<10.9	<11.1	<12.0
Copper	ND(1)	ND(1)	(mg/kg)	<2.4	<14.90	<6.70	<22.80	26.5	15.1	<2.4
Iron	ND(1)	ND(1)	(mg/kg)	1510 E	2570 E	<1040.00	3510	1960	2370	340
Lead	1,000	108	(mg/kg)	14.3 S	6.60	16.6	<9.30	43.4	26.8	<5.30
Magnesium	ND(1)	ND(1)	(mg/kg)	1050B	1120B	1080B	1180B	1190B	1130	513B
Manganese	5,500	ND(1)	(mg/kg)	22.3 E	72.4 E	119	53.7 B	46.8	66.7	9.5
Mercury	480	23	(mg/kg)	NR	NR	NR	NR	0.39	0.21	<0.12
Nickel	2,600	3.24	(mg/kg)	<24.5	<23.6	<24.5	23.9 B	<21.8	<22.3	<24.1
Potassium	ND(1)	ND(1)	(mg/kg)	<245	<236	<245	330B	<218	<223	<241
Selenium	9,900	389	(mg/kg)	<0.48	<0.48	<0.50	<0.49	<0.41	<0.43	<0.46
Silver	9,000	353	(mg/kg)	<6.1	<5.9	8.4B	7.7B	7.2B	<5.6	<6.0
Sodium	ND(1)	ND(1)	(mg/kg)	688B	484B	751B	548B	525B	630B	709B
Vanadium	4,800	ND(1)	(mg/kg)	<12.2	<11.8	<12.3	<11.9	<10.9	<11.1	<12.0
Zinc	560,000	ND(1)	(mg/kg)	42.3	53.1	52.5 B	139.0 B	41.4	24	6.4B

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC.

Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	NW15.3 3	FCN1.6 6	SW10.1 1	ES.1 1	SW5.3 3	CS37.1 1	FCS4.5 5
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Methylene Chloride	23,000	42,200	(ug/kg)	380BJ	<1600	<1500	<1500	<1600	210BJ	260BJ
Acetone	1,800,000	ND(1)	(ug/kg)	340BJ	<1600	<1500	210BJ	420BJ	470BJ	560BJ
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
2-Butanone	15,000,000	ND(1)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Toluene	3,500,000	100(2)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Chlorobenzene	300,000	50(2)	(ug/kg)	<1500	<1600	<1500	<1500	<1600	<1600	<1600
Xylenes, Total	92,000,000	100(2)	(ug/kg)	160BJ	<1600	<1500	<1500	<1600	<1600	<1600
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<2100	<2000	<1900	<2100	470J	<41000
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	3100J
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	8100J
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	<8400
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	1700J
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	2600J
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	3400J
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	430J	<2100	5800J
Anthracene	300,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	6300J
Carbazole	120,000	224,000	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	<8400
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	<400	<2100	<2000	<1900	<2100	380J	<8400
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	87J	<2100	200J	280J	510J	410J	<8400
Pyrene	41,000,000	1,000(2)	(ug/kg)	<400	<2100	<2000	260J	350J	450J	<8400
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<2100	<2000	<1900	<2100	3700	<8400
Benzo(a)Anthracene	4,900	5040	(ug/kg)	<400	<2100	<2000	<1900	<2100	<2100	<8400
Chrysene	500,000	50,300	(ug/kg)	<400	<2100	<2000	340J	310J	390J	<8400
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	190BJ	<2100	<2000	<1900	<2100	2200	<8400
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	67J	<2100	<2000	<1900	<2100	720J	<8400
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	49J	<2100	<2000	500J	<2100	<2100	<8400
Benzo(a)Pyrene	500	540	(ug/kg)	<400	<2100	<2000	340J	350J	320J	<8400
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	64J	<2100	<2000	<1900	<2100	600J	<8400
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<400	<2100	<2000	<1900	<2100	220J	<8400
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	59J	<2100	<2000	<1900	<2100	900J	<8400
Total PAHs			(ug/kg)	516	ND	200	1620	1950	4060	31,000
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	15	<2.1	<2.2	<2.2
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	9.0P
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Heptachlor	500	ND(1)	(ug/kg)	3	<2.1	<2.1	5.6	<2.1	<2.2	18P
Aldrin	200	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Heptachlor Epoxide	300	101	(ug/kg)	3.9	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.0	<2.1	<2.1	<2.0	<2.1	<2.2	<2.2
Dieldrin	300	296	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	<4.2	11P
4,4'-DDE	11,000	12,400	(ug/kg)	23	<4.2	8	250	10	<4.2	43
Endrin	470,000	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	11P	11P
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	8.5P	<4.2
4,4'-DDD	17,000	17,500	(ug/kg)	10	3.6	5.9	110	8.4	11P	650
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	7.4P	<4.2
4,4'-DDT	12,000	11,300	(ug/kg)	62	16	20	420	24	110P	870
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<20	<21	<21	<20	<21	120P	<22
Endrin Ketone	470,000	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	38P	<4.2
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<3.9	<4.2	<4.2	<3.9	<4.2	26	<4.2
Alpha-Chlordane	3,000	3,210	(ug/kg)	110	6.5	21	200	25	15	72P
Gamma-Chlordane	3,000	3,210	(ug/kg)	110	6.9	22	200	26	30P	96P
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	56	<42	<42	<39	<42	<42	<42
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	1040	391	681	7270	1610	5290	291
Arsenic	3	15(3)	(mg/kg)	<10.6	3.8 B	<6.8	11	17.0 B	<12.9	8.8 B
Barium	4,000	4,940	(mg/kg)	5.5B	52B	5.2B	13.4B	6.6B	482.0 B	5.9B
Beryllium	1	ND(1)	(mg/kg)	<0.24	<0.24	<0.24	<0.23	<0.25	0.42B	<0.25
Cadmium	600	1,070	(mg/kg)	<1.2	<1.2	<1.2	<1.1	<1.2	<27.10	<1.3
Calcium	ND(1)	ND(1)	(mg/kg)	353000	357000	350000	270000	363000	261000	398000
Chromium, Total	430	160	(mg/kg)	9.4	5.5	7.6	27.4	9.7	124	6.3
Cobalt	110,000	ND(1)	(mg/kg)	<12.0	<12.2	<11.8	<11.5	<12.5	<12.7	<12.5
Copper	ND(1)	ND(1)	(mg/kg)	<11.30	<2.4	<2.4	<9.80	3.6B	308.0 B	<2.5
Iron	ND(1)	ND(1)	(mg/kg)	1190	<203	484	4650	960	20400	132 E
Lead	1,000	108	(mg/kg)	31.6	3.7	6.7	17.4	13.9	6050.0	7.2
Magnesium	ND(1)	ND(1)	(mg/kg)	553B	857B	844B	1490B	1160B	3130B	1160B
Manganese	5,500	ND(1)	(mg/kg)	27.3	5.6B	9.8B	81.5	29.1	191	<2.5
Mercury	480	23	(mg/kg)	<0.11	<0.12	<0.10	<0.12	<0.12	<0.14	<0.10
Nickel	2,600	3.24	(mg/kg)	<24.0	<24.4	<23.6	<22.9	<24.9	37.3B	<25.1
Potassium	ND(1)	ND(1)	(mg/kg)	<240	<244	<236	<229	<249	341B	<251
Selenium	9,900	389	(mg/kg)	<0.48	<0.50	<0.48	<0.46	<0.49	0.50B	<0.49
Silver	9,000	353	(mg/kg)	<6.0	<6.1	<5.9	<5.7	<6.2	<6.3	<6.3
Sodium	ND(1)	ND(1)	(mg/kg)	722B	846B	724B	356B	706B	537B	1100B
Vanadium	4,800	ND(1)	(mg/kg)	<12.0	<12.2	<11.8	11.6 B	<12.5	<12.7	<2.5
Zinc	560,000	ND(1)	(mg/kg)	59.3 B	8.8 B	12.6B	39.5 B	18.2	1460	18.7B

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data, analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	FCS7.5 5	FCSN3.4 4	FCSN4.4 4	N5.1 1	NW5.3 3	SE5.3 3	CS15.1 1
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Methylene Chloride	23,000	42,200	(ug/kg)	470BJ	370BJ	260BJ	490BJ	270BJ	490BJ	6J
Acetone	1,800,000	ND(1)	(ug/kg)	<1600	670J	<2000	<1500	230BJ	<1500	4J
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
2-Butanone	15,000,000	ND(1)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Toluene	3,500,000	100(2)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Chlorobenzene	300,000	50(2)	(ug/kg)	<1600	<1500	<2000	<1500	<1500	<1500	<12
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<1600	200J	<2000	<1500	160BJ	<1500	<12
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<2100	<8100	<1100	<2000	<8000	<770	<380
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	49J
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	44J	<8100	<1100	<2000	<8000	<770	61
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Fluorene	30,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	110J
Anthracene	300,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Carbazole	120,000	224,000	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	47J	<8100	<1100	<2000	<8000	<770	100BJ
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	350J	140J
Pyrene	41,000,000	1,000(2)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	180J
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Benzo(a)Anthracene	4,900	5040	(ug/kg)	<430	<8100	<1100	<2000	<8000	380J	100J
Chrysene	500,000	50,300	(ug/kg)	<430	<8100	<1100	<2000	<8000	260J	150J
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	63J	<8100	<1100	<2000	<8000	<770	<380
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	<430	<8100	<1100	<2000	<8000	120J	320J
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<430	<8100	<1100	<2000	<8000	180J	<380
Benzo(a)Pyrene	500	540	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	130J
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	100J
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	41J
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	<430	<8100	<1100	<2000	<8000	<770	<380
Total PAHs			(ug/kg)	44	ND	ND	ND	ND	1290	1381
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.2	<2.1	<2.8	<DL	<2.0	<2.0	<3.9
Beta BHC	ND(1)	ND(1)	(ug/kg)	4.4P	4.1	<2.8	<DL	<2.0	<2.0	<3.9
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.2	<2.1	<2.8	<DL	4.4	<2.0	<3.9
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	10P	<2.1	<2.8	<DL	<2.0	<2.0	<3.9
Heptachlor	500	ND(1)	(ug/kg)	450P	<2.1	<2.8	<DL	4.9	<2.0	4.7P
Aldrin	200	ND(1)	(ug/kg)	38P	<2.1	<2.8	<DL	<2.0	<2.0	<3.9
Heptachlor Epoxide	300	101	(ug/kg)	<2.2	3.8	<2.8	7.7	13	<2.0	<3.9
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.2	<2.1	<2.8	<DL	<2.0	<2.0	<3.9
Dieldrin	300	296	(ug/kg)	50P	<4.1	<5.4	<DL	<4.0	8.2	<7.7
4,4'-DDE	11,000	12,400	(ug/kg)	120	30	7.2	21	30	350	960
Endrin	470,000	ND(1)	(ug/kg)	230P	<4.1	<5.4	<DL	36	18	<7.7
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<4.2	<4.1	<5.4	<DL	8.0	<4.0	<7.7
4,4'-DDD	17,000	17,500	(ug/kg)	290P	31	10	<DL	33	340	180P
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<4.2	<4.1	<5.4	<DL	5.8	<4.0	<7.7
4,4'-DDT	12,000	11,300	(ug/kg)	700	120	17	<DL	170	750	1100
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<22	<21	<28	<DL	<20	<20	<39
Endrin Ketone	470,000	ND(1)	(ug/kg)	<4.2	<4.1	<5.4	<DL	23	11	<7.7
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<4.2	<4.1	<5.4	<DL	18	<4.0	<7.7
Alpha-Chlordane	3,000	3,210	(ug/kg)	570P	70	12	99	250	46	91P
Gamma-Chlordane	3,000	3,210	(ug/kg)	610P	84	16	130	350	96	90
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<42	<41	<54	<DL	<40	<40	<77
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	199	785	52800	1860	1520	2830	2940
Arsenic	3	15(3)	(mg/kg)	0.88B	12.4	10.8	32.8	17.4	4	63.0
Barium	4,000	4,940	(mg/kg)	5.5B	6.8B	133	12.8B	9.5B	9.8B	206B
Beryllium	1	ND(1)	(mg/kg)	<0.25	<0.24	2.5	<0.24	<0.23	<0.23	0.53B
Cadmium	600	1,070	(mg/kg)	<1.3	<6.0	<1.6	<1.2	<5.7	<1.1	<5.7
Calcium	ND(1)	ND(1)	(mg/kg)	408000	370000	48400	355000	337000	294000	274000
Chromium, Total	430	160	(mg/kg)	6.3	13.7	145	10.7	11.9	11.3	17.2
Cobalt	110,000	ND(1)	(mg/kg)	<12.6	<12.0	10.0B	<12.2	<11.4	<11.4	<11.4
Copper	ND(1)	ND(1)	(mg/kg)	<2.5	2.7B	10.5	4.6B	13.6	13	14.2B
Iron	ND(1)	ND(1)	(mg/kg)	86.5	512	46200	1380	2200	1760	4660
Lead	1,000	108	(mg/kg)	2.7	5.4	114	15.6	67.1	14.6	19.4
Magnesium	ND(1)	ND(1)	(mg/kg)	1160B	1180B	2880	1080B	884B	1110B	1020
Manganese	5,500	ND(1)	(mg/kg)	<2.5	56.2	167	39	51.7	32.1	48.1
Mercury	480	23	(mg/kg)	<0.11	<0.12	<0.16	<0.12	<0.11	<0.11	<0.11
Nickel	2,600	3.24	(mg/kg)	<25.2	<23.9	22.9	<24.3	<22.8	<22.9	<22.8
Potassium	ND(1)	ND(1)	(mg/kg)	<252	<239	1320B	<243	<228	<229	<1140
Selenium	9,900	389	(mg/kg)	<0.52	49	<0.63	<0.46	<0.46	<0.47	<0.46
Silver	9,000	353	(mg/kg)	<6.3	<6.0	<1.6	<6.1	<5.7	<5.7	<5.7
Sodium	ND(1)	ND(1)	(mg/kg)	1170B	872B	336B	518B	588B	442B	695B
Vanadium	4,800	ND(1)	(mg/kg)	<2.5	<12.0	109	<12.2	<11.4	<11.4	<11.4
Zinc	560,000	ND(1)	(mg/kg)	14.3B	13.7B	43.6	175	129	38.2	79.4

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD ARB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	CS15.3 3	CS19.1 1	CS19.3 3	CS23.1 1	CS23.3 3	CS24.1 1	CS24.3 3
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Methylene Chloride	23,000	42,200	(ug/kg)	6J	6J	7J	6J	10J	8J	8J
Acetone	1,800,000	ND(1)	(ug/kg)	4J	3200E	830E	<12	22	75	4J
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
2-Butanone	15,000,000	ND(1)	(ug/kg)	<12	<12	<12	<12	2J	3J	<13
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Toluene	3,500,000	100(2)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<12	<12	<12	<12	<12	<13
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	46J	120J	<410	<1900	<820	580J	<830
Anthracene	300,000,000	1,000(2)	(ug/kg)	45J	<390	<410	<1900	<820	1400J	<830
Carbazole	120,000	224,000	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	61BJ	110BJ	61BJ	<1900	97BJ	<4100	1108J
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	100J	140J	<410	<1900	<820	3900J	340J
Pyrene	41,000,000	1,000(2)	(ug/kg)	130J	140J	<410	<1900	<820	6600	430J
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<390	<410	<1900	<820	720J	<830
Benzo(a)Anthracene	4,900	5040	(ug/kg)	75J	69J	<410	<1900	<820	4900	340J
Chrysene	500,000	50,300	(ug/kg)	100J	81J	<410	<1900	<820	5300	400J
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	50BJ	58BJ	65BJ	<1900	<820	<4100	<830
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	190J	150J	<410	<1900	<820	7400	910
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<400	<390	<410	190J	<820	7400	<830
Benzo(a)Pyrene	500	540	(ug/kg)	82J	49J	<410	<1900	<820	4300	350J
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	73J	<390	<410	<1900	<820	3200	280J
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<400	<390	<410	<1900	<820	1600	120J
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	<400	<390	<410	<1900	<820	<4100	<830
Total PAHs			(ug/kg)	586	599	ND	190	ND	43,380	3,170
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Heptachlor	500	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	5.5P	NR	20P
Aldrin	200	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Heptachlor Epoxide	300	101	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.1	<2.1	<2.1	NR	<2.1	NR	<2.1
Dieldrin	300	296	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	<4.2
4,4'-DDE	11,000	12,400	(ug/kg)	180P	64	76P	NR	170	NR	120
Endrin	470,000	ND(1)	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	<4.2
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	<4.2
4,4'-DDD	17,000	17,500	(ug/kg)	32P	13P	12P	NR	48P	NR	77P
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	<4.2
4,4'-DDT	12,000	11,300	(ug/kg)	270	190	80	NR	310PZ	NR	340
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<21	<21	<21	NR	<21	NR	<21
Endrin Ketone	470,000	ND(1)	(ug/kg)	<4.1	<4.1	<4.1	NR	<4.2	NR	5.9P
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<4.1	6.6P	<4.1	NR	<4.2	NR	2.7
Alpha-Chlordane	3,000	3,210	(ug/kg)	20P	11P	10.0	NR	38PZ	NR	170
Gamma-Chlordane	3,000	3,210	(ug/kg)	18P	13P	7.5P	NR	44Z	NR	170
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<41	48P	<41	NR	62P	NR	<42
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	1590	3320	1160	4510	21500	4220	1280
Arsenic	3	15(3)	(mg/kg)	<47.3	46.9	7.4	16.9	6.3	47.8	7.2
Barium	4,000	4,940	(mg/kg)	9.5B	12.1B	8.9B	12.8B	12.5B	64.2B	16.0B
Beryllium	1	ND(1)	(mg/kg)	0.44B	0.57B	0.3B	0.69B	1.4	0.73B	0.45B
Cadmium	600	1,070	(mg/kg)	<6.1	<5.9	<5.8	22.6	10.9	<6.0	<6.3
Calcium	ND(1)	ND(1)	(mg/kg)	350000	345000	356000	334000	240000	286000	369000
Chromium, Total	430	160	(mg/kg)	11.8	18.3	9.7	18.0	58.4	21.9	10.1
Cobalt	110,000	ND(1)	(mg/kg)	<12.2	<11.9	<11.7	<11.9	<12.5	<12.0	<12.6
Copper	ND(1)	ND(1)	(mg/kg)	<12.2	12.0B	<11.7	<11.9	<12.5	22.1B	<12.6
Iron	ND(1)	ND(1)	(mg/kg)	1660	2280	689	2450	14400	4350	889
Lead	1,000	108	(mg/kg)	<8.80	27.1	7.2	8.0	16.5	317	68.6
Magnesium	ND(1)	ND(1)	(mg/kg)	1090B	1340B	1030B	1170B	2330	1550B	1420B
Manganese	5,500	ND(1)	(mg/kg)	21.5 B	110	29.7	61.4	199	67.2	21.5
Mercury	480	23	(mg/kg)	<0.12	<0.11	<0.12	<0.12	<0.13	<0.12	<0.13
Nickel	2,600	3.24	(mg/kg)	<24.3	<23.7	<23.4	<23.8	<24.9	<23.9	<25.3
Potassium	ND(1)	ND(1)	(mg/kg)	<1220	<1190	<1170	<1190	<1250	<1200	<1260
Selenium	9,900	389	(mg/kg)	<0.47	<0.46	<0.46	<0.46	<0.48	<0.48	<0.51
Silver	9,000	353	(mg/kg)	<6.1	<5.9	<5.8	6.0B	<6.2	<6.0	<6.3
Sodium	ND(1)	ND(1)	(mg/kg)	913B	682B	865B	885B	558B	811B	1090B
Vanadium	4,800	ND(1)	(mg/kg)	<12.2	<11.9	<11.7	<11.9	26.7B	<12.0	<12.6
Zinc	560,000	ND(1)	(mg/kg)	39.0 B	26.6	20.2	18.6B	11.0B	80.7	28.2

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-1/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bl.	CS25.1 1	CS25.3 3	CS27.1 1	CS27.3 3	CS29.1 1	CS29.3 3	CS30.1 1
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
Methylene Chloride	23,000	42,200	(ug/kg)	7J	8J	8J	7J	<1400	<1500	160J
Acetone	1,800,000	ND(1)	(ug/kg)	4J	11J	7J	5J	140J	160J	560J
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
2-Butanone	15,000,000	ND(1)	(ug/kg)	3J	<13	3J	3J	<1400	<1500	<1500
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
Toluene	3,500,000	100(2)	(ug/kg)	1J	<13	<12	<12	<1400	<1500	<1500
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<13	<12	<12	<1400	<1500	<1500
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	43J	<430	<2000	<400	<1800	<400	<780
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<430	310J	41J	<1800	<400	<780
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<400	<430	240J	310J	<1800	<400	<780
Anthracene	300,000,000	1,000(2)	(ug/kg)	<400	<430	330J	94J	<1800	<400	<780
Carbazole	120,000	224,000	(ug/kg)	<400	<430	<2000	50J	<1800	<400	<780
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	56BJ	86BJ	<2000	70BJ	<1800	59J	<780
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	<400	<430	780J	360BJ	<1800	<400	<780
Pyrene	41,000,000	1,000(2)	(ug/kg)	<400	<430	1400J	430	<1800	<400	<780
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Benzo(a)Anthracene	4,900	5040	(ug/kg)	<400	<430	780J	320J	<1800	<400	<780
Chrysene	500,000	50,300	(ug/kg)	<400	<430	1000J	240J	<1800	<400	<780
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	<400	45J	<2000	45BJ	<1800	<400	<780
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	<400	<430	2300	420	<1800	<400	<780
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Benzo(a)Pyrene	500	540	(ug/kg)	<400	<430	870J	150J	<1800	<400	<780
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	<400	<430	<2000	<400	<1800	<400	<780
Total PAHs			(ug/kg)	43	ND	8,010	1,945	ND	ND	ND
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Heptachlor	500	ND(1)	(ug/kg)	<2.1	<2.2	2.2P	21P	<1.9	<2.1	4.6
Aldrin	200	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Heptachlor Epoxide	300	101	(ug/kg)	6.8	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.1	<2.2	<2.0	<4.1	<1.9	<2.1	<2.0
Dieldrin	300	296	(ug/kg)	<4.1	<4.2	<4.0	<7.9	<1.9	<4.0	<3.9
4,4'-DDE	11,000	12,400	(ug/kg)	10P	<4.2	8.0	23P	7.8	<4.0	170P
Endrin	470,000	ND(1)	(ug/kg)	<4.1	<4.2	<4.0	<7.9	<3.6	<4.0	<3.9
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<4.1	<4.2	<4.0	<7.9	<3.6	<4.0	<3.9
4,4'-DDD	17,000	17,500	(ug/kg)	<4.1	<4.2	49	98	10	4.6P	41P
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<4.1	<4.2	<4.0	<7.9	<3.6	<4.0	<3.9
4,4'-DDT	12,000	11,300	(ug/kg)	41	16	170	800P	160	30	180P
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<21	<20	<20	<41	<19	<21	<20
Endrin Ketone	470,000	ND(1)	(ug/kg)	<4.1	<4.2	8.5	<7.9	<3.6	<4.0	<3.9
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<4.1	<4.2	5.1P	<7.9	8.5	<4.0	<3.9
Alpha-Chlordane	3,000	3,210	(ug/kg)	61P	6.1	13P	76	6.3	3.0	31P
Gamma-Chlordane	3,000	3,210	(ug/kg)	56	5.3P	13	32	6.6P	2.6P	31
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<41	<42	<40	<79	<36	<40	<39
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	17700	2410	2710	2680	5130	1020	2970
Arsenic	3	15(3)	(mg/kg)	4.3	1.7B	48.7	20	2.9	0.62B	8.8
Barium	4,000	4,940	(mg/kg)	10.1B	5.9B	17.4B	11.1B	10.3B	5.9B	7.9B
Beryllium	1	ND(1)	(mg/kg)	1.1B	0.71	0.64B	0.6	0.41B	0.26B	0.25B
Cadmium	600	1,070	(mg/kg)	<5.9	<6.3	<5.8	<5.6	<5.1	<1.2	<1.2
Calcium	ND(1)	ND(1)	(mg/kg)	241000	358000	331000	357000	324000	395000	380000
Chromium, Total	430	160	(mg/kg)	61.5	12.7	12.7	13.1	19.9	8.0	13.4
Cobalt	110,000	ND(1)	(mg/kg)	<11.7	<12.6	<11.7	<11.2	<10.8	<12.1	<11.9
Copper	ND(1)	ND(1)	(mg/kg)	<11.7	<12.6	<11.7	<11.2	<10.8	<12.1	3.4B
Iron	ND(1)	ND(1)	(mg/kg)	15500	1250	1770	2010	3670	575	2210
Lead	1,000	108	(mg/kg)	17.3	6.0	48.8	30.1	16.7	0.86	10.1
Magnesium	ND(1)	ND(1)	(mg/kg)	16508	1200B	1560B	1310B	1090B	1170B	1180B
Manganese	5,500	ND(1)	(mg/kg)	101	12.4B	232	33.3	119	16.8B	39
Mercury	480	23	(mg/kg)	<0.12	<0.13	<0.11	<0.12	<0.10	<0.11	<0.11
Nickel	2,600	3.24	(mg/kg)	<23.4	<25.3	<23.2	<22.4	<21.5	<24.2	<23.8
Potassium	ND(1)	ND(1)	(mg/kg)	<1170	<1260	<1170	<1120	<215	<242	<238
Selenium	9,900	389	(mg/kg)	<0.49	<0.49	<0.48	<0.47	<0.43	<0.48	<0.47
Silver	9,000	353	(mg/kg)	<5.9	<6.3	6.0B	<5.6	5.8B	<6.0	6.4B
Sodium	ND(1)	ND(1)	(mg/kg)	508B	739B	695B	796B	807B	1040B	904B
Vanadium	4,800	ND(1)	(mg/kg)	26.5B	<12.6	<11.7	<11.2	<2.2	<12.1	<11.9
Zinc	560,000	ND(1)	(mg/kg)	16.4B	8.0B	26.0	28.1	16.9B	14.4B	21.1B

Notes:

<not detected at specified detection limit

<DL detection limit not specidfied

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bl.	CS30.3 3	FCS1.3 3	FCS2.3 3	FCS3.3 3	FCS5.3 3	FCS6.3 3	CS28.3 3
VOA TCL Compounds										
Bromomethane	ND(1)	ND(1)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Methylene Chloride	23,000	42,200	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Acetone	1,800,000	ND(1)	(ug/kg)	400J	1300J	<1500	430J	<1500	380J	3BJ
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
2-Butanone	15,000,000	ND(1)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA	NA	NA	NA	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Toluene	3,500,000	100(2)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Chlorobenzene	300,000	50(2)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<1500	<1500	<1500	<1600	<1500	<1500	<12
BNA TCL Compounds										
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<400	<390	110J	<410	63J	63J	<410
Anthracene	300,000,000	1,000(2)	(ug/kg)	<400	<390	130J	<410	<390	<390	<410
Carbazole	120,000	224,000	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	<400	130J	<410	<410	<390	72J	97BJ
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	<400	<390	680	<410	210J	54J	<410
Pyrene	41,000,000	1,000(2)	(ug/kg)	<400	<390	560	54J	280J	84J	<410
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Benzo(a)Anthracene	4,900	5040	(ug/kg)	<400	<390	150	<410	200J	<390	<410
Chrysene	500,000	50,300	(ug/kg)	<400	<390	120J	<410	220J	<390	<410
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	<400	<390	<390	<410	<390	<390	<410
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	<400	<390	120J	<410	370J	<390	<410
Benzo(a)Pyrene	500	540	(ug/kg)	<400	<390	54J	<410	170J	55J	<410
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	<400	<390	<390	<410	140J	<390	<410
Dibenz(A,H)Anthracene	500	505	(ug/kg)	<400	<390	<390	<410	60J	<390	<410
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	<400	<390	<390	<410	140J	44J	<410
Total PAHs			(ug/kg)	ND	ND	1,924	54	1,853	300	ND
Pesticide/PCB TCL Compounds										
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Heptachlor	500	ND(1)	(ug/kg)	<2.1	4.6	13	5.9	29	20	<2.1
Aldrin	200	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Heptachlor Epoxide	300	101	(ug/kg)	<2.1	<2.0	<2.0	<2.1	7.1	<DL	<2.1
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.1	<2.0	<2.0	<2.1	<DL	<DL	<2.1
Dieldrin	300	296	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
4,4'-DDE	11,000	12,400	(ug/kg)	11	6.2	15	13	150	28	6.9
Endrin	470,000	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
4,4'-DDD	17,000	17,500	(ug/kg)	4.9P	13	38P	100	23	97	<4.1
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
4,4'-DDT	12,000	11,300	(ug/kg)	28	60	140P	460P	260	380	12P
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<21	<20	<20	<21	<DL	<DL	<21
Endrin Ketone	470,000	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<4.1	<3.9	<3.9	<4.1	<DL	<DL	<4.1
Alpha-Chlordane	3,000	3,210	(ug/kg)	4.0	8.7	47	30.0	270	130	8.0
Gamma-Chlordane	3,000	3,210	(ug/kg)	3.5P	7.3P	43P	26	220	120	7.2
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<41	<39	<39	<41	<DL	<DL	<41
TAL Metals										
Aluminum	+	ND(1)	(mg/kg)	725	380	1530	727	1340	688	699
Arsenic	3	15(3)	(mg/kg)	2.2B	1.4B	27.4	8.4	12.8	1.1B	1.3B
Barium	4,000	4,940	(mg/kg)	5.3B	4.5B	5.5B	5.4B	6.6B	7.8B	11.8B
Beryllium	1	ND(1)	(mg/kg)	<0.23	<0.23	<0.24	0.26B	0.25B	0.25B	<2.3
Cadmium	600	1,070	(mg/kg)	<1.1	<1.2	<5.9	<1.2	<5.9	<5.8	<11.5
Calcium	ND(1)	ND(1)	(mg/kg)	370000	385000	380000	388000	343000	365000	726000
Chromium, Total	430	160	(mg/kg)	7.0	5.9	8.7	7.7	9.7	8.1	<23.1
Cobalt	110,000	ND(1)	(mg/kg)	<11.5	<11.6	<11.8	<12.3	<11.8	<11.6	<23.1
Copper	ND(1)	ND(1)	(mg/kg)	<11.5	<2.3	<11.8	<2.5	<2.4	<2.3	<23.1
Iron	ND(1)	ND(1)	(mg/kg)	345	197	862	377	749	408	322
Lead	1,000	108	(mg/kg)	3.6	1.0	1.7	0.79	38.5	11.0	0.85
Magnesium	ND(1)	ND(1)	(mg/kg)	864B	1090	1130B	998B	898B	1130B	2200B
Manganese	5,500	ND(1)	(mg/kg)	5.6B	4.6B	10.9B	3.0B	13.5	12.3B	10.2B
Mercury	480	23	(mg/kg)	<0.11	<0.11	<0.12	<0.12	<0.12	<0.10	<0.12
Nickel	2,600	3.24	(mg/kg)	<22.9	<23.2	<23.5	<24.5	<23.6	<23.3	<46.1
Potassium	ND(1)	ND(1)	(mg/kg)	<229	<232	<235	<245	<236	<233	<2310
Selenium	9,900	389	(mg/kg)	<0.46	<0.47	<0.47	<0.47	<0.45	<0.46	<0.48
Silver	9,000	353	(mg/kg)	6.9B	7.9B	6.8B	<6.1	<5.9	5.6B	19.7B
Sodium	ND(1)	ND(1)	(mg/kg)	978B	901B	833B	998B	952	953B	1700B
Vanadium	4,800	ND(1)	(mg/kg)	<2.3	<11.6	<11.8	<12.3	<11.8	<11.6	<23.1
Zinc	560,000	ND(1)	(mg/kg)	11.7B	13.0B	<5.9	<6.1	16.6B	<16.0B	13.7B

Notes:

<not detected at specified detection limit

<DL, detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples); Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC. Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT.

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

TABLE 2-13

POST EXCAVATION SUMMARY OF CONSTITUENTS DETECTED IN SOIL/BEDROCK SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
HOMESTEAD AFB, FLORIDA

Sample ID / Sample Interval / Analyte	1995 FDEP Health Based Soil Target Levels	Removal Action Levels	Units ft.-bls.	CS28.1 1	CS34.1 1
VOA TCL Compounds					
Bromomethane	ND(1)	ND(1)	(ug/kg)	<12	<1400
Methylene Chloride	23,000	42,200	(ug/kg)	<12	<1400
Acetone	1,800,000	ND(1)	(ug/kg)	4BJ	<1400
1,1-Dichloroethene	100	ND(1)	(ug/kg)	<12	<1400
2-Butanone	15,000,000	ND(1)	(ug/kg)	<12	<1400
cis-1,3-Dichloropropene	ND(1)	ND(1)	(ug/kg)	<12	<1400
Tetrachloroethene	28,000	ND(1)	(ug/kg)	NA	NA
Trichloroethene	9,300	24,200	(ug/kg)	<12	<1400
Toluene	3,500,000	100(2)	(ug/kg)	<12	<1400
Chlorobenzene	300,000	50(2)	(ug/kg)	<12	<1400
Xylenes, Total	92,000,000	100(2)	(ug/kg)	<12	<1400
BNA TCL Compounds					
Benzoic Acid	ND(1)	ND(1)	(ug/kg)	<400	<1900
Naphthalene	12,000,000	1,000(2)	(ug/kg)	<400	<1900
2-Methylnaphthalene	1,800,000	1,000(2)	(ug/kg)	<400	<1900
Acenaphthylene	56,000,000	1,000(2)	(ug/kg)	57J	<1900
Acenaphthene	30,000,000	1,000(2)	(ug/kg)	<400	<1900
Dibenzofuran	3,500,000	1,000(2)	(ug/kg)	<400	<1900
Fluorene	30,000,000	1,000(2)	(ug/kg)	<400	<1900
Phenanthrene	21,000,000	1,000(2)	(ug/kg)	<400	400J
Anthracene	300,000,000	1,000(2)	(ug/kg)	<400	190J
Carbazole	120,000	224,000	(ug/kg)	<400	250J
Di-n-Butyl Phthalate	140,000,000	ND(1)	(ug/kg)	180BJ	<1900
Fluoranthene	48,000,000	1,000(2)	(ug/kg)	150J	2200
Pyrene	41,000,000	1,000(2)	(ug/kg)	210J	2700
Benzyl Butyl Phthalate	310,000,000	ND(1)	(ug/kg)	<400	240J
Benzo(a)Anthracene	4,900	5040	(ug/kg)	170J	1500
Chrysene	500,000	50,300	(ug/kg)	170J	1900
Bis(2-Ethylhexyl) Phthalate	110,000	ND(1)	(ug/kg)	52J	<1900
Benzo(b)Fluoranthene	5,000	5010	(ug/kg)	220J	2500
Benzo(k)Fluoranthene	48,000	4970	(ug/kg)	220J	2000
Benzo(a)Pyrene	500	540	(ug/kg)	170J	1800J
Indeno(1,2,3-C,D)Pyrene	5,000	5040	(ug/kg)	150J	1200J
Dibenz(A,H)Anthracene	500	505	(ug/kg)	78J	<1900
Benzo(g,h,i)Perylene	50,000	ND(1)	(ug/kg)	120J	1100J
Total PAHs			(ug/kg)	1,715	19,450
Pesticide/PCB TCL Compounds					
Alpha BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<1.9
Beta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<1.9
Delta BHC	ND(1)	ND(1)	(ug/kg)	<2.0	<1.9
Gamma BHC (Lindane)	ND(1)	ND(1)	(ug/kg)	<2.0	<1.9
Heptachlor	500	ND(1)	(ug/kg)	<2.0	<1.9
Aldrin	200	ND(1)	(ug/kg)	<2.0	<1.9
Heptachlor Epoxide	300	101	(ug/kg)	<2.0	<1.9
Endosulfan I	5,900,000	ND(1)	(ug/kg)	<2.0	<1.9
Dieldrin	300	296	(ug/kg)	<3.9	<1.9
4,4'-DDE	11,000	12,400	(ug/kg)	120	11
Endrin	470,000	ND(1)	(ug/kg)	<3.9	<3.6
Endosulfan II	ND(1)	ND(1)	(ug/kg)	<3.9	<3.6
4,4'-DDD	17,000	17,500	(ug/kg)	16	22P
Endosulfan Sulfate	5,900,000	ND(1)	(ug/kg)	<3.9	<3.6
4,4'-DDT	12,000	11,300	(ug/kg)	150	74
Methoxychlor	7,800,000	ND(1)	(ug/kg)	<20	<19
Endrin Ketone	470,000	ND(1)	(ug/kg)	<3.9	10
Endrin Aldehyde	480,000	ND(1)	(ug/kg)	<3.9	<3.6
Alpha-Chlordane	3,000	3,210	(ug/kg)	32	7.5
Gamma-Chlordane	3,000	3,210	(ug/kg)	28	6.7
PCB-1260 (Aroclor 1260)	ND(1)	ND(1)	(ug/kg)	<39	97P
TAL Metals					
Aluminum	+	ND(1)	(mg/kg)	4020	3200
Arsenic	3	15(3)	(mg/kg)	13.0	24.5
Barium	4,000	4,940	(mg/kg)	18.0B	32.1B
Beryllium	1	ND(1)	(mg/kg)	<2.4	<0.22
Cadmium	600	1,070	(mg/kg)	<11.9	1.6
Calcium	ND(1)	ND(1)	(mg/kg)	716000	250000
Chromium, Total	430	160	(mg/kg)	32.8	19.1
Cobalt	110,000	ND(1)	(mg/kg)	<23.8	<10.8
Copper	ND(1)	ND(1)	(mg/kg)	<23.8	30.7
Iron	ND(1)	ND(1)	(mg/kg)	2860	3710
Lead	1,000	108	(mg/kg)	14.2	209
Magnesium	ND(1)	ND(1)	(mg/kg)	<2320B	1040B
Manganese	5,500	ND(1)	(mg/kg)	85.4	56.4
Mercury	480	23	(mg/kg)	<0.10	<0.09
Nickel	2,600	3.24	(mg/kg)	<47.6	<21.6
Potassium	ND(1)	ND(1)	(mg/kg)	<2380	<216
Selenium	9,900	389	(mg/kg)	<0.44	<0.43
Silver	9,000	353	(mg/kg)	20.0B	<5.4
Sodium	ND(1)	ND(1)	(mg/kg)	1480B	556B
Vanadium	4,800	ND(1)	(mg/kg)	<23.8	<10.8
Zinc	560,000	ND(1)	(mg/kg)	13.4B	84.7

Notes:

<not detected at specified detection limit

<DL detection limit not specified

J - Estimated value, <CRQL

P - >25% difference in detected value between columns

B - compound detected in associated blank (organics samples). Reading is less than CRQL for inorganic samples

NR - Not Reported

1 - ND - No data. analyte was either not listed on the Soil Target Level Table or was listed, but qualified with an ND. Analyte was also not listed in Chapter 62-775 of the FAC.

2 - Analyte was not listed on the Soil Target Level Table but was listed in Chapter 62-775 of the FAC.

Total VOC listed in Chapter 62-775 as having a maximum concentration of 100 µg/kg and 1 mg/kg for Total PAHs.

3 - Removal Action Level As Determined by BCT

PR - Previously reported and evaluated during the Site SS-13/OU-3 RI/BRA

Box indicates PAH Compound used to calculate total PAHs. Shading indicates greater than guidance level.

Base/Neutral Acid Extractable Compounds. Fifty-one of the 75 soil/bedrock samples collected at OU-7 were analyzed for BNAs. Analytical results from these samples indicated detectable concentrations of one or more of the following polynuclear aromatic hydrocarbons(PAHs); acenaphthylene, phenanthrene, anthracene, fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benozo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-c,d)pyrene, dibenz(a,h)anthracene, and benzo(g,h,i)perylene. Concentrations of total PAHs in soil/bedrock samples ranged from 44 to 43,380 ug/kg. Twenty samples had total PAH levels greater than the 1,000 ug/kg clean soil criteria (Florida Administration Code 62-775), benzo(a)pyrene was the only BNA compound that was detected above the 500 ug/kg FDEP Health Based Soil Target Level or the 540 ug/kg Removal Action Level. Benzo(a)pyrene exceeded soil action levels in six soil/bedrock samples with the maximum concentration being 4,300 ug/kg. Three of the soil/bedrock samples containing elevated benzo(a)pyrene were taken from confirmation samples in the South Area and three were collected in the North Area. The PAHs in this area are likely the result of stormwater runoff and accumulation from anthropogenic sources such as roadways.

Di-n-butylphthalate, butylbenzylphthalate, and bis(2-ethylhexyl)phthalate were detected along with many of the PAH compounds at concentrations less than the established Removal Action Levels in one or more confirmatory samples. In some instances, soil/bedrock BNA detection limits were elevated to greater than the Removal Action Levels due to matrix interference. However, arsenic was the primary compound used for determining excavation lirnits.

Naphthalene or methylenaphthalene were detected in 4 soil/bedrock samples. One sample FCS4.5 collected from the floor of the South Area excavation at a depth of 4.5 ft bgs, exceeded the Removal Action Level for naphthalene (3.1 µg/kg), 2-methylnapthalene (8.1 µg/kg), acenaphthene (1.7 µg/kg), dibenzofuran (2.6 µg/kg), fluorine (3.4 µg/kg), phenanthrene (5.8 µg/kg), and anthracene (6.3 µg/kg). Minimal exposure potential exist for this sample, given the fact it was collected from a depth of 5 ft bgs in bedrock. A summary of soil/bedrock analytical results for BNAs are presented in Table 2-13. Maps depicting the soil/bedrock sampling locations are provided in Figures 2-5, 2-6, 2-7, and 2-8.

Organochlorine Pesticides/PCBs. Seventy three of the 75 soil/bedrock samples used to characterize OU-7 were analyzed for organochlorine pesticides and PCBs. Of the samples collected, none were found to contain levels of pesticides which exceeded the FDEP Health Based Soil Target or the Removal Action Levels. One sample, FCS7.5, collected from

bedrock at a depth of 5 ft bgs, contained 450 ug/kg of heptachlor which approaches the 500 ug/kg FDEP Health-Based Soil Target Level. In addition, four samples collected from the North Area excavation, contained a detectable levels of the PCBs aroclor 1260 at a concentration of 56 ug/kg. No Removal Action Levels were established for alpha-BHC, beta-BHC, delta-BHC, gamma-BHC (Lindane), aldrin, heptachlor, endrin, endosulfan II, endosulfan sulfate, methoxychlor, endrin ketone, endrin aldehyde, or PCBs.

Twenty pesticide compounds were detected in one or more of the soil/bedrock samples collected from the North and South Areas. Compounds in detectable concentrations were alpha-BHC, beta-BHC, delta-BHC, gamma-BHC (Lindane), aldrin, heptachlor, heptachlor epoxide, dieldrin, 4,4'-DD, 4,4'-DDD, 4,4'-DDT, Endrine, Endosulfan I, Endosulfan sulfate, Methoxychlor, Endrin ketone, Endrin aldehyde, alpha-Chlordane, and gamma-Chlordane. A summary of the pesticide/PCB analytical results is provided as Table 2-13. Soil/bedrock sampling locations are provided in Figures 2-5, 2-6, 2-7, and 2-8.

Metals and Cyanide. Fifty-three of the 75 soil/bedrock samples used to characterize the site were analyzed for TAL metals. Cyanide was not detected in any of the samples collected. Of the metals analyzed, only arsenic and lead were detected at concentrations that exceeded Health Based Soil Target or Removal Action Levels. Arsenic exceeded the Removal Action Levels of 15 mg/kg in 16 samples with concentrations ranging from 16.7 mg/kg to 123 mg/kg. One of the samples that exceeded arsenic removal levels was associated with the Site SS-13/OU-3, PCB Storage Area investigation. Arsenic concentrations in the North Area confirmation samples ranged from 3.5 to 44.5 mg/kg and from 4.3 mg/kg to 47.3 mg/kg in the South Area samples. Those soil/bedrock sample locations that exceed the present Corrective Action Level of 10 mg/kg include 22 soil/bedrock sample locations; the two samples associated with the OU-3 sample location E-5, as well as 10 samples from the North Area and 10 samples from the South Area excavations. Arsenic was the primary constituent determining the IRA excavation limits. Those locations that contained concentrations of arsenic that exceed Removal Action Levels are typically found in areas where the excavations could not be extended laterally due to the proximity to buildings or parking areas.

Lead was reported above action levels in soil/bedrock samples FCSN4.4 and CS37.1 at concentrations of 114 mg/kg and 6,050 mg/kg, respectively. The 114 mg/kg concentration of lead is below the FDEP action level of 1,000 mg/kg but above the Removal Action Level of 108 mg/kg. The 6,050 mg/kg concentration of lead in sample CS37.1 appears to be an anomaly, as no apparent source was identified.

Additional metals detected in soil/bedrock samples collected included aluminum, calcium, barium, beryllium, chromium, copper, cobalt, iron, magnesium, manganese, nickel, sodium, vanadium, zinc, and mercury (Table 2-13). These metals are typically present in carbonate rocks and soil/bedrock at various concentrations. According to average carbonate composition data presented by Hem (1989), calcium, magnesium, aluminum, iron, manganese, and sodium are the most common constituents of carbonates (Table 2-12). Additionally, barium, chromium, cobalt, copper, nickel, vanadium, zinc, mercury, and arsenic occur as trace concentrations. Concentrations of chromium, copper, arsenic, barium, calcium, sodium, and zinc were also reported in background sample P2-SL-0023-2 at levels above the average carbonate composition.

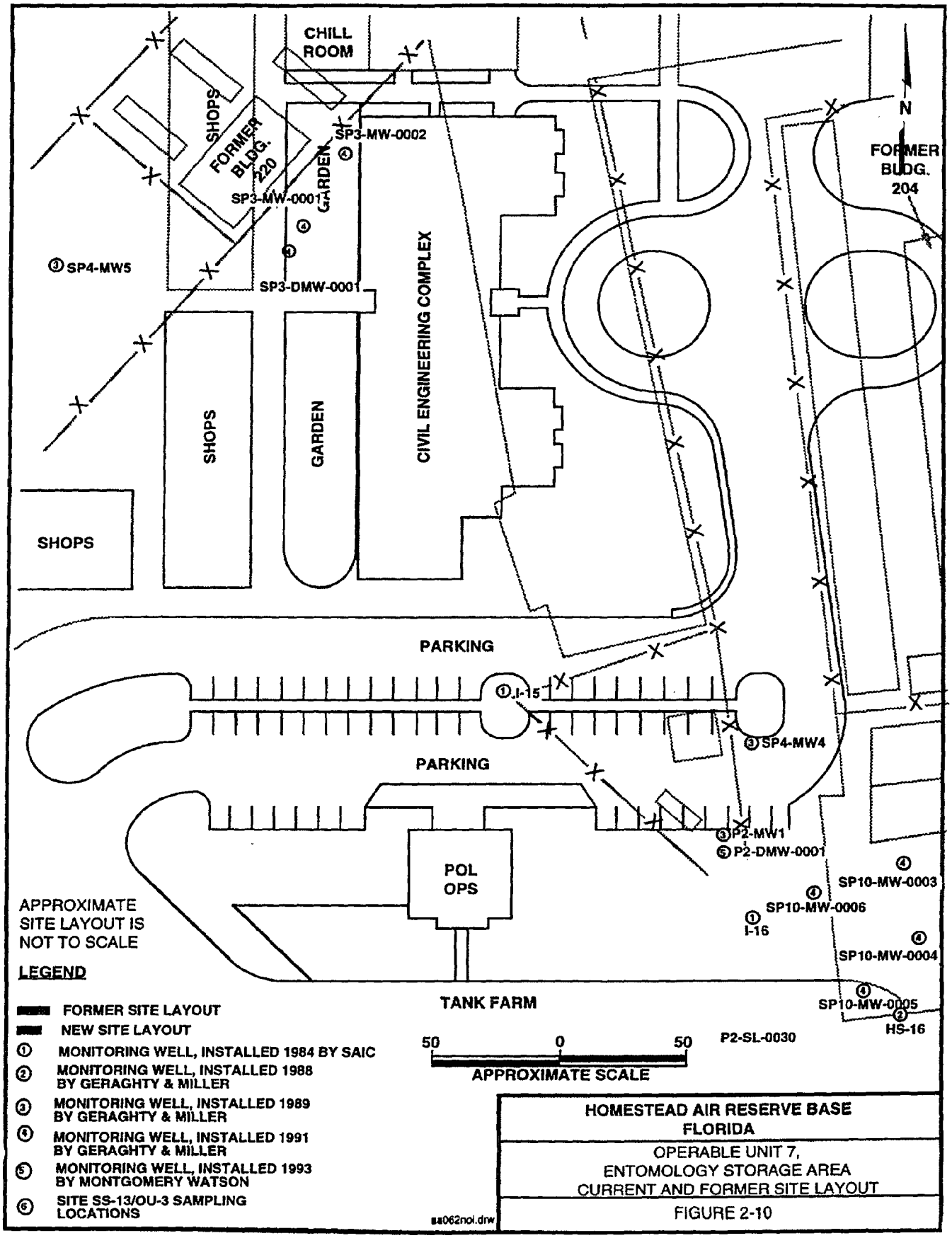
A summary of metal analytical results for soil/bedrock samples is provided in Table 2-13. Soil/bedrock sampling locations are provided in Figures 2-5, 2-6, 2-7, and 2-8.

2.6.1.3 Summary of Groundwater Investigations

Groundwater samples were collected from OU-7 monitoring wells during all phases of the IRP investigations with the exception of the 1994 IRA. Fourteen monitoring wells, ten in the South Area and four in the North Area, have been used to evaluate groundwater impacts at OU-7. Four wells in the South Area, SP-10-MW-0003 through SP-10-MW-0006, were associated with the former fuels site ST-18, while the four wells in the North Area were associated with the former OU-3 PCB Spill Site or the fuels Site SS-2. Monitoring well locations are depicted in Figure 2-10.

The IRP Phase II investigation conducted in 1984 included the installation of two shallow monitoring wells (I-15 and I-16). Groundwater samples were collected and analyzed for 17 specific pesticides. None of these pesticides were detected at levels above their respective quantitation limits.

In 1991, groundwater samples were collected from ten permanent monitoring wells located at OU-7 and adjacent sites. Groundwater samples collected from the monitoring wells at OU-7 (I-15, I-16, HS-16, and P2-MW1) were analyzed for TCL VOCs, BNAs, TAL metals, OC pesticides, and TRPH. The groundwater sample from HS-16 was additionally analyzed for TDS. The groundwater samples collected from the monitoring wells SP10-MW-0003 through SP10-MW-0006 and the monitoring wells SP4-MW4 and SP4-MW5 were analyzed for volatile organic halocarbons, PAHs, benzene, toluene, ethylbenzene, and xylene (BTEX),


CHILL ROOM
SHOPS
FORMER BLDG. 220
SP3-MW-0002
SP3-MW-0001
GARDEN
N
FORMER BLDG. 204
SP4-MW5
SP3-DMW-0001
SHOPS
GARDEN
CIVIL ENGINEERING COMPLEX
SHOPS
PARKING
I-15
SP4-MW4
PARKING
P2-MW1
P2-DMW-0001
POL OPS
SP10-MW-0003
SP10-MW-0006
I-15
SP10-MW-0004
SP10-MW-0005
HS-16
TANK FARM
APPROXIMATE SITE LAYOUT IS NOT TO SCALE
LEGEND
FORMER SITE LAYOUT
NEW SITE LAYOUT
① MONITORING WELL, INSTALLED 1984 BY SAIC
② MONITORING WELL, INSTALLED 1988 BY GERAGHTY & MILLER
③ MONITORING WELL, INSTALLED 1989 BY GERAGHTY & MILLER
④ MONITORING WELL, INSTALLED 1991 BY GERAGHTY & MILLER
⑤ MONITORING WELL, INSTALLED 1993 BY MONTGOMERY WATSON
⑥ SITE SS-13/OU-3 SAMPLING LOCATIONS
50 0 50
APPROXIMATE SCALE
P2-SL-0030
HOMESTEAD AIR RESERVE BASE
FLORIDA
OPERABLE UNIT 7,
ENTOMOLOGY STORAGE AREA
CURRENT AND FORMER SITE LAYOUT
FIGURE 2-10
a062nol.drw

methyl tertiary butyl ether (MTBE), ethylene dibromide (EDB), total lead, and total recoverable petroleum hydrocarbon (TRPH).

In 1993, Montgomery Watson performed an additional investigation of groundwater at OU-7 to further define the extent of contamination and to fill data gaps as recommended by the USEPA. Groundwater samples from the five monitoring wells (I-15, I-16, SP4-MW4, P2-MW1, and P2-DMW-0001) were analyzed for TCL organochlorine pesticides/PCBs and cyanide while the samples from P2-MW1 and P2-DMW-0001 were additionally analyzed for TCL VOCs, BNAs, and total and dissolved (filtered) TAL metals.

Six groundwater monitoring wells, I-15, I-16, MW-5, P2-MW1, P2-DMW-0001, and SP4-MW4, were abandoned in accordance with the South Florida Water Management District policies. The remaining wells are presumed to have been abandoned during construction of the new civil engineering complex. There have been no new wells installed at this site subsequent to construction of the new Civil Engineering Compound.

2.6.1.4 Nature and Extent of Groundwater Contamination

Groundwater Quality and Guidance Concentrations. Groundwater from the Biscayne Aquifer is generally calcium-bicarbonate water and typically is classified as “hard”, but otherwise is of generally acceptable chemical quality. However, dissolved iron concentrations are naturally high in the Biscayne Aquifer System and commonly exceed the Florida Secondary drinking water regulations standard (Sonntag, 1987). Concentrations of inorganic of constituents detected in the Biscayne Aquifer in Dade County are presented in Table 2-14. Groundwater analytical results were compared to Florida Groundwater Guidance Concentrations, Florida 62-770 Target Clean-Up Levels, Federal USEPA Primary and Secondary drinking-water standards’ Maximum Contaminant Levels (MCLs) and MCL goals (MCLGs) (Table 2-15).

Volatile Organic Compounds. 1991 Investigation. Groundwater samples were collected from 10 permanent monitoring wells at OU-7. The OU-7 monitoring well samples were analyzed for TCL VOCs. No VOCs constituents were detected in the 1991 groundwater samples. A summary of the 1991 groundwater analytical results are provided in Table 2-16.

1993 Investigation. One shallow (P2-MW1) and one deep (P2-DMW-0001) monitoring well were sampled for VOCs during the 1993 investigation. Groundwater samples from both wells were collected in duplicate. No VOCs were detected in sample P2-MW1 and its

TABLE 2-14

CONCENTRATIONS OF DISSOLVED INORGANIC CONSTITUENTS DETECTED IN THE BISCAYNE AQUIFER IN DADE COUNTY, FLORIDA
Homestead Air Reserve Base, Florida

Constituent	Range (mg/l)	Mean (mg/l)
Arsenic	<0.001 -0.002	0.0012
Barium	<0.1 -0.1	0.1
Cadmium	<0.001 - 0.003	0.001
Calcium	55 - 140	90
Chloride	13 - 110	42
Chromium [(a)]	<0.01 - 0.01	--
Fluoride	0.1 -0.5	0.2
Iron	<0.01 -1.9	0.56
Lead	<0.001 -0.006	0.0019
Magnesium	1.7 - 19	5.6
Mangnesium	<0.01 -0.03	0.0097
Mercury	<0.0001 - 0.0003	0.0001
Potassium	0.2 - 6.5	2.4
Sodium	7.4 - 77	26.6
Sulfate	0.1 - 45	14.6
Zinc	<0.01 - 0.03	0.0075
TDS	196 -478	333
Alkalinity (as $CaCO_3$)	157 - 624	263
Hardness (as $CaCO_3$)	150 -370	249

Source: Causaras, C.R., 1987, Geology of the Surficial Aquifer System ,Dade County, Florida. U.S. Geological Survey Water Resources Investigation Report 86-4126.

Notes:
(a) All detected observations had the same value.
TDS - Total Dissolved Solids
mg/l - milligrams per liter

TABLE 2-15

GROUNDWATER QUALITY CRITERIA

Analyte	Florida Drinking Water Standards	Florida 62-770	EPA Drinking Water Standards	EPA Maximum Contaminant Level Goat
VOLATILE ORGANIC COMPOUNDS (ug/l)				
Bromodichloromethane	NS	NS	100	0
Chloroform	NS	NS	100	0
Dibromochloromethane	NS	NS	NS	NS
PESTICIDES/PCBS (ug/L)				
Alpha-BHC	NS	NS	NS	NS
DDD	NS	NS	NS	NS
METALS (ug/L)				
Aluminum	2001	NS	50 TO 200 h	NS
Arsenic	50 k	NS	50*	NS
Cadmium	5 k	NS	5 i	5 i
Calcium	NS	NS	NS	NS
Chromium	100 k	NS	100 i	100 i
Lead	15 k	50	15 s	0
Manganese	50 l	NS	50 h	NS
Vanadium	NS	NS	NS	NS
TOTAL RECOVER ABLE PETROLEUM HYDROCARBONS (mg/L)	NS	5	NS	NS
TOTAL DISSOLVED SOLIDS (mg/L)	500 l	NS	500 h	NS
BIOCHEMICAL OXYGEN DEMAND (mg/L)	NS	NS	NS	NS
TOTAL SUSPENDED SOLIDS (mg/L)	NS	NS	NS	NS
ALKALINITY (mg/L)	NS	NS	NS	NS
TOTAL ORGANIC CARBON (mg/L)	NS	NS	NS	NS
SULFATE (mg/L)	250	NS	500	500 g
SULFIDE (mg/L)	NS	NS	NS	NS
HARDNESS as CaCO3 (mg/L)	NS	NS	NS	NS

ug/L - micrograms per liter
mg/L - milligrams per liter
NS - No Standard
g - Numbers represent EPA's Primary MCL for Inorganics.
h - Numbers represent EPA's Secondary MCL for Inorganics which are non-enforceable taste, odor or appearance guidelines.
i - Numbers represent EPA's Final MCL effective July 1992, Federal Register, January 30, 1991 and July 1, 1991.
k - Florida Primary Drinking Water Standard.
l - Florida Secondary Drinking Water Standard.
s - Final Action Level - The final lead action level is exceeded is the level of lead/copper in more than 10 percent
* - Under Review

TABLE 2-16

SUMMARY OF ANALYTICAL RESULTS OF GROUNDWATER SAMPLES
COLLECTED IN 1991 AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
Geraghty & Miller, 1991

Analyte	Florida Groundwater Guidance Concentrations	m	FAC 62-770 Florida		EPA Drinking Water Standards		G&M Sample I.D. Savannah I.D. Sampling Date	Trip Blank 37647-10 11/24/91	P2-EB-0029 37647-1 11/24/91	P2-HS-16 37647-2 11/24/91	P2-HS-9016 37647-3 11/24/91	P2-I-15 37647-6 11/24/91
VOLATILE ORGANIC COMPOUNDS (ug/L):												
Benzene	1	k	1	b	5	e		< 5.0	< 5.0	< 5.0 UJ	< 5.0 UJ	< 5.0 UJ
Methylene chloride	5		NS		NS			< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
BASE/NEUTRAL AND ACID EXTRACTABLE ORGANIC COMPOUNDS (ug/l):												
Acenaphthene	20			c	NS			NA	< 10	< 10	< 10	[0.89]
Benzo(a)pyrene	0.2			c	2	f		NA	< 10	< 10	[0.16]	< 10
bis-(2-Ethylhexyl)phthalate	6		NS		NS	f		NA	54	320 UJ	[1.7] U	[2.6] U
Butylbenzylphthalate	1400		NS		NS			NA	< 10	[0.50] J	< 10	< 10
Di-n-butylphthalate	700		NS		NS			NA	< 10	[1.0]	< 10	< 10
Dibenzofuran	NS		NS		NS			NA	< 10	< 10	< 10	< 10
Fluoranthene	280			c	NS			NA	< 10	[0.82]	[0.55]	< 10
Fluorene	280			c	NS			NA	< 10	< 10	< 10	< 10
2-Methylnapthalene	NS			d	NS			NA	< 10	< 10	< 10	< 10
Napthalene	6.8			d	NS			NA	< 10	< 10	< 10	[0.95]
Phenanthrene	10			c	NS			NA	< 10	[0 .69]	< 10	< 10
Pyrene	210			c	NS			NA	< 10	[0.64] J	[0.31] J	< 10
CHLORINATED PESTICIDES (ug/L):												
4,4'-DDD	0.1		NS		NS			NA	< 0.020	< 0.020 UJ	< 0.020	< 0.020
4,4'-DDE	0.1		NS		NS			NA	< 0.020	< 0.020 UJ	< 0.020	< 0.020
METALS (ug/L):												
Aluminum	200		NS		50 to 200	h,i		NA	< 200	2900 J	4300 J	21000 J
Arsenic	50	k	NS		50	g		NA	< 10	34 J	38 J	150 J
Barium	2000	k	NS		2000	i,g		NA	< 10	39 J	49 J	120 J
Calcium	NS		NS		NS			NA	360	1300000 J	1700000 J	8900000 J
Chromium	100	k	NS		100	i,g		NA	< 10	22 J	26 J	320 J
Copper	1000	l	NS		1300	s		NA	< 25	< 25 UJ	< 25 UJ	26 J
Iron	300	l	NS		300	h		NA	< 50	2000 J	2500 J	23000 J
Lead	15	k	50		15	s		NA	< 5.0 UJ	21 J	24 J	20 J
Magnesium	NS		NS		NS			NA	< 50	4200 J	5000 J	22000 J
Manganese	50	l	NS		50	h		NA	< 10	38 J	48 J	880 J
Nickel	100		NS		100	f		NA	< 40	< 40 UJ	< 40 UJ	44 J
Potassium	NS		NS		NS	f		NA	< 1000	1800 J	1800 J	3600 J
Sodium	160000		NS		NS			NA	< 500	13000 J	14000 J	28000 J
Vanadium	49		NS		NS			NA	< 10	13 J	17 J	120 J
Zinc	5000	l	NS		5000	h		NA	24	37 UJ	61 UJ	< 100 UJ
TOTAL PETROLEUM HYDROCARBONS (mg/L)	NS		5		NS			NA	< 1.0	< 1.0	< 1.0	< 1.0
TOTAL DISSOLVED SOLIDS	NS		NS		500,000	h		NA	< 0.5	410	450	NA

TABLE 2-16

SUMMARY OF ANALYTICAL RESULTS OF GROUNDWATER SAMPLES
COLLECTED IN 1991 AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
Geraghty & Miller, 1991

Analyte	Florida Groundwater Guidance Concentrations	m	FAC 62-770 Florida		EPA Drinking Water Standards		G&M Sample I.D. Savannah I.D. Sampling Date	P2-I-16 37647-5 11/24/91	P2-MW-1 37647-5 11/24/91	SP10-MW-0003 37321-2 11/7/91	SP10-MW-0004 37292-4 11/6/91	SP10-MW-0005 37292-5 11/6/91
VOLATILE ORGANIC COMPOUNDS (µg/L):												
Benzene	1	k	1	b	5	e		< 5.0	< 5.0	< 1.0	< 1.0	3.4
Methylene chloride	5		NS		NS			< 5.0	< 5.0	NA	NA	NA
BASE/NEUTRAL AND ACID EXTRACTABLE ORGANIC COMPOUNDS (ug/l):												
Acenaphthene	20			c	NS			< 10	[5.3]	< 10	< 10	< 10
Benzo(a)pyrene	0.2			c	2	f		< 10	< 10	< 10	< 10	< 10
bis-(2-Ethylhexyl)phthalate	6		NS		NS	f		[2.1] U	[1.7] UJ	< 10	< 10	< 10
Butylbenzylphthalate	1400		NS		NS			< 10	< 10	< 10	< 10	< 10
Di-n-butylphthalate	700		NS		NS			< 10	< 10	< 10	< 10	< 10
Dibenzofuran	NS		NS		NS			< 10	[5.0]	< 10	< 10	< 10
Fluoranthene	280			c	NS			< 10	< 10	< 10	< 10	< 10
Fluorene	280			c	NS			< 10	[9.9)	< 10	< 10	< 10
2-Methylnapthalene	NS			d	NS			[0.30] J	[34)	< 10	< 10	< 10
Napthalene	6.8			d	NS			[0.61]	12	< 10	< 10	< 10
Phenanthrene	10			c	NS			< 10	15	< 10	< 10	< 10
Pyrene	210			c	NS			< 10	< 10			
CHLORINATED PESTICIDES (ug/L):												
4,4'-DDD	0.1		NS		NS			< 0.020	8.7 J	NA	NA	NA
4,4'-DDE	0.1		NS		NS			< 0.020	0.095 J	NA	NA	NA
METALS (ug/L):												
Aluminum	200		NS		50 TO 200	h,i		3800 J	640	NA	NA	NA
Arsenic	50	k	NS		50	g		29 J	960	NA	NA	NA
Barium	2000	k	NS		2000	i,g		38 J	< 10	NA	NA	NA
Calcium	NS		NS		NS			2500000 J	370000	NA	NA	NA
Chromium	100	k	NS		100	i,g		< 50 UJ	< 10	NA	NA	NA
Copper	1000	l	NS		1300	s		< 25 UJ	< 25	NA	NA	NA
Iron	300	l	NS		300	h		2500 J	630	NA	NA	NA
Lead	15	k	50		15	s		< 6.0 UJ	< 5.0 UJ	230	12	140
Magnesium	NS		NS		NS			7700 J	2100	NA	NA	NA
Manganese	50	l	NS		50	h		99 J	12	NA	NA	NA
Nickel	100		NS		100	f		< 40 UJ	< 40	NA	NA	NA
Potassium	NS		NS		NS	f		< 1000 UJ	2000	NA	NA	NA
Sodium	160000		NS		NS			11000 J	13000	NA	NA	NA
Vanadium	49		NS		NS			< 50 UJ	< 10	NA	NA	NA
Zinc	5000	l	NS		5000	h		< 100 UJ	< 20	NA	NA	NA
TOTAL PETROLEUM HYDROCARBONS (mg/L)	NS		5		NS			< 1.0	14	< 1.0	< 1.0	< 1.0
TOTAL DISSOLVED SOLIDS	NS		NS		500,000	h		NA	NA	NA	NA	NA

TABLE 2-16

SUMMARY OF ANALYTICAL RESULTS OF GROUNDWATER SAMPLES
COLLECTED IN 1991 AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
Geraghty & Miller, 1991

Analyte	Florida Groundwater Guidance Concentrations	m	FAC 62-770 Florida		EPA Drinking Water Standards		G&M Sample I.D. Savannah I.D. Sampling Date	SP10-MW-9005 37292-2 11/6/91		SP10-MW-0006 37321-4 11/7/91		SP4-MW-4 37373-10 11/11/91		SP4-MW-5 37401-5 11/12/91
VOLATILE ORGANIC COMPOUNDS (ug/L):														
Benzene	1	k	1	b	5	e		3.2	<	1.0		NA		NA
Methylene chloride	5		NS		NS			NA		NA		30.0	<	1.0
BASE/NEUTRAL AND ACID EXTRACTABLE ORGANIC COMPOUNDS (ug/l):														
Acenaphthene	20			c	NS			< 10		< 10		< 10		< 10
Benzo(a)pyrene	0.2			c	2	f		< 10		< 10		< 10		< 10
Bis-(2-Ethylhexyl)phthalate	6		NS		NS	f		< 10		< 10		< 10		< 10
Butylbenzylphthalate	1400		NS		NS			< 10		< 10		< 10		< 10
Di-n-butylphthalate	700		NS		NS			< 10		< 10		< 10		< 10
Dibenzofuran	NS		NS		NS			< 10		< 10		< 10		< 10
Fluoranthene	280			c	NS			< 10		< 10		< 10		< 10
Fluorene	280			c	NS			< 10		< 10		< 10		< 10
2-Methylnapthalene	NS			d	NS			< 10		< 10		< 10		< 10
Napthalene	6.8			d	NS			< 10		< 10		< 10		< 10
Phenanthrene	10			c	NS			< 10		< 10		< 10		< 10
Pyrene	210			c	NS									
CHLORINATED PESTICIDES (ug/L):														
4,4'-DDD	0.1		NS		NS			NA		NA		NA		NA
4,4'-DDE	0.1		NS		NS			NA		NA		NA		NA
METALS (ug/L):														
Aluminum	200		NS		50 TO 200	h,i		NA		NA		NA		NA
Arsenic	50	k	NS		50	g		NA		NA		NA		NA
Barium	2000	k	NS		2000	i,g		NA		NA		NA		NA
Calcium	NS		NS		NS			NA		NA		NA		NA
Chromium	100	k	NS		100	i,g		NA		NA		NA		NA
Copper	1000	l	NS		1300	s		NA		NA		NA		NA
Iron	300	l	NS		300	h		NA		NA		NA		NA
Lead	15	k	50		15	s		160		240		15		11
Magnesium	NS		NS		NS			NA		NA		NA		NA
Manganese	50	l	NS		50	h		NA		NA		NA		NA
Nickel	100		NS		100	f		NA		NA		NA		NA
Potassium	NS		NS		NS	f		NA		NA		NA		NA
Sodium	160000		NS		NS			NA		NA		NA		NA
Vanadium	49		NS		NS			NA		NA		NA		NA
Zinc	5000	l	NS		5000	h		NA		NA		NA		NA
TOTAL PETROLEUM HYDROCARBONS (mg/L)	NS		5		NS			< 1.0		< 1.0		< 1.0		< 1.0
TOTAL DISSOLVED SOLIDS	NS		NS		500,000	h		NA		NA		NA		NA

duplicate sample P2-MW91. Acetone and chloroform were detected in sample P2-DMW-0001 at concentrations of 4 µg/l and 2 µg/l, respectively. Chloroform, bromodichloromethane, and dibromochloromethane were detected in the duplicate sample P2-DMW-9001 at concentrations of 9 µg/l, 4 µg/l, and 2 µg/l, respectively. All of these detection's are qualified as estimated, because they where less than the CRQL. These compounds are classified as trihalomethanes with a regulatory level established in drinking water at <100 µg/l total concentration. Acetone and 1,2-dichloropropane were detected in equipment blank P2-EB-0001 at concentrations of 11 µg/l and 2 µg/l, respectively. Neither of these two compounds were detected in the associated samples (P2-MW1 and duplicate P2-MW91). Methyl ethyl ketone and 1,2-dichloropropane were detected in equipment blank sample P2-EB-0002 at concentrations of 4 µg/l and 3 µg/l, respectively. 1,2-dichloropropane was detected in the associated sample duplicate, P2-DMW-9001. The source of these compounds is most likely the isopropanol used for equipment decontamination.

A summary of constituents detected in groundwater during the 1993 investigation is provided as Table 2-17.

1994 Investigation. No groundwater samples were collected for analysis during the 1994 IRA.

Base/Neutral and Acid Extractable Compounds. 1991 Investigation. Several BNAs, mostly PAHs, were detected in five of the ten groundwater samples, including one duplicate, collected at OU-7 in 1991, as shown in Table 2-17. Total PAHs were detected in samples I-15, I-16, HS-16, HS-9016 (the duplicate of HS-16), and P2-MW1 at concentrations of 1.84, 0.91, 1.46, 1.02, and 61.2 µg/l, respectively. The FAC 62-770 regulations establish a 10 µg/l action level for total PAHs in groundwater for petroleum contaminated sites. The aerial extent of groundwater containing PAHs above 50 µg/l is limited to the southern portion of the site in the immediate vicinity of monitoring well P2-MW1 (Figure 2-10). The naphthalene concentration of 54 µg/l detected in sample P2-MW1 exceeded the Florida Groundwater Guidance concentration of 10 µg/l; however, none of the other concentrations of PAHs detected in the five groundwater samples exceeded Florida or Federal Standards for drinking water.

Additional BNAs (non-PAHs) detected in groundwater samples include di-n-butylphthalate detected in sample HS-16 at a concentration of 1.0 µg/l; dibenzofuran was detected in sample P2-MW1 at a concentration of 5.0 µg/l; and butylbenzylphthalate was detected in sample HS-16 at a concentration of 0.50 µg/l. The concentrations of these non-PAHs detected were

TABLE 2-17
SUMMARY TABLE OF DETECTED COMPOUNDS IN GROUNDWATER
OU-7, ENTOMOLOGY STORAGE AREA
MONTGOMERY WATSON, 1993 INVESTIGATION
HOMESTEAD ARB, FLORIDA

Analyte	Florida Drinking Water Standard	EPA Drinking Water Standard	EPA Maximum Contaminant Level Goal	Sample ID Date Collected	P2-MW-1 3/3/93	P2-MW-91 3/3/93 Duplicate	P2-DMW-0001 3/12/93	P2-DMW-9001 3/12/93 Duplicate
VOA TCL Compounds (ug/l)								
Acetone	NS	NS	NS		<10	<10	4 J	<10
Chloroform	NS	100(a)	NS		<10	<10	2 J	9 J
Methyl Ethyl Ketone (2-Butanone)	NS	NS	NS		<10	<10	<10	<10
Bromodichloromethane	NS	100(a)	NS		<10	<10	<10	4 J
1,2-dichloropropane	5	5	0		<10	<10	<10	<10
Dibromochloromethane	NS	100(a)	NS		<10	<10	<10	2 J
Pesticide/PCB TCL Compounds (ug/l)								
Alpha BHC	NS	NS	NS		.030 JP	0.024 J	<0.054	<0.055
p,p'-DDE	NS	NS	NS		0.12	0.090 J	<0.11	<0.11
p,p'-DDD	NS	NS	NS		10	9.6	0.16	0.18 P
P,p'-DDT	NS	NS	NS		.023 JP	0.022 J	0.078 J	0.11
BNA TCL Compounds (ug/l)								
2-Chlorophenol	NS	NS	NS		<11	<11	<11	3 J
2-Methylnapthalene	10(b)	NS	NS		1 J	3 J	1 J	9 J
Acenaphthene	NS	NS	NS		4 J	3 J	<11	<11
Anthracene	NS	NS	NS		2 J	2 J	<11	<11
Bis(20Ethylhexyl) Phthalate	6	6	0		1 J	1 J	0.2 J	1 J
Di-n-Butyl Phthalate	NS	NS	NS		<11	<11	0.6J	2 J
Dibenzofuran	NS	NS	NS		3 J	2 J	<11	0.7 J
Diethylphthalate	NS	NS	NS		<11	<11	<11	0.3 J
Fluoranthene	NS	NS	NS		0.8 J	0.5 J	<11	<11
Fluorene	NS	NS	NS		8 J	6 J	<11	1 J
N-Nitrosodiphenylamine	NS	NS	NS		<11	<11	0.8 J	<11
Napthalene	10(b)	NS	NS		2 J	2 J	0.9 J	7 J
Phenanthrene	NS	NS	NS		14	14	0.5 J	2 J
Phenol	NS	NS	NS		<11	<11	4 J	35
Pyrene	NS	NS	NS		1 J	0.9 J	<11	<11

All samples analyzed by Savannah Laboratories, Tallahassee, Florida

< - not detected at specified detection limit
NS - no standard
B - compound detected in an associated blank
J - estimated quantity, quality control criteria were not met

Notes:
(a) - MCL of 100 ug/L is for total THM's
(b) - total napthalenes must be <100 ug/l to meet FAC 62-770 guidelines

TABLE 2-17
SUMMARY TABLE OF DETECTED COMPOUNDS IN GROUNDWATER
OU-7, ENTOMOLOGY STORAGE AREA
MONTGOMERY WATSON, 1993 INVESTIGATION
HOMESTEAD ARB, FLORIDA
(CONTINUED)

Analyte	Florida Drinking Water Standard	EPA Drinking Water Standard	EPA Maximum Contaminant Level Goal	Sample ID Date Collected	SP4-MW4 3/3/93	P2-I-15 3/3/93	P2-EB-0001 3/3/93	P2-EB-0002 3/12/93
VOA TCL Compounds (ug/l)								
Acetone	NS	NS	NS		<10	<10	11	<10
Chloroform	NS	100(a)	NS		<10	<10	<10	<10
Methyl Ethyl Ketone (2-Butanone)	NS	NS	NS		<10	<10	<10	4 J
Bromodichloromethane	NS	100(a)	NS		<10	<10	<10	<10
1,2-dichloropropane	5	5	0		<10	<10	2 J	3 J
Dibromochloromethane	NS	100(a)	NS		<10	<10	<10	<10
Pesticide/PCB TCL Compounds (ug/l)								
Alpha BHC	NS	NS	NS		<0.052	<0.055	<0.061	<0.052
p,p'-DDE	NS	NS	NS		0.044 J	<0.11	<0.12	<0.10
p,p'-DDD	NS	NS	NS		0.019 J	0.23	<0.12	<0.10
P,p'-DDT	NS	NS	NS		0.075 J	<0.11	<0.12	0.021 J
BNA TCL Compounds (ug/l)								
2-Chlorophenol	NS	NS	NS		NA	NA	<13	<11
2-Methylnapthalene	10(b)	NS	NS		NA	NA	<13	<11
Acenaphthene	NS	NS	NS		NA	NA	<13	<11
Anthracene	NS	NS	NS		NA	NA	<13	<11
Bis(20Ethylhexyl) Phthalate	6	6	0		NA	NA	<13	<11
Di-n-Butyl Phthalate	NS	NS	NS		NA	NA	<13	<11
Dibenzofuran	NS	NS	NS		NA	NA	<13	<11
Diethylphthalate	NS	NS	NS		NA	NA	<13	<11
Fluoranthene	NS	NS	NS		NA	NA	<13	<11
Fluorene	NS	NS	NS		NA	NA	<13	<11
N-Nitrosodiphenylamine	NS	NS	NS		NA	NA	<13	<11
Napthalene	10(b)	NS	NS		NA	NA	0.3J	<11
Phenanthrene	NS	NS	NS		NA	NA	<13	<11
Phenol	NS	NS	NS		NA	NA	1J	<11
Pyrene	NS	NS	NS		NA	NA	<13	<11

All samples analyzed by Savannah Laboratories, Tallahassee, Florida
< - not detected at specified detection limit
NS - no standard
B - compound detected in an associated blank
J - estimated quantity, quality control criteria were not met

Notes:
(a) - MCL of 100 µg/L is for total THM's
(b) - total naphthalenes must be <100 ug/l to meet PAC 62-770 guidelines

TABLE 2.17
SUMMARY TABLE OF DETECTED COMPOUNDS IN GROUNDWATER
OU-7, ENTOMOLOGY STORAGE AREA
MONTGOMERY WATSON, 1993 INVESTIGATION
HOMESTEAD ARB, FLORIDA
(CONTINUED)

Analyte	Florida Drinking Water Standard	EPA Drinking Water Standard	EPA Maximum Contaminant Level Goal	Sample ID Date Collected	P2-MW-1 3/3/93	P2-MW-91 3/393	P2-MW-1 3/3/93 Filtered	P2-MW-91 3/3/93 Filtered	P2-DMW-0001 3/12/93	P2-DMW-9001 3/12/93
Metals (ug/l)										
Aluminum	200(g)	50-200(c)	NS		104 B	126 B	<2.0	<20.0	39.7 B	48.7 B
Arsenic	50 (f)	50 (d)	NS		534	540	510	632	<5.0W	<15.0
Barium	2,000 (f)	2,000 (d)	2,000 (g)		5.6 B	5.6 B	5.6 B	5.3 B	11.4 B	11.8 B
Cadmium	5(f)	5 (e)	5		5.4	5.5	5.5	7.3	<2.0	<2.0
Calcium	NS	NS	NS		**101000**	**98900**	**99600**	**103000**	**95500**	**96100**
Copper	1,000	1,300	1,300		2.6 B	<2.0	<2.0	<2.0	<2.0	<2.0
Iron	300	300(c)	NS		**994**	**981**	**983**	**758**	69.4 B	24.0 B
Magnesium	NS	NS	NS		1910 B	1890 B	1920 B	1930 B	3520 B	3500 B
Manganese	50 (g)	50(c)	NS		17.1	16.5	18	16.4	2.2 B	2.3 B
Potassium	NS	NS	NS		3490 B	3140 B	3260 B	3230 B	5920	6020
Sodium	160,000 (f)	NS	NS		17200	17300	17600	17700	15200	14900
Zinc	5,000 (g)	5,000(c)	NS		95.6	20.1	16.4 B	8.3 B	27.3	16.7 B

All samples analyzed by Savannah Laboratories, Tallahassee, Florida
< not detected at specified detection limit
Bold > equal or greater than BG
Bold & Shaded > equal or greater than2* BG
NS - no standard

Notes:
(c) - EPA Secondary Drinking Water Standard
(d) - EPA Primary MCL
(e) - EPA Final MCL
If) - Florida Primary MCL
(g) - Florida Secondary Drinking Water Standard
B - Value is less than CRQL but greater than IDL
W - post digestion spike for furnace AA out of control limits

TABLE 2-17
SUMMARY TABLE OF DETECTED COMPOUNDS IN GROUNDWATER
OU-7, ENTOMOLOGY STORAGE AREA
MONTGOMERY WATSON, 1993 INVESTIGATION
HOMESTEAD ARB, FLORIDA
(CONTINUED)

Analyte	Florida Drinking Water Standard	EPA Drinking Water Standard	EPA Maximum Contaminant Level Goal	Sample ID Date Collected	P2-DMW-0001 3/12/93 Filtered	P2-DMW-9001 3/12/93 Filtered	P2-EB-0001 3/3/93	P2-EB-0001 3/3/93 Filtered	P2-EB-0002 3/12/93	P2-EB-0002 3/12/93 Filtered
Metals (mg/l)										
Aluminum	200	50-200(c)	NS		<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Arsenic	50 (f)	50 (d)	NS		<5.0 W	<5.0 W	<5.0	<5.0	<5.0	<5.0 W
Barium	1,000 (f)	2,000 (d)	2,000 (g)		11.0 B	11.4b	<1.0	<1.0	1.2 B	<1.0
Cadmium	5(f)	5 (e)	5 (e)		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Calcium	NS	1,000(c)	NS		**95800**	**95100**	53.7B	38.7B	322B	36.0B
Copper	1,000	1,300	1,300		<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Iron	300	300(c)	NS		11.7B	<7.0	<7.0	<7.0	<7.0	47.6B
Magnesium	NS	NS	NS		3540B	3520B	<30.0	<30.0	<30.0	<30.0
Manganese	50 (g)	50(c)	NS		2.4B	2.3B	<1.0	<1.0	<1.0	<1.0
Potassium	NS	NS	NS		6010	6020	<325	<325	<325	<325
Sodium	160,000 (f)	NS	NS		15100	15000	50.3 B	<30.0	<30.0	40.2 B
Zinc	5,000 (g)	5,000(c)	NS		11.7B	20.8	8.1 B	6.3 B	17.9 B	14.5B

All samples analyzed by Savannah Laboratories, Tallahassee, Florida
< not detected at specified detection limit
Bold > equal or greater than BG
Bold & Shaded > equal or greater than2* BG
NS - no standard

Notes:
(c) - EPA Secondary Drinking Water Standard
(d) - EPA Primary MCL
(c) - EPA Final MCL
(f) - Florida Primary MCL
(g) - Florida Secondary Drinking Water Standard
B - Value is less than CRQL but greater than IDL
W - post digestion spike for furnace AA out of control limits

well below the Florida Groundwater Guidance Concentrations and Federal Drinking Water Standards (Table 2-15).

1993 Investigation. One shallow (P2-MWI) and one deep (P2-DMW-0001) monitoring well were sampled for BNAs in the 1993 investigation. Groundwater samples from both wells were collected in duplicate. Several BNAs, mostly PAHs, were detected in the sample and duplicate collected from P2-MWl. Total PAHs in sample P2-MW1 and duplicate P2-MW91 were 29.8 µg/1 and 26.4 µg/l. Both of these values exceed FDEP 62-770 guidelines of <10 µg/1 for total PAHs. Total PAHs detected in sample P2-DMW-0001 and duplicate P2-DMW-9001 were 0.5 µg/1 and 3 µg/l, respectively.

Additional BNAs (non-PAHs) detected in groundwater include phenol in P2-DMW-0001 and P2-DMW-9001 at 4 µg/1 and 35 µg/l, respectively; 2-chlorophenol in P2-DMW-9001 at 3 µg/l; dibenzofuran in P2-MWl, P2-MW91 and P2-DMW-9001 at 3 µg/l, 2 µg/l and 0.7 µg/l, respectively; diethyl phthalate in P2-DMW-9001 at 0.3 µg/l; n-nitrosodiphenylamine in P2-DMW-0001 at 0.8 µg/l; di-n-butyl phthalate in P2-DMW-0001 and P2-DMW-9001 at 0.6 µg/l and 2 µg/l, respectively; and bis(2-ethylhexyl)phthalate in P2-MW1, P2-MW91, P2-DMW-0001, and P2-DMW-9001 at 1 µg/l, 1 µg/l, 0.2 µg/l, and 1 µg/l, respectively. A summary of constituents detected in groundwater during the 1993 investigation is provided as Table 2-17.

1994 Investigation. No groundwater samples were collected for BNA analysis during the 1994 IRA.

Organochlorine Pesticide/PCBs. 1991 Investigation. In 1991, five groundwater samples, I-15, I-16, HS-16, HS-9016 (the duplicate of HS-16), and P2-MW1 were analyzed for pesticide compounds (Table 2-6). Two pesticide compounds, 4,4'-DDD and 4,4'-DDE, were detected in only one groundwater sample, P2-MW1, at concentrations of 8.7 and 0.095 µg/l, respectively. No other pesticide compounds were detected above their respective quantitation limits in the five groundwater samples collected during this investigation. In 1991, the aerial extent of pesticide compounds dissolved in groundwater was limited to the immediate vicinity of P2-MW1 in the southern portion of the site.

1993 Investigation. In 1993 groundwater samples from four shallow monitoring wells (I-15, I-16, SP4-MW4, and P2-MWl) and one deep monitoring well (P2-DMW-0001) were analyzed for organochlorine pesticides and PCBs. PCBs were not detected in any of the samples collected. Groundwater samples from P2-MW1 and P2-DMW-0001 were collected

in duplicate. DDT and/or its metabolites were detected in four of the five wells sampled. DDT was detected in samples P2-MW1, duplicate P2-MW91, P2-DMW-0001, duplicate P2-DMW-9001, and SP4-MW4 at concentrations of 0.023 µg/l, 0.022 µg/l, 0.078 µg/l, 0.11 µg/l and 0.075 µg/l, respectively. The DDD metabolite was detected in samples P2-MW1, duplicate P2-MW91, P2-DMW-0001, duplicate P2-DMW-9001, SP4-MW4, and I-15 at concentrations of 10 µg/l, 9.6 µg/l, 0.16 µg/l, 0.18 µg/l, 0.019 µg/l, and 0.23 µg/l, respectively. The DDE metabolite was detected in samples P2-MW1, duplicate P2-MW91, and SP4-MW4 at concentrations of 0.12 µg/l, 0.09 µg/l, and 0.044 µg/l, respectively. Alpha-BHC was detected in sample P2-MW1 and its duplicate P2-MW91 at concentrations of 0.030 µg/1 and 0.024 µg/l, respectively. A summary of constituents detected in groundwater during the 1993 investigation is provided as Table 2-17.

1994 Investigation. No groundwater samples were collected for pesticide analysis during the 1994 Interim Removal Action.

Metals and Cyanide. 1991 Investigations. The following metals were detected in one or more of the groundwater samples collected in 1991 by G&M: aluminum, barium, calcium, chromium, iron, magnesium, manganese, nickel, potassium, sodium, vanadium, lead, and arsenic. Calcium, potassium, magnesium, and vanadium were detected in the five groundwater samples analyzed for TAL metals; however, no groundwater quality standards or guidelines exist for these metals (Table 2-15).

Groundwater samples collected from HS-16, HS-9016, I-15, I-16, and P2-MW1 contained very high concentrations of total calcium, 1,300,000, 1,700,000, 8,900,000, 2,500,000, and 370,000 µg/l, respectively. The sampling logs for all 5 samples indicate that the samples were turbid. It is probable that the high TAL metal concentrations, particularly calcium, are a result of suspended sediments and thereby overstate the actual concentrations of the analyses at the site (G&M, 1992d). These calcium concentrations are significantly higher than the calcium concentration range (55,000 to 140,000 µg/1) reported in the Biscayne Aquifer by Sonntag (1987).

Arsenic was detected in samples HS- 16, HS-9016, I-15, I-16, and P2-MW 1 at concentrations of 34, 38, 150, 29, and 960 µg/l, respectively. The arsenic concentrations detected in I-15 (150 µg/1) and P2-MW1 (960 µg/1) exceed the Florida Primary Drinking Water Standard and Federal MCL for drinking water of 50 µg/l for arsenic. Barium was detected in all samples collected, except P2-MW1, at concentrations ranging from 39 to 120 µg/1 which are well

below the Florida Primary Drinking Water Standard of 1000µg/I and the Federal MCL for drinking water of 2000 µg/l.

Chromium concentrations were detected above the Florida Primary Drinking Water Standard of 50 µg/l and the Federal MCL for drinking water of 100 µg/l in sample I-15 at a concentration of 320 µg/l. Sodium was detected in all wells sampled at concentrations ranging from 11,000 to 28,000 µg/1 which were well below the Florida Primary Drinking Water Standard of 160,000 µg/l.

Lead was detected in samples HS-16, HS-9016, I-15, SP4-MW4, SP4-MW5, SP10-MW-0003, SP10-MW-0004, SP10-MW-0005 and its duplicate SP10-MW-9005, and SP10-MW-0006 at concentrations of 21, 24, 20, 15, 11, 230, 12, 140, 160, and 240 µg/l, respectively which exceed the Federal Action Level for lead of 15 µg/1 in all samples except SP4-MW4, SP4-MW5, and SP10-MW-0004. Total lead concentrations detected in samples SP10-MW-0003, SP10-MW-0005 and its duplicate SP10-MW-9005, and SP10-MW-0006 exceeded the Florida Primary Drinking Water Standard of 50 µg/l. The aerial extent of total lead dissolved in groundwater is primarily located off-site in the southeastern corner of the site in the vicinity of Site ST-18. In addition, a localized area of total lead dissolved in the groundwater is located in the immediate vicinity of I-15. Nickel was detected in one sample I-15 at a concentration of 44 µg/l, which is below the Florida Groundwater Guidance Concentration of 150 µg/l and the Federal MCL of 100 µg/l.

Federal Secondary Drinking Water Standards establish recommended limits and deal with the aesthetic qualities of drinking water; however, the FDEP has adopted these standards as the Florida Secondary Drinking Water Standards and requires that potable groundwater shall meet these recommended limits. Iron, which is naturally high in the Biscayne Aquifer and commonly exceeds the Florida standard (Sonntag, 1987), was detected in all of the monitoring wells sampled for TAL metals at concentrations ranging from 630 to 23,000 µg/1 which exceed the Federal Secondary MCL for drinking water and the Florida Secondary Drinking Water Standard of 300 µg/l (Table 2-15). The Federal Secondary MCL for drinking water and Florida Secondary Drinking Water Standard for manganese (50 µg/1) was exceeded in two samples, I-15 and I-16, at concentrations of 880 and 99 µg/l, respectively. Aluminum was detected in all samples at concentrations ranging from 640 to 21,000 µg/l. The Federal Secondary MCL for aluminum (50 to 200 µg/1) was exceeded in all samples.

1993 Investigation. Groundwater samples from four shallow monitoring wells (I-15, I-16, SP4-MW4, and P2-MW1) and one deep monitoring well (P2-DMW-0001) were analyzed for

cyanide during the 1993 investigation. Groundwater samples from P2-MW1 and P2-DMW-0001 were additionally analyzed for TAL metals. Groundwater samples were analyzed for total (unfiltered) and dissolved (filtered) metals due to concerns about the elevated turbidity of the groundwater samples collected during previous sampling events. Samples analyzed for dissolved metals were field filtered using an in-line, disposable (single use) 0.45 micron filter. The groundwater samples from monitoring wells P2-MW1 and P2-DMW-0001 were collected in duplicate for cyanide and TAL metals (both filtered and unfiltered). No cyanide was detected in any of the samples collected.

Arsenic calcium, and iron exceed both the federal and state drinking water MCL in both the unfiltered and filtered sample for well P2-MW-1 and its duplicate. Calcium was the only compound that exceeded MCLs in the deep well P2-DMW-0001 and its duplicate. Iron exceeded the state and federal MCLs of 300 µg/l in both the filtered and unfiltered samples P2-MW-1 and P2-MW91 ranging in concentration from 758 µg/l to 994 µg/l. However, the concentrations of calcium and iron fall within the range of dissolved calcium in the Biscayne Aquifer as reported by Causarus (1987) and Sountage (1987), respectively. Arsenic concentrations detected between the filtered and unfiltered samples were comparable at P2-MW-1 with concentrations ranging from 510µmg/l to 632 mg/l. These concentrations exceed both the Florida Primary Drinking Water Standards and the federal Primary MCL of 50 µg/l.

Other dissolved metals detected at trace levels include barium, cadmium, magnesium, manganese, potassium, sodium, and zinc. Copper was detected slightly above the detection level in the unfilter sample from P2-MW-1.

Groundwater metal analytical results for filtered and unfiltered samples from the 1993 Investigation are summarized in Table 2-17.

1994 Investigation. No groundwater samples were collected for metals analysis during the 1994 Interim Removal Action.

Hydrocarbon Compounds. In 1991 groundwater samples were analyzed for TRPH analysis. In 1991, TRPH was detected in one of the eleven samples. TRPH was detected in the sample from well P2-MW1 at a concentration of 14 mg/l which exceeds the Section 62-770, FAC TRPH criteria of 5 mg/l (Table 2-15). The aerial extent of TRPH dissolved in groundwater is limited to the vicinity of monitoring well P2-MW1 and corresponds to the soil/bedrock headspace data of >50 ppm and TRPH concentrations detected in soil/bedrock samples collected from the 4 to 6 ft interval at this location.

1993 and 1994 Investigation. No groundwater samples were collected for TRPH analysis during the 1993 or 1994 Investigations.

2.6.1.5 Summary

Subsequent to the 1994 IRA, the soil/bedrock impacts at OU-7 have been characterized by sample locations which were not excavated as a result of the IRA. Seventy-five soil/bedrock samples from four investigations, including the G&M 1991 OU-7 RI the 1993 Montgomery Watson OU-7 RI, the 1993 Montgomery Watson OU-3 RI and the 1994 IRA delineation and confirmation samples provided the sources of data for site characterization.

Characterization of OU-7 indicated remnant levels of PAHs and arsenic in soil/bedrock near areas that were capped by buildings or parking areas. The excavations were not extended under these covered areas because the covers act as a cap and reduce the potential for exposure to the underlying soil/bedrock. Furthermore, the development of this area by the Air Force Reserve provides a cap over much of the site. Exposure is further reduced by the limited amount of soil which prohibits manual excavation activities. The thickness of soil at this site, as determined from soil boring logs, indicates a relatively thin veneer of soil, less than 12 inches.

Lead was found to exceed action levels in one sample while PAHs, primarily benzo(a)pyrene, and arsenic were found in isolated pockets above action levels. Fifteen soil/bedrock samples with arsenic concentrations above the 15 mg/kg Removal Action Level range in concentration from 16.7 to 123 mg/kg. Eight of the samples containing arsenic above the Removal Action Level are located in the South Area, five are located in the North Area, and one sample is located southeast of the former PCB Spill Area. A summary of the soil/bedrock metal analytical results is presented as Table 2-13.

Volatile organic compounds were not reported above Removal Action Levels in any of the non-excavated soil/bedrock samples. Twenty-three BNAs, primarily PAHs, were detected in soil/bedrock samples. The PAH benzo(a)pyrene was reported above the 1995 FDEP Health Based Soil Target Level of 500 µg/kg in six samples. However, only two of these samples associated with the South Area excavation, CS34.1 (1.8 µg/kg) and CS 19.3 (4.3 µg/kg), exceeded the current BCT acceptance level for benzo(a)pyrene of 1.5 µg/kg. Two of the samples were collected from the southwest corner of the North Area, while the remainder of the elevated detections were from the east side wall samples in the South Area, adjacent to

the asphalt covering. Total PAH concentrations in soil/bedrock samples ranged from below the detection limit to 43,380 µg/kg. Twenty samples had reported total PAH concentration greater than the 1,000 µg/kg Clean Soil Criteria of FAC 62-775.400. PAHs concentrations have been observed throughout the Homestead ARB area and have been associated with anthropogenic sources such as asphalt. The elevated PAHs are within the range of concentrations detected in urban areas and within the range of values reported for road dust (Menzie, et al., 1992).

One or more pesticides were reported in each of the 1994 IRA confirmation soil/bedrock samples. However, the concentration of pesticides reported were all below the specified Removal Action Levels in the confirmation samples. One PCB, aroclor 1260, was detected in four confirmation soil/bedrock samples, NW 15.3 (56 µg/kg), CS 15.3 (48 µg/kg), CS23.3 (62µg/kg), and CS34.1 (97 µg/kg) also below the specified Removal Action Level.

The groundwater at OU-7 appears to be relatively unaffected by former operations at OU-7. Groundwater analytical results did not indicate concentrations for VOCs, BNAs, or pesticide/PCB compounds above state or federal drinking water standards (Table 2-16 and 2-17). Groundwater contaminants detected during previous investigations consist primarily of metals. Groundwater metal analytical results indicate arsenic, calcium, and iron above the USEPA and State of Florida drinking water standards.

The arsenic concentration of 960 µg/l in the unfiltered 1991 P2-MW 1 sample is much higher than that in the 1993 P2-MW1 filtered sample (534 µg/1). This is likely related to the high turbidity in the 1991 P2-MW1 sample relative to the 1993 P2-MWl sample, as indicated by the respective calcium concentrations. (1991 calcium concentration: 370,000 µg/l. 1993 calcium concentration: 101,000 µg/1). This suggests that the 1993 P2-MW1 sample arsenic results are more representative of the groundwater underlying OU-7. However, the level of arsenic found in groundwater at P2-MW1 still exceeds state and federal MCLs. In general, groundwater metals are lower in the 1993 samples as compared to the 1991 samples. This is presumed to be due to the groundwater sampling methodology used during the 1993 sampling event which utilized a low flow sample pump to minimize turbidity during sampling. With the exception of arsenic, elevated calcium and iron concentrations would be expected given the composition of the aquifer material and are consistent with the levels of these constituents commonly found in the Biscayne Aquifer (Causarus, 1987).

A summary of constituents detected in OU-7 groundwater from the 1993 investigation is provided as Table 2-17. Figure 2-11 depicts the concentrations of arsenic and pesticides in groundwater from the 1991 and 1993 sampling event.

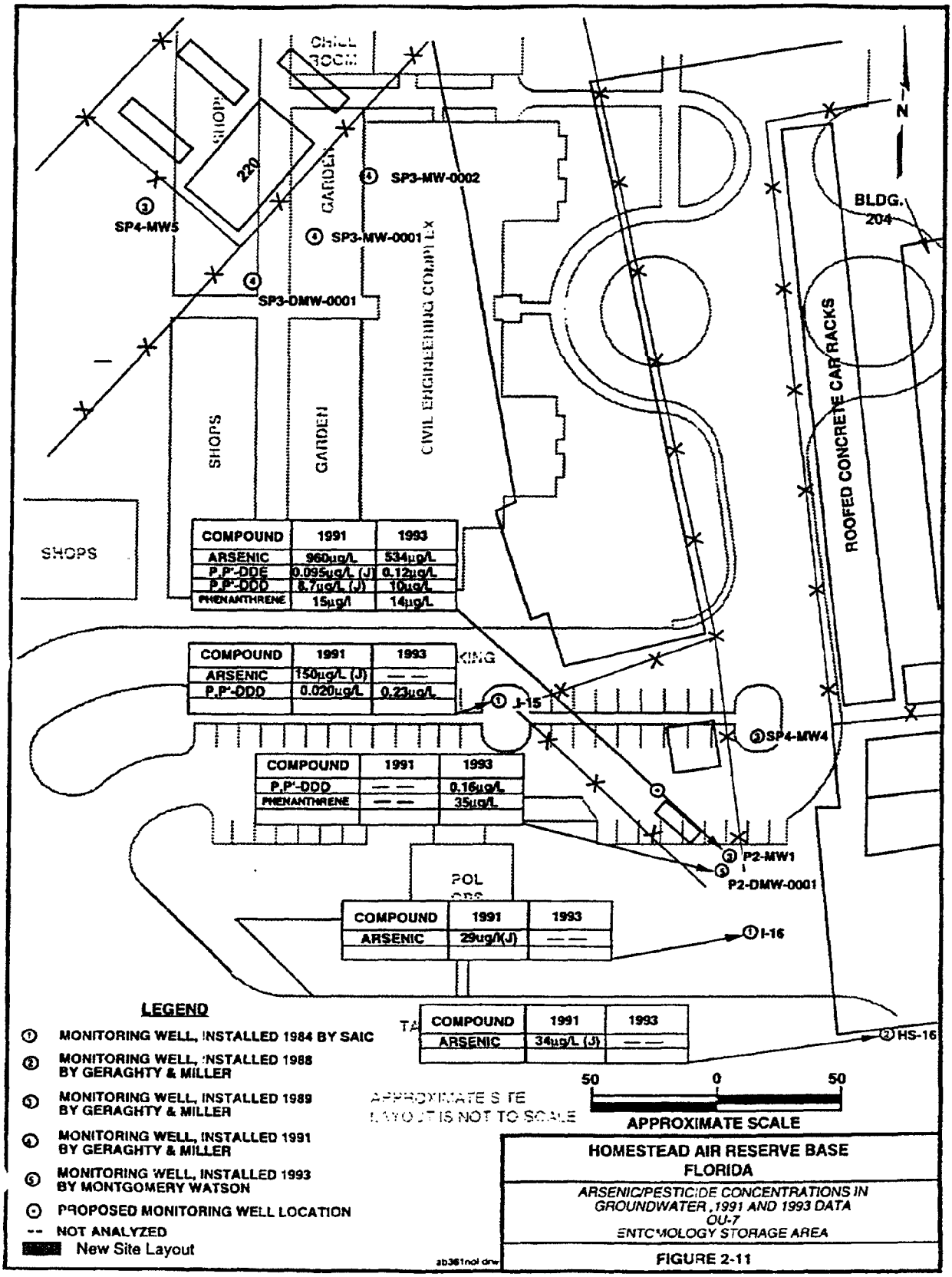
2.6.2 Potential Routes of Migration

The source of wastes at OU-7 were accidental releases of diesel fuel and pesticides. Products spilled on the ground may have moved down through the soil/bedrock profile and leached to shallow groundwater, migrated in surface runoff, or been released to the air via direct volatilization, volatilization from groundwater, or dust emission. The drainage canal to the west may not drain the area because the concrete wall east of the canal prevents site surface runoff from entering this canal.

Elevated levels of 7 metals (aluminum, arsenic, barium, chromium, lead, silver and vanadium) were detected in surface soil/bedrock. Elevated levels of arsenic were observed in site soil/bedrock samples across the site, as well as in groundwater from within the source area. The source of the arsenic contamination is likely through the use of arsenical pesticides. Other Chemicals of Concern (COCs) include one VOC (benzene), and 5 pesticides (DDT, DDE, the alpha-chlordane and gamma-chlordane isomers, endrin ketone and heptachlor epoxide). Six metals at elevated levels were found in subsurface soil/bedrock (aluminum, antimony, arsenic, chromium, silver, and vanadium). The isomers of chlordane had penetrated to the subsurface also.

DDE is a break-down product of DDT and is somewhat more water soluble than its parent compound. DDE has the potential to migrate further than DDT due to this characteristic.

Only metals were found as COPCs in the groundwater. There are no potable wells located on-site. In the immediate vicinity (within one mile) of the site there are two wellfields (Nos. 1 and 2). These wells are no longer in use. Additionally, migration to the groundwater at the two non-potable wells south of the site is not expected to occur because several drainage ditches and canals occur between the site and these wells. Thus, there is currently little potential for exposure to affected groundwater. The base water supply is obtained currently from a wellfield located off-base and more than 1.5 miles southwest of OU-7. Although the old on-base wells are still on-line and are used during peak consumption periods to augment the off-site wells, this pumping is infrequent and does not alter the groundwater on-site (Geraghty & Miller, 1992a). Future potable use of the groundwater in the vicinity of OU-7 is unlikely due to salt-water intrusion.



HOMESTEAD AIR RESERVE BASE
FLORIDA

ARSENIC/PESTICIDE CONCENTRATIONS IN GROUNDWATER, 1991 AND 1993 DATA
OU-7
ENTOMOLOGY STORAGE AREA

FIGURE 2-11

Although other contaminated media are present at OU-7, the principal route of migration of contaminants is through shallow groundwater. Past activities allowed contaminants to enter soil/bedrock and surface water, and the contaminants eventually migrated to shallow groundwater.

Operable Unit 7 is situated on very level topography at the Base. The cycle of water through the site begins with precipitation. During rainfall events, water percolates rapidly through the limestone and weathered limestone bedrock underlying the site. Surface water runoff is limited due to the flat topography and lack of drainage at OU-7. Given the highly transmissive underlying formation, rainwater typically infiltrates rapidly into the shallow aquifer system. It is estimated that horizontal groundwater movement can be on the order of tens of feet during a single rainfall event. Once the rainfall ceases, the water table returns to near static conditions and groundwater movement decreases dramatically.

Between rainfall events, evaporation from the surface soil/bedrock returns water from the aquifer to the atmosphere. The rate of loss is greatest with open water bodies and decreases with increasing distance from the water table.

The natural concentrations of chemicals in the soil/bedrock, rock, and water have a controlling effect on the fate and transport mechanisms. Soil/bedrock at the site exist primarily as a veneer on the bedrock surface. The soil has both organic and iron precipitants. Nevertheless, the calcium carbonate from the underlying oölite is the primary mineral present.

2.7 SUMMARY OF SITE RISK

In order to evaluate whether existing or future exposure to contaminated media at OU-7 could pose a risk to people or the environment, USAF completed a Baseline Risk Assessment (BRA) in May 1996 with USEPA oversight of this process. This evaluation then served as a baseline for determining whether cleanup of each site media was necessary. In the BRA, USAF evaluated site risks for environmental media. This ROD addresses the risks attributable to chemicals in the soil and groundwater at OU-7. The risk assessment included the following major components: selection of chemicals of potential concern, exposure assessment, toxicity assessment, risk characterization, development of remedial goal options, ecological risk, and uncertainties. The USAF estimated potential site risk in the absence of any future remediation.

2.7.1 Selection of Chemicals of Potential Concern

This section presents an analysis of the site data to determine which chemicals present in site samples are potentially responsible for the greatest risks at the site. These chemicals are designated chemicals of potential concern (COPCs). The selection of COPCs allows the risk assessment to focus on a manageable list of the most important chemicals, which in turn permits concise analysis and presentation of information during the remainder of the risk assessment.

2.7.1.1 Criteria For Selection. The process of selecting the COPCs involves four criteria. The first criterion involves determining whether a chemical is present within its range of natural background concentrations. Chemicals present at background levels are not selected as COPCs. Tables 2-12 and 2-14 present soil and groundwater background data, respectively.

The second criterion is whether a chemical represents at least one percent of the risk in a given media, based on a screening method that involves the concentration and toxicity of the chemical. Factors other than concentration and toxicity are considered to potentially modify this criterion to include additional chemicals that account for less than one percent of the risk. These factors include physical and chemical properties of a given chemical, environmental persistence, medium-specific mobility, the potential to bioaccumulate, potential routes of exposure, the spatial extent of the chemical, and the range and magnitude of concentrations detected.

Changes in COPC screening guidance have occurred. At the request of regulators, this change in guidance was incorporated into this document by screening chemicals detected in site samples using an additional method based on USEPA Region III Risk-Based Concentrations (RBCs). This additional screening is discussed further in Section 2.7.1.4.

The third criterion is whether a chemical is an essential human nutrient that is only toxic at very high doses (i.e., at doses that are both much higher than beneficial levels and much higher than could be associated with contact at the site). Chemicals typically considered under this criterion include calcium, iron, magnesium, potassium, and sodium.

The fourth criterion is to determine frequency of detection in a given medium. When chemicals are detected in less than five percent of the samples for a given medium, they are

not selected as chemicals of concern. However, the number of samples at OU-7 for any given medium is no more than 24. Therefore this criterion was not used for OU-7. The following paragraphs discuss the three criteria above in greater detail.

Background levels have been estimated for groundwater, surface soil, and subsurface soil. As per Region IV risk assessment guidance (USEPA, 1992b), inorganic chemicals where the maximum detected concentration is less than twice the background concentration are considered to be present at background levels. Exceptions to this rule have been made for known human carcinogens such as arsenic and chromium (assumed to present in the hexavalent state, or Cr(VI)). For these metals, the maximum detected concentration has been required to be less than background to assume that the metal is present at background levels.

The results of COPC screening for groundwater, surface soil, and subsurface soil are summarized in Tables 2-18, 2-19, and 2-20, respectively.

Soil. For surface soil, five Base-wide background samples were collected by Geraghty & Miller in 1991. These samples include SP11-SL-0028-2, P3-SL-0023, P2-SL-0023-2, SP3-SL-0004-1, and SP3-SL-0004-2. For subsurface soil, two background samples (SP11-SL-0028-6 and SP7-SL-0002) were collected. Soil background values are summarized in Table 2-12. As in the case of groundwater, data concerning typical chemical concentration ranges in soil are used to place the site data in perspective. In particular, data from Hem (1989) concerning carbonate sediments are employed for this purpose.

Groundwater. For groundwater, United States Geological Survey (USGS) data on the Biscayne Aquifer have been used for comparison with site groundwater samples. The USGS data are summarized in Table 2-14. While it is generally considered preferable to determine background concentrations with wells immediately upgradient of the site, the monitoring well P2-I-15 designated by Geraghty & Miller as a background well has concentrations of several metals which are greater than associated site samples, and which are also above regulatory concentrations. These results indicate that this well is probably not representative of background levels, and the USGS data are more likely to represent undisturbed conditions.

Other sources of background information for groundwater include data concerning typical chemical concentration ranges in groundwater. These data have been used to place the site data in perspective.

TABLE 2-18

SUMMARY OF CHEMICAL OF POTENTIAL CONCERN IN GROUNDWATER
OU-7,ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 1 or 2)

Constituent	Minimum Concentration	Maximum Concentration	No. of Wells With Detects	Preliminary Screening Summary
VOCs (µg/L)				
Bromodichloromethane	4	4	1/5	**Included[2]**
Chloroform	9	9	1/5	**Included[2]**
Dibromochloromethane	2	2	1/5	**Included[2]**
BNAs (µg/L)				
Acenaphthene	5.3	5.3	1/5	Excluded, low score[1]
Anthracene	2.0	2.0	1/5	Excluded, low score[1]
bis(2-Ethylhexyl)phthalate	1.0	1.0	2/5	Excluded, low score[1]
Butylbenzylphthalate	0.5	0.5	1/5	Excluded, low score[1]
Di-n-butylphthalate	1.0	2.0	2/5	Excluded, low score[1]
Dibenzofuran	0.7	5.0	3/5	Excluded, low score[1]
Diethylphthalate	0.3	0.3	1/5	Excluded, low score[1]
Fluoranthene	0.8	0.8	2/5	Excluded, low score[1]
Fluorene	1.0	9.9	3/5	Excluded, low score[1]
2-Methylnaphthalene	0.3	34.0	4/5	Excluded, low score[1]
N-nitrosodiphenylamine	0.8	0.8	1/5	Excluded, low score[1]
Naphthalene	0.6	12.0	4/5	Excluded, low score[1]
Phenanthrene	0.7	15.0	4/5	Excluded, low score[1]
Phenol	35.0	35.0	1/5	Excluded, low score[1]
Pyrene	0.6	1.0	2/5	Excluded, low score[1]
TPHs (µg/L)	51.0	882	2/2	**Included[2]**

TABLE 2-18

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN IN GROUNDWATER
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 2 of 2)

Chemical (µg/l)	Minimum Concentration	Maximum Concentration	No. of Wells With Detects	Preliminary Screening Summary
Pesticides (µg/L)				
Alpha-BHC	0.03	0.03	1/5	**Included[2]**
DDD	0.18	10	3/5	**Included[2]**
DDE	0.09	0.12	2/5	Excluded, low score[1]
DDT	0.02	0.11	2/5	Excluded, low score[1]
Inorganics (mg/L)				
Aluminum	0.049	4.3	5/5	**Included[2]**
Arsenic	0.0025	0.96	5/5	**Included**
Barium	0.0056	0.039	4/5	Excluded, low score[1]
Cadmium	0.001	0.0055	2/5	**Included**
Calcium	101	2,500	5/5	**Included, qualitative, high conc essential nutrient**
Chromium (VI)	0.026	0.026	1/5	**Included**
Copper	0.0026	0.0026	1/5	Excluded, low score[1]
Iron	0.069	2.5	5/5	Excluded,below Biscayne Aquifer value, essential nutrient
Lead	0.024	0.024	1/5	Included, above current action level
Magnesium	1.91	7.7	5/5	Excluded, below Biscayne Aquifer value, essential nutrient
Manganese	0.0023	0.099	5/5	**Included**
Potassium	1.8	6.0	4/5	Excluded, below Biscayne Aquifer value, essential nutrient
Sodium	11.0	17.3	5/5	Excluded, below Biscayne Aquifer value, essential nutrient
Vanadium	0.013	0.013	1/5	Excluded, low score[1]
Zinc	0.027	0.10	3/5	Excluded, low score[1]

Note:
[(1)]Low score indicates <1% results for concentration-toxicity screen (USEPA,1989) for the RfD and/or SF calculation (see Table 2-6).
[(2)]Chemical was included as a COPC based on additional screening using benchmarks based on USEPA Region III Risk-Based Concentrations (RBCs); see Section 2.6 for details.

TABLE 2-19

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 1 of 3)

Constituent	Minimum Concentration	Maximum Concentration	No. of Samples With Defects	Preliminary Screening Summary
VOCs (µg/kg)				
Acetone	4	560	10/14	Excluded, equipment decontamination contaminant
Benzene	**24**	**24**	**1/14**	**Included, Class A carcinogen**
1,l-Dichloroethene	25	25	1/14	Excluded, low score[1]
Chlorobenzene	19	19	1/14	Excluded, low score[1]
Methylene Chloride	3	720	8/14	Excluded, low score[1]
Toluene	1	23	3/14	Excluded, low score[1]
Trichloroethene	19	19	1/14	Excluded, low score[1]
Xylenes (total)	1	1	1/14	Excluded, low score[1]
BNAs (µg/kg)				
Acenaphthylene	57	57	1/15	Excluded, low score[1]
Anthracene	110	220	2/15	Excluded, low score[1]
Benzo(a)anthracene	**65**	**1,400**	**5/15**	Included[2]
Benzo(a)pyrene	**66**	**970**	**5/15**	**Included[2]**
Benzo(b)fluoranthene	**69**	**2,000**	**6/15**	**Included[2]**
Benzo(g,h,i)perylene	44	550	4/15	Excluded, low score[1]
Benzo(k)floranthene	66	500	4/15	Excluded, low score[1]
bis(2-Ethylhexyl)phthalate	52	130	3/15	Excluded, low score[1]
Butylbenzylphthalate	8.6	8.6	1/14	Excluded, low score[1]
Carbazole	59	92	2/13	Excluded, low score[1]
Chrysene	79	1,300	6/15	Excluded, low score[1]
Di-n-butylphthalate	56	1,010	4/15	Excluded, low score[1]
Di-n-octylphthalate	10	10	1/14	Excluded, low score[1]
Dibenzo(a,h)anthracene	**17**	**280**	**3/15**	**Included[2]**
Fluoranthene	97	1,900	8/15	Excluded, low score[1]
Indeno(1,2,3-c,d)pyrene	45	630	5/15	Excluded, low score[1]
2-Methylnaphthalene	43	84	2/15	Excluded, low score[1]
Naphthalene	50	50	1/15	Excluded, low score[1]
Phenanthrene	50	1,100	3/15	Excluded, low score[1]
Pyrene	92	2,200	6/15	Excluded, low score[1]

TABLE 2-19

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 2 of 3)

Constituent	Minimum Concentration	Maximum Concentration	No. of Samples With Defects	Preliminary Screening Summary
Pesticides/PCBs (µg/kg)				
alpha-BHC	15	15	1/24	Excluded, low score[1]
delta-BHC	83	83	1/24	Excluded, low score[1]
Chlorodane isomers	**7.6**	**3,500**	**15/25**	**Included**
DDD	4.8	890	15/25	Excluded, low score[1]
DDE	**5.1**	**2,200**	**19/25**	**Included**
DDT	**12**	**4,600**	**18/25**	**Included**
Endosulfan sulfate	540	541	1/25	Excluded, low score[1]
Endrin Ketone	**1200**	**1,200**	**1/25**	**Included**
Heptachlor	4.6	37	3/24	Excluded, low score[1]
Heptachlor epoxide	**6.8**	**94**	**3/24**	**Included**
Methoxychlor	960	960	1/25	Excluded, low score[1]
Inorganics (mg/kg)				
Aluminum	**681**	**17,700**	**14/14**	**Included**
Arsenic	**0.49**	**44.5**	**30/31**	**Included**
Barium	**5.2**	**451**	**15/15**	**Included**
Beryllium	0.012	1.1	6/15	Excluded, below site background
Cadmium	1.6	1.6	1/15	Excluded, low score[1]
Calcium	24100	716,000	14/14	Excluded, essential nutrient (qualitative evaluation)
Chromium (VI)	**6.8**	**61.5**	**15/15**	**Included**
Copper	3.4	26.5	11/15	Excluded, low score[1]
Iron	484	15,500	14/14	Excluded, essential nutrient (qualitative evaluation)
Lead	6.6	4.34	15/15	Excluded, below 400 mg/kg screening level
Magnesium	844	23,220	14/14	Excluded, essential nutrient (qualitative evaluation)
Manganese	**9.8**	**119**	**14/14**	**Included**
Mercury	0021	0.39	5/14	Excluded, low score[1]
Nickel	2	2	1/15	Excluded, low score[1]
Potassium	330	330	1/10	Excluded, essential nutrient (qualitative evaluation)
Silver	**5.8**	**20**	**5/14**	**Included**
Sodium	356	1,480	14/14	Excluded, essential nutrient (qualitative evaluation)

TABLE 2-19

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN IN SURFACE SOIL AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 3 of 3)

Constituent	Minimum Concentration	Maximum Concentration	No. of Samples With Defects	Preliminary Screening Summary
Inorganics (mg/kg)				
Vanadium	**4**	**26.5**	**4/14**	**Included**
Zinc	5	222	15/15	Excluded, low score[1]
Cyanide	20	20	1/14	Excluded, low score[1]

Notes:

(1) Low score indicates <1% result for concentration-toxicity screen (USEPA, 1989) for the RfD and/or SF calculation (see Table 2-7).

(2) Chemical was included as a COPC based on additional screening using benchmarks based on USEPA Region III Risk-Based Concentration (RBCs) See Section 2.6 for details.

TABLE 2-20

SUMMARY OF CHEMICAL OF POTENTIAL CONCERN IN SUBSURFACE SOIL (>2FT) AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 1 of 3)

Constituent	Minimum Concentration	Maximum Concentration	No. of Samples With Defects	Preliminary Screening Summary
VOCs (µg/kg)				
Acetone	3	1,600	21/29	Excluded, equipment decontamination contaminant
Bromomethane	350	350	1/29	Excluded, low score[1]
Methylene	2	2,100	18/29	Excluded, low score[1]
Tetrachloroethene	4,800	4,800	1/2	Excluded, low score[1]
Xylenes (total)	160	200	2/29	Excluded, low score[1]
BNAs (µg/kg)				
Ancenapthene	1,700	1,700	1/36	Excluded, low score[1]
Acenaphthylene	41	110	2/36	Excluded, low score[1]
Anthracene	45	6,300	5/36	Excluded, low score[1]
Benzo(a)anthracene	18	1,500	10/36	Excluded, low score[1]
Benzo(a)pyrene	**14**	**1,000**	**11/36**	**Included[2]**
Benzo(b)flouranthene	44	2,000	9/36	Excluded, low score[1]
Benzo(g,h,i)perylene	44	810	6/36	Excluded, low score[1]
Benzo(k)fluoranthene	47	510	8/36	Excluded, low score[1]
bis(2-Ethylhexyl)phthalate	45	944	8/35	Excluded, low score[1]
Butylbenzylphthalate	13	13	1/29	Excluded, low score[1]
Carbazole	50	310	2/27	Excluded, low score[1]
Chrysene	43	1,300	11/36	Excluded, low score[1]
Di-n-butylphthalate	47	677	12/36	Excluded, low score[1]
Di-n-octylphthalate	25	25	1/29	Excluded, low score[1]
Dibenzofuran	2,600	2,600	1/29	Excluded, low score[1]
Dibenzo(a,h)anthracene	60	350	41/29	Excluded, low score[1]
Fluoranthene	27	2,700	14/36	Excluded, low score[1]
Fluorene	56	3,400	2/36	Excluded, low score[1]
Indeno(1,2,3-cd)pyrene	64	830	6/36	Excluded, low score[1]
2-Methylnaphthalene	44	8,100	2/29	Excluded, low score[1]
Naphthalene	3,100	3,100	1/36	Excluded, low score[1]
Phenanthrene	46	5,800	10/36	Excluded, low score[1]
Pyrene	6.5	2,600	14/36	Excluded, low score[1]

TABLE 2-20

SUMMARY OF CHEMICAL OF POTENTIAL CONCERN IN SUBSURFACE SOIL (>2FT) AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 2 of 3)

Constituent	Minimum Concentration	Maximum Concentration	No. of Samples With Defects	Preliminary Screening Summary
Pesticides/PCBs (µg/kg)				
Aldrin	2.6	38	2/40	Excluded, low score[1]
alpha-BHC	2.6	2.6	1/40	Excluded, low score[1]
beta-BHC	2.6	9	4/47	Excluded, low score[1]
delta-BHC	2.6	12	3/40	Excluded, low score[1]
gamma-BHC	2.6	10	2/40	Excluded, low score[1]
Chlordane isomers	**2.0**	**1,890**	**29/47**	**Included**
DDD	2.4	650	31/47	Excluded, low score[1]
DDE	2.1	460	30/47	Excluded, low score[1]
DDT	6	1,100	37/47	Excluded, low score[1]
Dieldrin	5.1	50	4/40	Excluded, low score[1]
Endosulfan I (alpha)	5.1	5.1	1/38	Excluded, low score[1]
Endosulfan II (beta)	8	13	2/40	Excluded, low score[1]
Endosulfan sulfate	6	20	2/47	Excluded, low score[1]
Endrin	5.1	230	5/40	Excluded, low score[1]
Endrin Aldehyde	2.7	18	2/28	Excluded, low score[1]
Endrin Ketone	5.9	23	4/47	Excluded, low score[1]
Heptachlor	2.6	450	13/40	Excluded, low score[1]
Heptachlor epoxide	3.8	13	5/40	Excluded, low score[1]
Methoxychlor	100	100	1/40	Excluded, low score[1]
Toxaphene	200	200	1/21	Excluded, low score[1]
Acrolor 1260	56	56	1/28	Excluded, low score[1]
Inorganics (mg/kg)				
Aluminum	**199**	**52,800**	**29/29**	**Included**
Antimony	**14.6**	**14.6**	**1/36**	**Include, high detection limits**
Arsenic	**0.62**	**47.3**	**29/36**	**Included**
Barium	4	156	36/36	Excluded, low score[1]
Beryllium	0.12	2.5	13/36	Excluded, below site background
Calcium	48,400	726,000	29/29	Excluded, essential nutrient (qualitative evaluation)
Chromium (VI)	**3.1**	**145**	**35/36**	**Included**

TABLE 2-20

SUMMARY OF CHEMICALS OF POTENTIAL CONCERN IN SUBSURFACE SOUL (>2FT) AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 3 of 3)

Constituent	Minimum Concentration	Maximum Concentration	No. of Samples With Defects	Preliminary Screening Summary
Inorganics (mg/kg) (continued)				
Cobalt	10	10	2/29	Excluded, low score[1]
Copper	0.41	25	14/36	Excluded, low score[1]
Iron	45	46,200	28/29	Excluded, essential nutrient (qualitative evaluation)
Lead	0.79	115	29/36	Excluded, below 400 mg/kg screening level
Magnesium	513	2,880	29/29	Excluded, essential nutrient (qualitative evaluation)
Mangansese	**3**	**167**	**27/29**	**Included**
Mercury	0.21	0.21	1/27	Excluded, low score[1]
Nickel	11	22.9	2/36	Excluded, low score[1]
Potassium	1,320	1,320	1/29	Excluded, essential nutrient (qualitative evaluation)
Selenium	49	49	1/29	Excluded[3]
Silver	**5.6**	**19.7**	**6/29**	**Included**
Sodium	336	1,700	29/29	Excluded, essential nutrient (qualitative evaluation)
Vanadium	**4**	**109**	**3/29**	**Included**
Zinc	0.43	129	31/36	Excluded, low score[1]

Notes:

(1) Low score indicates <1% result of concentration-toxicity screen (USEPA, 1989) for the RfD and/or SF calculation (see Table 2-8).

(2) Chemical was included as a COPC based on additional screening using benchmarks based on USEPA Region III Risk-Based Concentrations (RBCs); see Section 2.6 for details.

(3) Chemical was not included as a COPS based on additional screening using benchmarks based on USEPA Region III Risk-Based Concentrations (RBCs) see Section 2.6 for details.

2.7.1.2 Concentration-Toxicity Screen. The concentration-toxicity screen is used to calculate indices that rank the chemicals according to their relative potentials to create health risks at the site. One index is used to rank chemicals according to their potential for initiating or promoting cancers, and a second index ranks chemicals according to their potential for chronic non-cancer effects. The first index applies only to carcinogens, while the latter index applies to noncarcinogens. These indices are used for ranking purposes only, and do not represent actual risk values.

The index used for ranking carcinogens involves the use of a slope factor (SF). Studies of carcinogenicity tend to focus on identifying the slope of the linear portion of a curve of dose versus response. A plausible upper-bound value of the slope is called the slope factor.

The index used to rank chemicals according to their potential to cause noncarcinogenic effects involves the use of a reference dose (RfD). A chronic RfD is an estimate of a daily exposure level for which people, including sensitive populations, do not have an appreciable risk of suffering significant adverse health effects. Most SFs and RfDs were obtained from the *Integrated Risk Information System* (IRIS), or, if not available there, from the *Health Effects Assessment Summary Tables* (HEAST).

The index for carcinogenic effects is calculated by taking the maximum detected concentration of each contaminant and multiplying by the oral slope factor. The inhalation SF is used for chemicals that are only carcinogenic by inhalation (chromium and cadmium). The index for noncarcinogenic effects is calculated by taking the maximum detected concentration of each contaminant and dividing by the oral RfD. Chemicals making up at least one percent of the total index for all chemicals have been selected as COPCs (unless the chemical has been eliminated based on background or essential nutrient considerations). Concentration toxicity screening results for groundwater, surface soil, and subsurface soils are presented in Tables 2-21, 2-22, and 2-23, respectively. Due to changes in guidance during the development of this document, an additional toxicity - screening method, based on Region III RBCs, was also used to screen for COPCs. This method is described in Section 2.7.1.4.

2.7.1.3 Data Analysis. This subsection is organized according to media (groundwater, surface soil, and subsurface soil). Within each medium, the data are presented in the order of volatile organic compounds (VOCs), semi volatile organic compounds (SVOC), pesticides/polychlorinated biphenyls (PCBs), inorganics. Comparisons are made to the four criteria listed in Section 2.7.1.1, and then chemicals of potential concern are selected. The

TABLE 2-21

TOXICITY-CONCENTRATION SCREENING FOR CHEMICALS IN GROUNDWATER AT
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Constituent	Maximum Concentration (mg/l)	RfD (mg/kg/day)		Slope Factor (mg/kg/day)[-1]		Non-carcinogen Index (conc/RfD)	Carcinogen Index (conc x SF)	% RfD	% SF
VOCs									
Bromodichloromethane	0.004	2.0E-02	[a]	6.2E-02	[a]	2.0E-01	2.5E-04	0.01%	0.01%
Chloroform	0.009	1.0E-02	[a]	6.1E-03	[a]	9.0E-01	5.5E-05	0.03%	0.00%
Dibromochloromethane	0.002	2.0E-02	[a]	8.4E-02	[a]	1.0E-01	1.7E-04	0.00%	0.01%
BNAs									
Acenaphthene	0.005	6.0E-02	[a]	NA		8.3E-02	NC	0.00%	NC
Anthracene	0.002	3.0E-01	[a]	NA		6.7E-03	NC	0.00%	NC
bis(2-Ethylhexyl)phthalate	0.001	2.0E-02	[a]	1.4E-02	[a]	5.0E-02	1.4E-05	0.00%	0.00%
Butylbenzylphthalate	0.0005	2.0E-01	[a]	NA		2.5E-03	NC	0.00%	NC
Di-n-Butyl Phthalate	0.002	1.0E-01	[a]	NA		2.0E-02	NC	0.00%	NC
Dibenzofuran	0.005	4.0E-03	[a]	NA		1.3E+00	NC	0.04%	NC
Diethyl phthalate	0.0003	8.0E-01	[a]	NA		3.8E-04	NC	0.00%	NC
Fluoranthene	0.00082	4.0E-02	[a]	NA		2.1E-02	NC	0.00%	NC
Fluorene	0.0099	4.0E-02	[a]	NA		2.5E-01	NC	0.01%	NC
2-Methylnaphthalene [11]	0.034	4.0E-02	[c]	NA		8.5E-01	NC	0.03%	NC
N-nitrosodiphenylamine	0.0008	NA		4.9E-03	[a]	NC	3.9E-06	NC	0.00%
Naphthalene	0.012	4.0E-02	[a]	NA		3.0E-01	NC	0.01%	NC
Phenanthrene [12]	0.015	3.0E-02	[a]	NA		5.0E-01	NC	0.02%	NC
Phenol	0.035	6.0E-01	[a]	NA		5.8E-02	NC	0.00%	NC
Pyrene	0.001	3.0E-02	[a]	NA		3.3E-02	NC	0.00%	NC
TPHs [13]	0.882	6.0E-01	[d]	NA		1.5E+00	NC	0.05%	NC
Pesticides									
alpha-BHC [14]	0.00003	3.0E-04	[a]	6.3E+00	[b]	1.0E-01	1.9E-04	0.00%	0.01%
DDD	0.01	5.0E-04	[a]	2.4E-01	[a]	2.0E+01	2.4E-03	0.61%	0.09%
DDE	0.00012	5.0E-04	[a]	3.4E-01	[a]	2.4E-01	4.1E-05	0.01%	0.00%
DDT	0.00011	5.0E-04	[a]	3.4E-01	[a]	2.2E-01	3.7E-05	0.01%	0.00%
Metals									
Aluminum	4.3	1.0E+00	[c]	NA		4.3E+00	NC	0.13%	NC
Arsenic	**0.96**	**3.0E-04**	[a]	**1.5E+00**	[a]	**3.2E+03**	**1.4E+00**	**98%**	**57%**
Barium	0.039	7.0E-02	[a]	NA		5.6E-01	NC	0.02%	NC
Cadmium (water) [15]	**0.0055**	**5.0E-04**	[a]	**6.3E+00**	[a]	**1.1E+01**	**3.5E-02**	**0.34%**	**1.4%**
Calcium	2,500	NA		NA		NC	NC	NC	NC
Chromium (VI) [15]	**0.026**	**5.0E-03**	[a]	**4.1E+01**	[b]	**5.2E+00**	**1.1E+00**	**0.16%**	**42%**
Copper	0.0026	3.7E-02	[b]	NA		7.0E-02	NC	0.00%	NC
Iron	2.5	NA		NA		NC	NC	NC	NC
Lead	**0.024**	NA		NA		NC	NC	NC	NC
Magnesium	7.7	NA		NA		NC	NC	NC	NC
Manganese [16]	0.099	2.4E-02	[a]	NA		4.1E+00	NC	0.13%	NC
Potassium	6.02	NA		NA		NC	NC	NC	NC
Sodium	17.3	NA		NA		NC	NC	NC	NC
Vanadium	0.013	7.0E-03	[a]	NA		1.9E+00	NC	0.06%	NC
Zinc	0.0956	3.0E-01	[a]	NA		3.2E-01	NC	0.01%	NC

Notes:

Toxicity values quoted in this table are for the oral pathway unless otherwise noted
conc = concentration
NA = Not available
NC = Not calculated
RfD = Reference dose
SF = Slope factor

[a] IRIS, 1996
[b] HEAST, 1995
[c] ECAO
[d] Massachusetts, DEP, October 1994
[11] Naphthalene RfD used as surrogate for 2-Methylnapthalene RfD
[12] Pyrene RfD used as a surrogate for Phenanthrene RfD
[13] n-Nonane RfD used as surrogate for TPHs RfD
[14] Gamma-BHC RfD used as surrogate for alpha-BHC RfD
[15] Slope factor is for inhalation pathway
[16] RfD for manganese is calculated based on the NOAEL of 10 mg/day in food, using a modifying factor of 3 for non-dietary intake.

TABLE 2-22

TOXICITY-CONCENTRATION SCREENING FOR CHEMICALS IN SURFACE SOIL AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Chemical	Maximum Concentration (mg/kg)	RfD (mg/kg-day)		Slope Factor (mg/kg-day)$^{-1}$		Non-Carcinogen Index (conc/RfD)	Carcinogen Index (conc x SF)	% RfD	% SF
VOCs									
Benzene	0.024	3.0E-4	(c)	2.9E-02	(a)	8.0E+01	7.0E-04	0.03%	0.00%
1,1-Dichloroethene	0.025	9.0E-3	(a)	6.0E-01	(a)	2.8E+00	1.5E-02	0.00%	0.00%
Chlorobenzene	0.019	2.0E-2	(a)	NA		9.5E-01	NC	0.00%	NC
Methylene chloride	0.72	6.0E-2	(a)	7.5E-03	(a)	1.2E+01	5.4E-03	0.00%	0.00%
Toluene	0.023	2.0E-1	(a)	NA		1.2E-01	NC	0.00%	NC
Trichloroethene	0.019	6.0E-3	(c)	1.1E-02	(c)	3.2E+00	2.1E-04	0.00%	0.00%
Xylenes	0.001	2.0E+0	(a)	NA		5.0E-04	NC	0.00%	NC
BNAs									
Acenaphthylene [1]	0.057	6.0E-2	(a)	NA		9.5E-01	NC	0.00%	NC
Anthracene	0.22	3.0E-1	(a)	NA		7.3E-01	NC	0.00%	NC
Benzo(a)anthracene [2]	1.4	3.0E-2	(a)	7.3E-01	(10) (a)	4.7E+01	1.0E+00	0.02%	0.04%
Benzo(a)pyrene [2]	0.97	3.0E-2	(a)	7.3E+00	(a)	3.2E+01	7.1E+00	0.01%	0.27%
Benzo(b)fluoranthene [2]	2.0	3.0E-2	(a)	7.3E-01	(10) (a)	6.7E+01	1.5E+00	0.02%	0.06%
Benzo(g,h,i)perylene [2]	0.55	3.0E-2	(a)	NA		1.8E+01	NC	0.01%	NC
Benzo(k)fluoranthene [2]	0.5	3.0E-2	(a)	7.3E-02	(10) (a)	1.7E+01	3.7E-02	0.01%	0.00%
bis(2-Ethylhexyl)phthalate	0.13	2.0E-2	(a)	1.4E-02	(a)	6.5E+00	1.8E-03	0.00%	0.00%
Butylbenzylphthalate	0.009	2.0E-1	(a)	NA		4.3E-02	NC	0.00%	NC
Carbazole	0.092	NA		2.0E-02	(a)	NC	1.8E-03	NC	0.00%
Chrysene [2]	1.3	3.0E-2	(a)	7.3E-03	(10) (a)	4.3E+01	9.5E-03	0.01%	0.00%
Di-n-butylphthalate	1.01	1.0E-1	(a)	NA		1.0E+01	NC	0.00%	NC
Di-n-octylphthalate	0.01	2.0E-2	(a)	NA		5.0E-01	NC	0.00%	NC
Dibenzo(a,h)anthracene [2]	0.28	3.0E-2	(a)	7.3E+00	(10) (a)	9.3E+00	2.0E+00	0.00%	0.08%
Fluoranthene	1.9	4.0E-2	(a)	NA		4.8E+01	NC	0.02%	NC
Indeno(1,2,3-c,d)pyrene [2]	0.63	3.0E-2	(a)	7.3E-01	(10) (a)	2.1E+01	4.6E-01	0.01%	0.02%
2-Methylnapthalene [3]	0.08	4.0E-2	(a)	NA		2.1E+00	NC	0.00%	NC
Naphthalene	0.05	4.0E-2	(a)	NA		1.3E+00	NC	0.00%	NC
Phenanthrene [2]	1.1	3.0E-2	(a)	NA		3.7E+01	NC	0.01%	NC
Pyrene	2.2	3.0E-2	(a)	NA		7.3E+01	NC	0.03%	NC
Pesticides/PCBs									
alpha-BHC [4]	0.015	3.0E-4	(a)	6.3E+00	(a)	5.0E+01	9.5E-02	0.02%	0.00%
delta-BHC [4]	0.083	3.0E-4	(a)	1.8E+00	(11) (a)	2.8E+02	1.5E-01	0.10%	0.01%
Chlordane Isomers	**3.5**	**6.0E-5**	(a)	**1.3E+00**	(a)	**5.8E+04**	**4.6E+00**	**20%**	**0.17%**
DDD [5]	0.89	5.0E-4	(a)	2.4E-01	(a)	1.8E+03	2.1E-01	0.61%	0.01%
DDE [5]	**2.2**	**5.0E-4**	(a)	**3.4E-01**	(a)	**4.4E+03**	**7.5E-01**	**1.51%**	**0.03%**
DDT	**4.6**	**5.0E-4**	(a)	**3.4E-01**	(a)	**9.1E+03**	**1.6E+00**	**3.2%**	**0.06%**
Endosulfan Sulfate	0.54	6.0E-3	(a)	NA		9.0E+01	NC	0.03%	NC
Endrin Ketone [6]	**1.2**	**3.0E-4**	(a)	**NA**		**4.0E+03**	**NC**	**1.4%**	**NC**
Heptachlor	0.037	5.0E-4	(a)	4.5E+00	(a)	7.4E+01	1.7E-01	0.03%	0.01%
Heptachlor Epoxide	**0.094**	**1.3E-5**	(a)	**9.1E+00**	(a)	**7.2E+03**	**8.6E-01**	**2.5%**	**0.03%**
Methoxychlor	0.96	5.0E-3	(a)	NA		1.9E+02	NC	0.07%	NC

TABLE 2-22

TOXICITY-CONCENTRATION SCREENING FOR CHEMICALS IN SURFACE SOIL AT
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Chemical	Maximum Concentration (mg/kg)	RfD (mg/kg-day)		Slope Factor (mg/kg-day)$^{-1}$		Non-Carcinogen Index (conc/RfD)	Carcinogen Index (conc x SF)	% RfD	% SF
Metals									
Aluminum	**17,700**	**1.0E+0**	[c]	**NA**		**1.8E+04**	**NC**	**6.1%**	**NC**
Arsenic	**44.5**	**3.0E-4**	[a]	**1.5E+00**	[a]	**1.5E+05**	**6.7E+01**	**51%**	**2.5%**
Barium	**451**	**7.0E-2**	[a]	**NA**		**6.4E+03**	**NC**	**2.2%**	**NC**
Beryllium	1.1	5.0E-3	[a]	4.3E+00	[a]	2.2E+02	4.7E+00	0.08%	0.18%
Cadmium (food) [7]	1.6	1.0E-3	[a]	6.3E+00	[a]	1.6E+03	1.0E+01	0.55%	0.38%
Calcium	716,000	NA		NA		NC	NC	NC	NC
Chromium VI [7]	**61.5**	**5.0E-3**	[a]	**4.1E+01**	[b]	**1.2E+04**	**2.5E+03**	**4.3%**	**96%**
Copper	26.5	3.7E-2	[d]	NA		7.2E+02	NC	0.25%	NC
Cyanide (free)	20	2.0E-2	[a]	NA		1.0E+03	NC	0.35%	NC
Iron	15,500	NA		NA		NC	NC	NC	NC
Lead	43.4	NA		NA		NC	NC	NC	NC
Magnesium	23,220	NA		NA		NC	NC	NC	NC
Manganese [8]	**119**	**2.4E-2**	[a]	**NA**		**5.0E+03**	**NC**	**1.7%**	**NC**
Mercury	0.39	3.0E-4	[a]	NA		1.3E+03	NC	0.45%	NC
Nickel [9]	2	2.0E-2	[a]	8.4E-01	[a]	1.0E+02	1.7E+00	0.03%	0.06%
Potassium	330	NA		NA		NC	NC	NC	NC
Silver	**20**	**5.0E-3**	[a]	**NA**		**4.0E+03**	**NC**	**1.4%**	**NC**
Sodium	1,480	NA		NA		NC	NC	NC	NC
Vanadium	**26.5**	**7.0E-3**	[b]	**NA**		**3.8E+03**	**NC**	**1.3%**	**NC**
Zinc	222	3.0E-1	[a]	NA		7.4E+02	NC	0.26%	NC

Notes:

Toxicity values quoted in this table are for the oral pathway unless otherwise noted
conc = concentration
NA = Not available
NC = Not calculated
RfD = Reference dose
SF = Slope factor

[a] IRIS, 1996
[b] HEAST, 1995
[c] ECAO
[d] Massachusetts, DEP, October 1994
[1] Acenaphthene RfD used as surrogate for Acenaphthylene RfD
[2] Pyrene RfD used as a surrogate for RfD of various PAHs
[3] Naphthalene RfD used as surrogate for 2-Methylnapthalene RfD
[4] Gamma-BHC RfD used as surrogate for alpha-BHC, beta-BHC, and delta-BHC RfDs
[5] DDT RfD used as a surrogate for DDD and DDE RfDs
[6] Endrin RfD used as surrogate for Endrin Aldehyde and Endrin Ketone RfDs
[7] Slope factor is for inhalation pathway
[8] RfD for manganese is calculated based on the NOAEL of 10 mg/day in food, using a modifying factor of 3 for non-dietary intake.
[9] Nickel refinery dust inhalation slope factor used as surrogate for Nickel slope factor
[10] Toxicity Equivalency Factor (TEF) was applied to the benzo(a)pyrene slope factor, based on the relative potency of this chemical to benz
[11] beta-BHC slope factor used as surrogate for delta-BHC slope factor

TABLE 2-23

CHEMICALS OF POTENTIAL CONCERN IN SUBSURFACE SOIL (>2FT) AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Constituent	Maximum Concentration (mg/kg)	RfD (mg/kg/day)	Slope Factor (mg/kg/day)$^{-1}$	Non-Carcinogen Index (conc/RfD)	Carcinogen Index (conc x SF)	% RfD	% SF
VOCs							
Bromomethane	0.35	1.4E-03 [a]	NA	2.5E+02	NC	0.07%	NC
Methylene chloride	2.1	6.0E-02 [a]	7.5E-03 [a]	3.5E+01	1.6E-02	0.01%	0.00%
Tetrachloroethene	4.8	1.0E-02 [a]	5.0E-02 [a]	4.8E+02	2.4E-01	0.13%	0.00%
Xylenes	0.2	2.0E+00 [a]	NA	1.0E-01	NC	0.00%	NC
BNAs							
Acenaphthene	1.7	6.0E-02 [a]	NA	2.8E+01	NC	0.01%	NC
Acenaphthylene [1]	0.11	6.0E-02 [a]	NA	1.8E+00	NC	0.00%	NC
Anthracene	6.3	3.0E-01 [a]	NA	2.1E+01	NC	0.01%	NC
Benzo(a)anthracene [2]	1.5	3.0E-02 [a]	7.3E-01 [a][b]	5.0E+01	1.1E+00	0.01%	0.02%
Benzo(a)pyrene [2]	1	3.0E-02 [a]	7.3E+00 [a]	3.3E+01	7.3E+00	0.01%	0.12%
Benzo(b)fluoranthene [2]	2	3.0E-02 [a]	7.3E-01 [a][b]	6.7E+01	1.5E+00	0.02%	0.02%
Benzo(g,h,i)perylene [2]	0.81	3.0E-02 [a]	NA .	2.7E+01	NC	0.01%	NC
Benzo(k)fluoranthene [2]	0.51	3.0E-02 [a]	7.3E-02 [a][b]	1.7E+01	3.7E-02	0.00%	0.00%
Bis(2-Ethylhexyl)phthalate	0.944	2.0E-02 [a]	1.4E-02 [a]	4.7E+01	1.3E-02	0.01%	0.00%
Butylbenzylphthalate	0.013	2.0E-01 [a]	NA	6.5E-02	NC	0.00%	NC
Carbazole	0.31	NA	2.0E-02 [b]	NC	6.2E-03	NC	0.00%
Chrysene [2]	1.3	3.0E-02 [a]	7.3E-03 [a][b]	4.3E+01	9.5E-03	0.01%	0.00%
Di-n-butylphthalate	0.677	1.0E-01 [a]	NA	6.8E+00	NC	0.00%	NC
Di-n-octylphthalate	0.025	2.0E-02 [a]	NA	1.3E+00	NC	0.00%	NC
Dibenzofuran	2.6	4.0E-03 [c]	NA	6.5E+02	NC	0.18%	NC
Dibenzo(a,h)anthracene [2]	0.35	3.0E-02 [a]	7.3E+00 [a][b]	1.2E+01	2.6E+00	0.00%	0.04%
Fluoranthene	2.7	4.0E-02 [a]	NA	6.8E+01	NC	0.02%	NC
Fluorene	3.4	4.0E-02 [a]	NA	8.5E+01	NC	0.02%	NC
Indeno(1,2,3-c,d)pyrene [2]	0.83	3.0E-02 [a]	7.3E-01 [a][b]	2.8E+01	6.1E-01	0.01%	0.01%
2-Methylnaphthalene [3]	8.1	4.0E-02 [c]	NA	2.0E+02	NC	0.06%	NC
Naphthalene	3.1	4.0E-02 [a]	NA	7.8E+01	NC	0.02%	NC
Phenanthrene [2]	5.8	3.0E-02 [a]	NA	1.9E+02	NC	0.05%	NC
Pyrene	2.6	3.0E-02 [a]	NA	8.7E+01	NC	0.02%	NC
Pesticides/PCBs							
Aldrin	0.038	3.0E-05 [a]	1.7E+01 [a]	1.3E+03	6.5E-01	0.35%	0.01%
alpha-BHC [4]	0.0026	3.0E-04 [a]	6.3E+00 [a]	8.7E+00	1.6E-02	0.00%	0.00%
beta-BHC [4]	0.009	3.0E-04 [a]	1.8E+00 [a]	3.0E+01	1.6E-02	0.01%	0.00%
delta-BHC [4]	0.012	3.0E-04 [a]	1.8E+00 [a][b]	4.0E+01	2.2E-02	0.01%	0.00%
gamma-BHC (Lindane)	0.01	3.0E-04 [a]	1.3E+00 [a]	3.3E+01	1.3E-02	0.01%	0.00%
Chlordane Isomers	**1.89**	**6.0E-05** [a]	**1.3E+00** [a]	**3.2E+04**	**2.5E+00**	**8.7%**	**0.04%**
DDD [5]	0.65	5.0E-04 [a]	2.4E-01 [a]	1.3E+03	1.6E-01	0.36%	0.00%
DDE [5]	0.46	5.0E-04 [a]	3.4E-01 [a]	9.1E+02	1.6E-01	0.25%	0.00%
DDT	1.1	5.0E-04 [a]	3.4E-01 [a]	2.2E+03	3.7E-01	0.60%	0.01%
Dieldrin	0.05	5.0E-05 [a]	1.6E+01 [a]	1.0E+03	8.0E-01	0.28%	0.01%
Endosulfan I	0.0051	6.0E-03 [a]	NA	8.5E-01	NC	0.00%	NC
Endosulfan II	0.013	6.0E-03 [a]	NA	2.2E+00	NC	0.00%	NC
Endosulfan Sulfate	0.02	6.0E-03 [a]	NA	3.3E+00	NC	0.00%	NC
Endrin	0.23	3.0E-04 [a]	NA	7.7E+02	NC	0.21%	NC
Endrin Aldehyde [6]	0.018	3.0E-04 [a]	NA	6.0E+01	NC	0.02%	NC
Endrin Ketone [6]	0.023	3.0E-04 [a]	NA	7.7E+01	NC	0.02%	NC
Heptachlor	0.45	5.0E-04 [a]	4.5E+00 [a]	9.0E+02	2.0E+00	0.25%	0.03%
Heptachlor Epoxide	0.013	1.3E-05 [a]	9.1E+00 [a]	1.0E+03	1.2E-01	0.28%	0.00%
Methoxychlor	0.1	5.0E-03 [a]	NA	2.0E+01	NC	0.01%	NC
Toxaphene	0.2	NA	1.1E+00 [a]	NC	2.2E-01	NC	0.00%
Aroclor 1260	0.056	NA	7.7E+00 [a]	NC	4.3E-01	NC	0.01%

TABLE 2-23

CHEMICALS OF POTENTIAL CONCERN IN SUBSURFACE SOIL (>2FT) AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Constituent	Maximum Concentration (mg/kg)	RfD (mg/kg/day)		Slope Factor (mg/kg/day)$^{-1}$		Non-Carcinogen Index (conc/RfD)	Carcinogen Index (conc x SF)	% RfD	% SF
Metals									
Aluminum	**52,800**	**1.0E+00**	[c]	**NA**		**5.3E+04**	**NC**	**15%**	**NC**
Antimony	**14.6**	**4.0E-04**	[a]	**NA**		**3.7E+04**	**NC**	**10%**	**NC**
Arsenic	**47.3**	**3.0E-04**	[a]	**1.5E+00**	[a]	**1.6E+05**	**7.1E+01**	**44%**	**1.2%**
Barium	156	7.0E-02	[a]	NA		2.2E+03	NC	0.62%	NC
Beryllium	2.5	5.0E-03	[a]	4.3E+00	[a]	5.0E+02	1.1E+01	0.14%	0.18%
Calcium	726,000	NA		NA		NC	NC	NC	NC
Chromium (VI) [7]	**145**	**5.0E-03**	[a]	**4.1E+01**	[b]	**2.9E+04**	**5.9E+03**	**8.0%**	**98%**
Cobalt	10	6.0E-02	[c]	NA		1.7E+02	NC	0.05%	NC
Copper	25	3.7E-02	[b]	NA		6.8E+02	NC	0.19%	NC
Iron	46,200	NA		NA		NC	NC	NC	NC
Lead	114	NA		NA		NC	NC	NC	NC
Magnesium	2,880	NA		NA		NC	NC	NC	NC
Manganese [8]	**167**	**2.4E-02**	[a]	**NA**		**7.0E+03**	**NC**	**1.9%**	**NC**
Mercury	0.21	3.0E-04	[b]	NA		7.0E+02	NC	0.19%	NC
Nickel [9]	23	2.0E-02	[a]	8.4E-01	[a]	1.2E+03	1.9E+01	0.32%	0.32%
Potassium	1,320	NA		NA		NC	NC	NC	NC
Selenium	**49**	**5.0E-03**	[a]	**NA**		**9.8E+03**	**NC**	**2.71%**	**NC**
Silver	**19.7**	**5.0E-03**	[a]	**NA**		**3.9E+03**	**NC**	**1.1%**	**NC**
Sodium	1,700	NA		NA		NC	NC	NC	NC
Vanadium	**109**	**7.0E-03**	[b]	**NA**		**1.6E+04**	**NC**	**4.3%**	**NC**
Zinc	129	3.0E-01	[a]	NA		4.3E+02	NC	0.12%	NC

Notes:

Toxicity values quoted in this table are for the oral pathway unless otherwise noted
conc = concentration
NA = Not available
NC = Not calculated
RfD = Reference dose
SF = Slope factor

[a] IRIS, 1996
[b] HEAST, 1995
[c] ECAO
[d] Massachusetts, DEP, October 1994
[1] Acenaphthene RfD used as surrogate for Acenaphthylene RfD
[2] Pyrene RfD used as a surrogate for RfD of various PAHs
[3] Naphthalene RfD used as surrogate for 2-Methylnaphthalene RfD
[4] Gamma-BHC RfD used as surrogate for alpha-BHC, beta-BHC, and delta-BHC RfDs
[5] DDT RfD used as a surrogate for DDD and DDE RfDs
[6] Endrin RfD used as surrogate for Endrin Aldehyde and Endrin Ketone RfDs
[7] Slope factor is for inhalation pathway
[8] RfD for manganese is calculated based on the NOAEL of 10 mg/day in food, using a modifying factor of 3 for non-dietary intake.
[9] Nickel refinery dust inhalation slope factor used as surrogate for Nickel slope factor
[10] Toxicity Equivalency Factor (TEF) was applied to the benzo(a)pyrene slope factor, based on the relative potency of this chemical to benzo(a)pyrene.
[11] beta-BHC slope factor used as surrogate for delta-BHC slope factor

summary Tables 2-18 through 2-20 present for each chemical, the range of concentrations, the frequency of detection, and whether the chemical has been selected as a chemical of potential concern.

The analytical data for this risk assessment were collected by Geraghty & Miller during investigations in 1989 and 1991, Montgomery Watson during 1993 and IT Corporation in 1994. An in-depth discussion of the sample collection and analytical methodology is presented in Section 2.0 of the Montgomery Watson RI (1996). These analytical data were reduced and analyzed for use in the risk assessment according to guidelines provided by USEPA (1989a, 1991). Geraghty & Miller and IT Corporation performed laboratory analyses and data validation for their field samples; Montgomery Watson performed its own data validation, which is reported in a *Quality Control Summary Report,* while Savannah Laboratories performed the laboratory analyses. All data collected by Geraghty & Miller in 1991, Montgomery Watson in 1993, and IT Corporation in 1994 were reviewed for this risk evaluation. This includes a review of detects, detection limits for non-detects, and estimated (J-qualified) data. Detection limits reported for Montgomery Watson samples were in compliance with Contract Laboratory Protocol Scope of Work (CLP SOW) contract required quantitation limits (CRQL).

Sample quantitation limits (SQL) at levels suitably low for risk assessment use were not consistently achieved. In the subsurface soil data base obtained in 1994 by IT Corp, three of 27 samples had SVOC SQL at 8000 to 8100 Mg/kg while all others were 2000 Mg/kg and below. In 1989, the thallium detection limit in all seven samples collected was 8 Mg/kg while all others were 1.0 Mg/kg and below. In both cases, had maximum concentrations at these detection limit levels been used in the toxicity screen, it could have affected the outcome of the selection of COPCs. The majority of the data obtained during other sampling events had acceptable detection limits for thallium and SVOCs which indicated that these chemicals were of limited occurrence on site. When thallium was repeatedly not detected in soils where a suitably low detection limit was reached, it was assumed that thallium. was also not detected to low levels in the samples with high detection limits. Similarly, it is highly unlikely that SVOCs would have been consistently found at levels just beneath the Sample Quantitation Limit (SQL) in the samples where a high SQL was obtained. Professional judgment indicated that inclusion of the nondetect data through use of 1/2 of the detection limit was sufficiently representative.

In reviewing the IT laboratory reports to obtain detection limits, some omissions from the Summary Table (IT Corp, 1994) were noted. In particular heptachlor, heptachlor epoxide,

and DDE had been detected in sample point FCSN2.4 but had been omitted from the Summary Table. These chemicals were added to the MW data base so it no longer is identical to the IT Summary Tables.

Geraghty & Miller specify in their remedial investigation that groundwater was analyzed for total petroleum hydrocarbons (TPH), while soil was analyzed for hydrocarbons limited in size to compounds with a carbon chain length of 8-20. Although these are two distinct analyses, both are termed TPH for the purposes of this document.

2.7.1.4 Screening Using Risk-Based Concentrations. Guidance on COPC selection changed during the development of this document. Therefore, an RBC-based benchmark screening method was added after input from regulators. Note that the use of both the toxicity-concentration screening method described in Section 2.7.1.2 and the RBC method described below results in a greater number of COPCs than use of each method singly. Therefore, selection of COPCs in this document is more conservative.

Risk-Based Concentrations. Current USEPA Region IV guidance recommends using the Region III RBCs as guidance for screening. RBCs are published periodically by USEPA Region III to act as guidance in risk management, risk assessment, and remediation decisions. RBCs are generated using default exposure parameters for chemicals in a specific media. Concentrations quoted in the USEPA Region III RBC Table represent risk levels of 1×10^{-6} (for carcinogens) or a hazard quotient of 1 (for non-carcinogens). USEPA Region IV suggests that screening values for non-carcinogenic chemicals be adjusted to represent a hazard quotient of 0.1.

Maximum concentration values of all chemicals detected in a particular environmental medium are compared to the appropriate RBC-based benchmark in Tables 2-24 to 2-26. Chemicals whose maximum concentration exceeded the benchmark value were added as COPCs. The results of this process are summarized below.

Groundwater. Chemicals detected in groundwater were compared to the Tap Water RBCs. The results of this comparison are shown in Table 2-24. The comparison resulted in bromodichloromethane, dibromochloromethane and chloroform, the pesticides alpha-BHC and DDD, TPHs, and manganese being added to the list of COPCs for groundwater. All other chemicals that exceeded the RBC-based benchmarks had already been selected as COPCs, based on previous screening described in Sections 2.7.1.2, 2.7.1.3, and Table 2-2 1.

TABLE 2-24

RBC-BASED BENCHMARK SCREENING FOR CHEMICALS IN GROUNDWATER AT
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Constituent	COPC from Previous Screening[1] (yes = +)	Maximum Concentration mg/l	Toxicity Values RfD mg/kg/day		Toxicity Values Slope Factor (mg/kg/day)[-1]		RBCs (Region III Tap Water) mg/l	RBC-Based Benchmark mg/l	Exceeds Benchmark (yes = +)	COPC
VOCs										
Bromodichloromethane	-	**0.004**	**2.0E-02**	[2]	**6.2E-02**	[2]	**0.00017**	**0.00017**	+	+
Chloroform	-	**0.009**	**1.0E-02**	[2]	**6.1E-03**	[2]	**0.00015**	**0.00015**	+	+
Dibromochloromethane	-	**0.002**	**2.0E-02**	[2]	**8.4E-02**	[2]	**0.00013**	**0.00013**	+	+
BNAs										
Acenaphthene	-	0.005	6.0E-02	[2]	NA		2.2	0.22	-	-
Anthracene	-	0.002	3.0E-01	[2]	NA		11	1.1	-	-
bis(2-Ethylhexyl)phthalate	-	0.001	2.0E-02	[2]	1.4E-02	[2]	0.0048	0.0048	-	-
Butylbenzylphthalate	-	0.0005	2.0E-01	[2]	NA		7.3	0.73	-	-
Di-n-Butyl Phthalate	-	0.002	1.0E-01	[2]	NA		3.7	0.37	-	-
Dibenzofuran	-	0.005	4.0E-03	[2]	NA		0.15	0.015	-	-
Diethyl phthalate	-	0.0003	8.0E-01	[2]	NA		29	2.9	-	-
Fluoranthene	-	0.00082	4.0E-02	[2]	NA		1.5	0.15	-	-
Fluorene	-	0.0099	4.0E-02	[2]	NA		1.5	0.15	-	-
2-Methylnaphthalene [3]	-	0.034	4.0E-02	[2]	NA		1.5	0.15	-	-
N-nitrosodiphenylamine	-	0.0008	NA		4.9E-03	[2]	0.014	0.014	-	-
Naphthalene	-	0.012	4.0E-02	[2]	NA		1.5	0.15	-	-
Phenanthrene [4]	-	0.015	3.0E-02	[2]	NA		1.1	0.11	-	-
Phenol	-	0.035	6.0E-01	[2]	NA		22	2.2	-	-
Pyrene	-	0.001	3.0E-02	[2]	NA		1.1	0.11	-	-
TPHs [5]	-	**0.882**	**6.0E-01**	[3]	NA		NA	NA	-	+
Pesticides										
alpha-BHC [6]	-	**0.00003**	**3.0E-04**	[2]	**6.3E+00**	[2]	**0.000011**	**0.000011**	+	+
DDD	-	**0.01**	**5.0E-04**	[2]	**2.4E-01**	[2]	**0.00028**	**0.00028**	+	+
DDE	-	0.00012	5.0E-04	[2]	3.4E-01	[2]	0.0002	0.0002	-	-
DDT	-	0.00011	5.0E-04	[2]	3.4E-01	[2]	0.0002	0.0002	-	-
Metals										
Aluminum	-	**4.3**	**1.0E+00**	[2]	NA		**37**	**3.7**	+	+
Arsenic	+	**0.96**	**3.0E-04**	[2]	**1.5E+00**	[2]	**0.000045**	**0.000045**	+	+
Barium	-	0.039	7.0E-02	[2]	NA		2.6	0.26	-	-
Cadmium (water) [7]	+	**0.0055**	**5.0E-04**	[2]	**6.3E+00**	[2]	**0.018**	**0.0018**	+	+
Calcium	-	2,500	NA		NA		NA	NA	-	-
Chromium VI [8]	+	**0.026**	**5.0E-03**	[2]	**4.1E+01**	[8]	**0.18**	**0.018**	+	+
Copper	-	0.0026	3.7E-02	[2]	NA		1.5	0.15	-	-
Iron	-	3	NA		NA		NA	NA	-	-
Lead	+	**0.024**	NA		NA		NA	NA	-	+
Magnesium	-	8	NA		NA		NA	NA	-	-
Manganese [9]	-	**0.099**	**2.4E-02**	[10]	NA		**0.18**	**0.018**	+	+
Potassium	-	6	NA		NA		NA	NA	-	-
Sodium	-	17	NA		NA		NA	NA	-	-
Vanadium	-	0.013	7.0E-03	[6]	NA		0.26	0.026	-	-
Zinc	-	0.0956	3.0E-01	[2]	NA		11	1.1	-	-

Notes:

Toxicity values quoted in this table are for the oral pathway unless otherwise noted
Essential nutrients (calcium, iron, magnesium, potassium, and sodium) are not considered in this table. See Table 2-3 and Sections 2.4 and 2.5 for full discussion of essential nutrients.
NA = Not available
NC = Not calculated
RfD = Reference dose
SF = Slope factor

[1] IRIS, 1996
[2] HEAST, 1995
[3] ECAO
[4] Massachusetts, DEP, October 1994
[5] Based on screening carried out in Table 2-6 and Section 2.5.
[6] Naphthalene RfD used as surrogate for 2-Methylnaphthalene RfD
[7] Pyrene RfD used as a surrogate for Phenanthrene RfD
[8] n-Nonane RfD used as surrogate for TPHs RfD. As no RBC is available for n-nonane, TPH was carried as a COPC.
[9] Gamma-BHC RfD used as surrogate for alpha-BHC
[10] Slope factor is for inhalation pathway
[11] RfD for manganese is calculated based on the NOAEL of 10 mg/day in food, using a modifying factor of 3 for non-dietary intake.

TABLE 2-25
RBC-BASED BENCHMARK SCREENING FOR CHEMICALS IN SURFACE SOIL AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Chemical	COPC from previous screening? [1] (yes = +)	Maximum Concentration mg/kg	Toxicity Values RfD mg/kg-day	Toxicity Values Slope Factor (mg/kg-day)$^{-1}$	RBCs (Region III Resid Soil) mg/kg	RBC-based benchmark mg/kg	Exceeds Benchmark (yes = +)	COPC
VOCs								
Acetone	-	0.56	1.0E-1 [a]	NA	7,800	780	-	-
Benzene	-	0.024	3.0E-4 [a]	2.9E-02 [a]	22	22	-	-
1,1-Dichloroethene	-	0.025	9.0E-3 [a]	6.0E-01 [a]	1.1	1.1	-	-
Chlorobenzene	-	0.019	2.0E-2 [a]	NA	1,600	160	-	-
Methylene chloride	-	0.72	6.0E-2 [a]	7.5E-03 [a]	85	85	-	-
Toluene	-	0.023	2.0E-1 [a]	NA	16,000	1,600	-	-
Trichloroethene	-	0.019	6.0E-3 [a]	1.1E-02 [a]	58	58	-	-
Xylenes	-	0.001	2.0E+0 [a]	NA	160,000	16,000	-	-
BNAs								
Acenaphthylene [1]	-	0.057	6.0E-2 [a]	NA	4,700	470	-	-
Anthracene	-	0.22	3.0E-1 [a]	NA	23,000	2,300	-	-
Benzo(a)anthracene [2]	-	**1.4**	**3.0E-2** [a]	**7.3E-01** [1,2,3,a]	**0.88**	**0.88**	+	+
Benzo(a)pyrene [2]	-	**0.97**	**3.0E-2** [a]	**7.3E+00** [a]	**0.088**	**0.088**	+	+
Benzo(b)fluoranthene [2]	-	**2.0**	**3.0E-2** [a]	**7.3E-01** [1,2,3,a]	**0.88**	**0.88**	+	+
Benzo(g,h,i)perylene [2]	-	0.55	3.0E-2 [a]	NA	2,300	230	-	-
Benzo(k)fluoranthene [2]	-	0.5	3.0E-2 [a]	7.3E-02 [1,2,3,a]	8.8	8.8	-	-
bis(2-Ethylhexyl)phthalate	-	0.13	2.0E-2 [a]	1.4E-02 [a]	46	46	-	-
Butylbenzylphthalate	-	0.009	2.0E-1 [a]	NA	16,000	1600	-	-
Carbazole	-	0.09	NA	2.0E-02 [b]	32	32	-	-
Chrysene [2]	-	1.3	3.0E-2 [a]	7.3E-03 [1,2,3,a]	88	88	-	-
Di-n-butylphthalate	-	1.01	1.0E-1 [a]	NA	7,800	780	-	-
Di-n-octylphthalate	-	0.01	2.0E-2 [b]	NA	1,600	160	-	-
Dibenzo(a,h)anthracene [2]	-	**0.28**	**3.0E-2** [a]	**7.3E+00** [1,2,3,a]	**0.088**	**0.088**	+	+
Fluoranthene	-	1.9	4.0E-2 [a]	NA	3,100	310	-	-
Indeno(1,2,3-c,d)pyrene [2]	-	0.63	3.0E-2 [a]	7.3E-01 [1,2,3,a]	0.88	0.88	-	-
2-Methylnaphthalene [3]	-	0.08	4.0E-2 [a]	NA	3,100	310	-	-
Naphthalene	-	0.05	4.0E-2 [a]	NA	3,100	310	-	-
Phenanthrene [2]	-	1.1	3.0E-2 [a]	NA	2,300	230	-	-
Pyrene	-	2.2	3.0E-2 [a]	NA	2,300	230	-	-
Pesticides/PCBs								
alpha-BHC [4]	-	0.015	3.0E-4 [a]	6.3E+00 [a]	0.1	0.1	-	-
delta-BHC [4]	-	0.083	3.0E-4 [a]	1.8E+00 [1,1,1,a]	0.35	0.35	-	-
Chlordane Isomers	+	**3.5**	**6.0E-5** [a]	**1.3E+00** [a]	**0.49**	**0.049**	+	+
DDD [5]	-	0.89	5.0E-4 [a]	2.4E-01 [a]	2.7	2.7	-	-
DDE [5]	+	**2.2**	**5.0E-4** [a]	**3.4E-01** [a]	**1.9**	**1.9**	+	+
DDT	+	**4.6**	**5.0E-4** [a]	**3.4E-01** [a]	**1.9**	**1.9**	+	+
Endosulfan Sulfate	-	0.54	6.0E-3 [a]	NA	470	47	-	-
Endrin Ketone [4]	+	**1.2**	**3.0E-4** [a]	**NA**	**23**	**2.3**	-	+
Heptachlor	-	0.037	5.0E-4 [a]	4.5E+00 [a]	0.14	0.14	-	-
Heptachlor Epoxide	+	**0.094**	**1.3E-5** [a]	**9.1E+00** [a]	**0.07**	**0.07**	+	+
Methoxychlor	-	0.96	5.0E-3 [a]	NA	390	39	-	-

TABLE 2-25
RBC-BASED BENCHMARK SCREENING FOR CHEMICALS IN SURFACE SOIL AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Chemical	COPC from previous screening? [1] (yes = +)	Maximum Concentration mg/kg	Toxicity Values RfD mg/kg-day		Toxicity Values Slope Factor (mg/kg-day)$^{-1}$		RBCs (Region III Resid Soil) mg/kg	RBC-based benchmark mg/kg	Exceeds Benchmark (yes = +)	COPC
Metals										
Aluminum	+	17,700	1.0E+0	[a]	NA		78,000	7,800	+	+
Arsenic	+	44.5	3.0E-4	[a]	1.5E+00	[a]	0.43	0.43	+	+
Barium	+	451	7.0E-2	[a]	NA		5,500	550	-	+
Beryllium	-	1.1	5.0E-3	[a]	4.3E+00	[a]	0.15	0.15	+	+
Cadmium (food) [2]	-	1.6	1.0E-3	[a]	6.3E+00	[a]	39	3.9	-	-
Chromium (VI) [2]	+	61.5	5.0E-3	[a]	4.1E+01	[b]	390	39	+	+
Copper	-	26.5	3.7E-2	[b]	NA		3,100	310	-	-
Cyanide (free)	-	20	2.0E-2	[a]	NA		1,600	160	-	-
Lead	-	43.4	NA		NA		NA	NA	-	-
Manganese [3]	+	119	2.4E-2	[a]	NA		390	39	+	+
Mercury	-	0.39	3.0E-4	[b]	NA		23	2.3	-	-
Nickel [4]	-	2	2.0E-2	[a]	8.4E-01	[a]	1,600	160	-	-
Silver	+	20	5.0E-3	[a]	NA		390	39	-	+
Vanadium	+	26.5	7.0E-3	[b]	NA		550	55	-	+
Zinc	-	222	3.0E-1	[a]	NA		23,000	2,300	-	-

Notes:

Toxicity values quoted in this table are for the oral pathway unless otherwise noted
Essential nutrients (calcium, iron, magnesium, potassium, and sodium) are not considered in this table. See Table 2-4 and Sections 2.4 and 2.5 for full discussion of essential nutrients.
NA = Not available
NC = Not calculated
RfD = Reference dose
SF = Slope factor

[a] IRIS, 1996
[b] HEAST, 1995
[c] ECAO
[d] Massachusetts, DEP, October 1994
[1] Acenaphthene RfD used as surrogate for Acenaphthylene RfD
[2] Pyrene RfD used as a surrogate for RfD of various compounds
[3] Naphthalene RfD used as surrogate for 2-Methylnapthalene RfD
[4] Gamma-BHC RfD used as surrogate for alpha-BHC, beta-BHC, and delta-BHC RfDs
[5] DDT RfD used as a surrogate for DDD and DDE RfDs
[6] Endrin RfD used as surrogate for Endrin Aldehyde and Endrin Ketone RfDs
[7] Slope factor is for inhalation pathway
[8] RfD for manganese is calculated based on the NOAEL of 10 mg/day in food, using a modifying factor of 3 for non-dietary intake.
[9] Nickel refinery dust inhalation slope factor used as surrogate for Nickel slope factor
[10] Toxicity Equivalency Factor (TEF) was applied to the benzo(a)pyrene slope factor, based on the relative potency of this chemical to benzo(a)pyrene.
[11] beta-BHC slope factor used as surrogate for delta-BHC slope factor

TABLE 2-26
RBC-BASED BENCHMARK SCREENING FOR CHEMICALS IN SUBSURFACE SOIL (>2FT) AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 1 of 2)

Chemical	COPC from previous screening? (yes = +)	Maximum Concentration mg/kg	Toxicity Values RfD mg/kg-day	Toxicity Values Slope Factor (mg/kg-day)$^{-1}$	RBCs (Region III Resid Soil) mg/kg	RBC-based benchmark mg/kg	Exceeds Benchmark (yes = +)	COPC
VOCs								
Bromomethane	-	0.35	1.4E-03	NA	2900	290	-	-
Methylene chloride	-	2.1	6.0E-02	7.5E-03	760	760	-	-
Tetrachloroethene	-	4.8	1.0E-02	5.0E-02	110	110	-	-
Xylenes	-	0.2	2.0E+00	NA	1,000,000	100,000	-	-
BNAs								
Acenaphthene	-	1.7	6.0E-02	NA	120,000	12,000	-	-
Acenaphthylene	-	0.11	6.0E-02	NA	120,000	12,000	-	-
Anthracene	-	6.3	3.0E-01	NA	610,000	61,000	-	-
Benzo(a)anthracene	-	1.5	3.0E-02	7.3E-01	7.8	7.8	-	-
Benzo(a)pyrene	-	1	**3.0E-02**	**7.3E+00**	**0.78**	**0.78**	+	+
Benzo(b)fluoranthene	-	2	3.0E-02	7.3E-01	7.8	7.8	-	-
Benzo(g,h,i)perylene	-	0.81	3.0E-02	NA		NA	-	-
Benzo(k)fluoranthene	-	0.51	3.0E-02	7.3E-02	78	78	-	-
Bis(2-Ethylhexyl)phthalate	-	0.944	2.0E-02	1.4E-02	410	410	-	-
Butylbenzylphthalate	-	0.013	2.0E-01	NA	410,000	41,000	-	-
Carbazole	-	0.31	NA	2.0E-02	290	290	-	-
Chrysene	-	1.3	3.0E-02	7.3E-03	780	780	-	-
Di-n-butylphthalate	-	0.677	1.0E-01	NA	200,000	20,000	-	-
Di-n-octylphthalate	-	0.025	2.0E-02	NA	41,000	4,100	-	-
Dibenzofuran	-	2.6	4.0E-03	NA	8,200	820	-	-
Dibenzo(a,h)anthracene	-	0.35	3.0E-02	7.3E+00	0.78	0.78	-	-
Fluoranthene	-	2.7	4.0E-02	NA	82,000	8,200	-	-
Fluorene	-	3.4	4.0E-02	NA	82,000	8,200	-	-
Indeno(1,2,3-c,d)pyrene	-	0.83	3.0E-02	7.3E-01	7.8	7.8	-	-
2-Methylnaphthalene	-	8.1	4.0E-02	NA	82,000	8,200	-	-
Naphthalene	-	3.1	4.0E-02	NA	82,000	8,200	-	-
Phenanthrene	-	5.8	3.0E-02	NA	61,000	6,100	-	-
Pyrene	-	2.6	3.0E-02	NA	61,000	6,100	-	-
Pesticides/PCBs								
Aldrin	-	0.038	3.0E-05	1.7E+01	0.34	0.34	-	-
alpha-BHC	-	0.0026	3.0E-04	6.3E+00	0.91	0.91	-	-
beta-BHC	-	0.009	3.0E-04	1.8E+00	3.2	3.2	-	-
delta-BHC	-	0.012	3.0E-04	1.8E+00	3.2	3.2	-	-
gamma-BHC (Lindane)	-	0.01	3.0E-04	1.3E+00	4.4	4.4	-	-
Chlordane Isomers	+	**1.89**	**6.0E-05**	**1.3E+00**	**4.4**	**4.4**	-	+
DDD	-	0.65	5.0E-04	2.4E-01	24	24	-	-
DDE	-	0.46	5.0E-04	3.4E-01	17	17	-	-
DDT	-	1.1	5.0E-04	3.4E-01	17	17	-	-
Dieldrin	-	0.05	5.0E-05	1.6E+01	0.36	0.36	-	-
Endosulfan I	-	0.0051	6.0E-03	NA	12,000	1,200	-	-
Endosulfan II	-	0.013	6.0E-03	NA	12,000	1,200	-	-
Endosulfan Sulfate	-	0.02	6.0E-03	NA	12,000	1,200	-	-
Endrin	-	0.23	3.0E-04	NA	610	61	-	-
Endrin Aldehyde	-	0.018	3.0E-04	NA	610	61	-	-
Endrin Ketone	-	0.023	3.0E-04	NA	610	61	-	-
Heptachlor	-	0.45	5.0E-04	4.5E+00	1.3	1.3	-	-
Heptachlor Epoxide	-	0.013	1.3E-05	9.1E+00	0.63	0.63	-	-
Methoxychlor	-	0.12	5.0E-03	NA	10,000	1,000	-	-
Toxaphene	-	0.2	NA	1.1E+00	5.2	5.2	-	-
Aroclor 1260	-	0.056	NA	7.7E+00	0.74	0.74	-	-

TABLE 2-26
RBC-BASED BENCHMARK SCREENING FOR CHEMICALS IN SUBSURFACE SOIL (>2FT) AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida
(Page 2 of 2)

Chemical	COPC from previous screening? [m] (yes = +)	Maximum Concentration mg/kg	Toxicity Values RfD mg/kg-day		Toxicity Values Slope Factor (mg/kg-day)$^{-1}$		RBCs (Region III Resid Soil) mg/kg	RBC-based benchmark mg/kg	Exceeds Benchmark (yes = +)	COPC
Metals										
Aluminum	+	**52,800**	**1.0E+00**	[e]	NA		**1,000,000**	**100,000**	-	+
Antimony	+	**14.6**	**4.0E-04**	[e]	NA		**820**	**82**	-	+
Arsenic	+	**47.3**	**3.0E-04**	[a]	**1.5E+00**	[a]	**3.8**	**3.8**	+	+
Barium	-	156	7.0E-02	[a]	NA		140,000	14,000	-	-
Beryllium	-	**2.5**	**5.0E-03**	[a]	**4.3E+00**	[a]	**1.3**	**1.3**	+	+
Chromium (VI) [n]	+	**145**	**5.0E-03**	[a]	**4.1E+01**	[b]	**10,000**	**1,000**	-	+
Cobalt	-	10	6.0E-02	[e]	NA		120,000	12,000	-	-
Copper	-	25	3.7E-02	[b]	NA		82,000	8,200	-	-
Lead	-	114	NA		NA		NA	NA	-	-
Manganese [o]	+	**167**	**2.4E-02**	[a]	NA		**10,000**	**1000**	-	+
Mercury	-	0.21	3.0E-04	[b]	NA		610	61	-	-
Nickel [p]	-	23	2.0E-02	[a]	8.4E-01	[a]	41,000	4,100	-	-
Selenium	+	49	5.0E-03	[a]	NA		10,000	1,000	-	-
Silver	+	**19.7**	**5.0E-03**	[a]	NA		**10,000**	**1,000**	-	+
Vanadium	+	**109**	**7.0E-03**	[e]	NA		**14,000**	**1400**	-	+
Zinc	-	129	3.0E-01	[e]	NA		610,000	61,000	-	-

Notes:

Toxicity values quoted in this table are for the oral pathway unless otherwise noted
Essential nutrients (calcium, iron, magnesium, potassium, and sodium) are not considered in this table. See Table 2-5 and Sections 2.4 and 2.5 for full discussion of essential nutrients.
NA = Not available
NC = Not calculated
RfD = Reference dose
SF = Slope factor

[a] IRIS, 1996
[b] HEAST, 1995
[c] ECAO
[d] Massachusetts, DEP, October 1994
[e] Acenaphthene RfD used as surrogate for Acenaphthylene RfD
[f] Pyrene RfD used as a surrogate for RfD of various PAHs
[g] Naphthalene RfD used as surrogate for 2-Methylnaphthalene RfD
[h] Gamma-BHC RfD used as surrogate for alpha-BHC, beta-BHC, and delta-BHC RfDs
[i] DDT RfD used as a surrogate for DDD and DDE RfDs
[j] Endrin RfD used as surrogate for Endrin Aldehyde and Endrin Ketone RfDs
[k] Slope factor is for inhalation pathway
[l] RfD for manganese is calculated based on the NOAEL of 10 mg/day in food, using a modifying factor of 3 for non-dietary intake.
[m] Nickel refinery dust inhalation slope factor used as surrogate for Nickel slope factor
[n] Toxicity Equivalency Factor (TEF) was applied to the benzo(a)pyrene slope factor, based on the relative potency of this chemical to benzo(a)pyrene.
[o] beta-BHC slope factor used as surrogate for delta-BHC slope factor

Surface soil. Chemicals detected in surface soil were compared to RBCs for residential soil. The results of this comparison are shown in Table 2-25. The comparison resulted in benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, dibenzo(a,h)anthracene, and manganese being added to the list of COPCs for surface soils. Although the maximum concentration of beryllium in surface soil exceeded its respective RBC-based benchmark, the concentrations detected were within background levels, and so beryllium was not considered a COPC in surface soil. All other chemicals detected in surface soil whose maximum concentration exceeded the RBC-based benchmarks had already been selected as COPCs based on previous screening described in Sections 2.7.1.2, 2.7.1.3 and Table 2-22.

Subsurface Soil. Chemicals detected in subsurface soil were compared to RBCs for soil in an industrial area. The results of this comparison are shown in Table 2-26. The comparison resulted in benzo(a)pyrene being added to the list of COPCs for subsurface soils. Although the maximum concentrations of beryllium in subsurface soil exceeded its respective RBC-based benchmark, the concentrations detected were within background levels, and so beryllium was not considered a COPC in subsurface soil. In the toxicity-screening (Table 2-23), selenium contributed greater than 1% of the overall risk for subsurface soils. However, selenium was detected in only 1 of 29 subsurface soil samples at 49 mg/kg, and this concentration is well below both the industrial and residential RBC concentrations. Therefore, selenium was not retained as a COPC. All other chemicals detected in subsurface soil whose maximum concentration exceeded the RBC-based benchmarks had already been selected as COPCs based on previous screening described in Sections 2.7.1.2, 2.7.1.3, and Table 2-23.

2.7.1.5 Chemicals of Potential Concern Selection Process. The chemicals of potential concern selection process determines those chemicals which are the most toxic and which are anticipated to create the greatest potential risk.

Identification of the COPCs for the risk assessment was accomplished in accordance with USEPA (1989a) guidance. All detected chemicals were included as COPCs for the risk assessment with the following exceptions:

- Chemicals that are essential human nutrients and chemicals that are toxic only at very high doses (i.e., much higher than those that could be associated with contact at the site) were eliminated from the quantitative risk assessment. Examples of such chemicals are calcium, magnesium, potassium, and sodium.

- As per USEPA Region IV risk assessment guidance (USEPA, 1992b), inorganic chemicals present at concentrations less than twice background concentrations were excluded from the list of COPCs. Only those chemicals for which the maximum detected concentration was greater than twice the background concentration were retained as COPCs.

- Inorganic and semi-volatile organics considered to be present in background concentrations according to the scientific literature for the specific chemical or those chemicals considered ubiquitous and determined not to be site-related. Although, phthalate esters, such as bis(2-ethylhexyl)phthalate and butylbenzylphthalate, are relatively ubiquitous in the environment, the presence of these constituents in media at the site may be due to sampling or laboratory artifacts, as well. Since these phthalates may not be site-related, for purposes of this risk assessment only the significant phthalates were considered COPCs.

- Chemicals detected in less than 5% of the samples analyzed per media (except in groundwater where data was obtained from only five sample points).

- Chemicals represented in less than 1% of the potential overall risk via the concentration-toxicity screen (USEPA, 1989), and whose maximum concentration detected did not exceed a benchmark based on USEPA Region III RBCs (USEPA, 1995a).

Based on the above evaluation, a group of COPCs was carried through the quantitative risk assessment for each of the environmental media, groundwater and soil. This selection is summarized in Table 2-27.

Tentatively Identified Compounds (TICs) and TRPH. Where it was appropriate, TICs were included within the quantitative risk analysis as COPCs for soil and groundwater. Tentatively identified chemicals in the Montgomery Watson 1993 groundwater dataset associated with petroleum products were summed for quantification. Categories of TICs included in this evaluation include: alkanes, unknown hydrocarbons, substituted benzenes, PAHs, cycloalkanes, and aromatics. The summed petroleum-related TICs were treated as TPH in screening and the risk characterization.

Unknown and other partially identified TICs were not included for further analysis due to the lack of information on these chemicals. Organic acids detected in soil and groundwater were

TABLE 2-27

CHEMICALS OF POTENTIAL CONCERN IN ENVIRONMENTAL MEDIA AT OU-7, ENTOMOLOGY STORAGE AREA Homestead Air Reserve Base, Florida

Compound	Groundwater	Surface Soil	Subsurface Soil
VOCs			
Benzene		X	
Bromodichloromethane	X		
Chloroform	X		
Dibromochloromethane	X		
BNAs			
Benzo(a)anthracene		X	
Benzo(a)pyrene		X	X
Benzo(b)fluoranthene		X	
Dibenzo(a,h)anthracene		X	
TPHs	X		
Pesticide/PCBs			
Alpha-BHC	X		
Chlordane isomers		X	X
DDD	X		
DDE		X	
DDT		X	
Endrin ketone		X	
Heptachlor epoxide		X	
Metals			
Aluminum	X	X	X
Antimony			X
Arsenic	X	X	X
Barium		X	
Cadmium	X		
Chromium	X	X	X
Lead	X		
Manganese	X	X	X
Silver		X	X
Vanadium		X	X

BNAs Base-neutral and acid extractable compounds
PCBs Polychlorinated biphenyls
VOCs Volatile organic compounds.

not included in the quantitative risk assessment as these chemicals are the result of natural processes by biological organisms (bacteria) in the breaking down or " weathering" of petroleum product at the site.

USEPA Region IV has adopted an approach to TPH developed by the State of Massachusetts DEP (Massachusetts DEP, 1994). This approach uses the toxicity values of certain hydrocarbon compounds (e.g. n-hexane, n-nonane, eicosane) for fractions of TPH. The toxicity of hydrocarbons tends to decrease with increasing carbon chain length. n-Hexane has an RfD of 0.06, n-nonane an RfD of 0.6, and eicosane an RfD of 6.

After review and discussion with USEPA Region IV, toxicity values for n-nonane (C9) were used as surrogate values for TPH and fuel-associated TICs. Use of n-nonane as a surrogate was felt to be more representative of the TPH present at the site than use of n-hexane, as volatile fractions of TPH (C4-C7) would be expected to attenuate by weathering more rapidly than heavier components.

2.7.2 Potential Routes of Migration

The source of wastes at OU-7 were accidental releases of diesel fuel and pesticides. Products spilled on the ground may have moved down through the soil/bedrock profile and leached to shallow groundwater, migrated in surface runoff, or been released to the air via direct volatilization, volatilization from groundwater, or dust emission. The drainage canal to the west may not drain the area because the concrete wall east of the canal prevents site surface runoff from entering this canal.

Elevated levels of 7 metals (aluminum, arsenic, barium, chromium, lead, silver, and vanadium) were detected in surface soil/bedrock. Elevated levels of arsenic were observed in site soil/bedrock samples across the site, as well as in groundwater from within the souce area. The source of the arsenic contamination is likely through the use of arsenical pesticides. Other Chemicals of Concern (COCs) include one VOC (benzene), and 5 pesticides (DDT, DDE, the alpha-chlordane and gamma-chlordane isomers, endrin ketone and heptachlor epoxide). Six metals at elevated levels were found in subsurface soil/bedrock (aluminum, antimony, arsenic, chromium, silver, and vanadium). The isomers of chlordane had penetrated to the subsurface also.

DDE is a break-down product of DDT and is somewhat more water soluble than its parent compound. DDE has the potential to migrate further than DDT due to this characteristic.

Only metals were found as COPCs in the groundwater. There are no potable wells located on-site. In the immediate vicinity (within one mile) of the site there are two wellfields (Nos. 1 and 2). These wells are no longer in use. Additionally, migration to the groundwater at the two non-potable wells south of the site is not expected to occur because several drainage ditches and canals occur between the site and these wells. Thus, there is currently little potential for exposure to affected groundwater. The base water supply is obtained currently from a wellfield located off-base and more than 1.5 miles southwest of OU-7. Although the old on-base wells are still on-line and are used during peak consumption periods to augment the off-site wells, this pumping is infrequent and does not alter the groundwater on-site (Geraghty & Miller, 1992a). Future potable use of the groundwater in the vicinity of OU-7 is unlikely due to salt-water intrusion.

Although other contaminated media are present at OU-7, the principal route of migration of contaminants is through shallow groundwater. Past activities allowed contaminants to enter soil/bedrock and surface water, and the contaminants eventually migrated to shallow groundwater.

Operable Unit 7 is situated on very level topography at the Base. The cycle of water through the site begins with precipitation. During rainfall events, water percolates rapidly through the limestone and weathered limestone bedrock underlying the site. Surface water runoff is limited due to the flat topography and lack of drainage at OU-7. Given the highly transmissive underlying formation, rainwater typically infiltrates rapidly into the shallow aquifer system. It is estimated that horizontal groundwater movement can be on the order of tens of feet during a single rainfall event. Once the rainfall ceases, the water table returns to near static conditions and groundwater movement decreases dramatically.

Between rainfall events, evaporation from the surface soil/bedrock returns water from the aquifer to the atmosphere. The rate of loss is greatest with open water bodies and decreases with increasing distance from the water table.

The natural concentrations of chemicals in the soil/bedrock, rock, and water have a controlling effect on the fate and transport mechanisms. Soil/bedrock at the site exist primarily as a veneer on the bedrock surface. The soil has both organic and iron precipitants. Nevertheless, the calcium carbonate from the underlying oölite is the primary mineral present.

2.7.3 Exposure Assessment

This section of the risk assessment identifies and describes potential human receptors, reviews possible pathways of exposure for chemicals of potential concern at OU-7, and presents estimates of exposure doses resulting from identified pathways at OU-7. An exposure assessment is conducted to identify potential sources and mechanisms of release, transport pathways (e.g. groundwater, surface water, soil, and air), routes of exposures (ingestion, inhalation, dermal contact), and potential on-site and off-site receptor populations (current users of the site, as well as adjacent populations which may be exposed to chemicals that have been transported off-site). This information provides the basis for constructing site-specific exposure scenarios.

Other information considered in the development of present and future exposure scenarios includes: physical characteristics of the site and surrounding area such as climatology, groundwater hydrology, location and description of surface water and surrounding land use and available state-specific guidelines relevant to exposure and risk assessments.

A critical step in assessing the potential risk to public health is to identify the pathways through which exposure could occur. A typical transport pathway consists of four necessary elements: 1) a source and mechanism of chemical release, 2) an environmental transport medium, 3) a point of potential contact with the contaminated medium, and 4) an exposure route (inhalation of vapors, ingestion of groundwater, etc.). All four of these elements must be present for a pathway to be complete.

Three environmental media were considered in this document - groundwater, surface soil, and subsurface soil. Guidance on what depth range should be used for surface soil differs between the USEPA (0 to 12 inches) and the Florida DEP (0 to 24 inches). Samples taken between 0 and 24 inches below level surface (bls) were considered surface soil samples, so receptor exposure during gardening or landscaping activities could be evaluated in this assessment. This choice seems reasonable for south Florida, as the year-round, mild climate would permit possible residential gardening and frequent landscaping activities on base.

Exposure Point Concentration. In accordance with USEPA methodology (1989a and 1992e), the medium-specific 95 percent UCL of the arithmetic mean concentrations for the COPCs will be used as exposure point concentrations (EPCs) to estimate reasonable maximum exposure (RME). The RME approach is suggested by the USEPA (1989a) to provide an estimate of the maximum exposure (and therefore risk) that might occur. The

natural log of the data was used since environmental data is typically log normally distributed. The RME corresponds to a duration and frequency of exposure greater than is expected to occur on an average basis. In those instances where the calculated 95 percent UCL exceeds the maximum detected concentration, the maximum detected concentration was used as the EPC for a more accurate estimate of RME concentration (USEPA, 1989a).

The following decision criteria were used in the development of the database used to calculate exposure point concentrations.

- All chemicals that were never detected in a medium (e.g., groundwater, soil, surface water, sediment) were eliminated from further analysis for that group.

- All analytical results reported as detects were used at the reported value. This included estimated data (J-qualified), as well as unqualified data.

- For non-detects, one-half the practical quantitation limit (PQL) was used as a proxy concentration (rather than using zero or eliminating the data point). In instances where one-half the PQL exceeded the maximum detected concentration for that constituent in that data group (i.e., an unusually high PQL), the maximum detect was used as the proxy value for that non-detect.

- For duplicate samples, the result for each chemical was selected as follows: if both were detects, the higher measured analytical concentration was used; if only one result was a positive detect, that concentration was used; if both were non-detects, one-half the lower PQL was used as the proxy concentration. For the case of two non-detects, the smaller PQL was used because higher PQLs are frequently the result of dilution of the sample, and use of the higher PQL would introduce more uncertainty into the calculation. Additionally, it is not reasonable to use the higher PQL when the duplicate analysis on the same sample has indicated that the chemical was not present at the lower PQL.

The results of these analyses for the sampled media are presented in Tables 2-28 through 2-30. The information presented in these tables includes, for each chemical of potential concern, the number of samples collected and included in the database developed by G&M (1989, 1991) for a preliminary BRA and, for soils, the number of these samples which remained following the 1994 IT Corporation soil removal activity. Similar information is presented for samples collected by Montgomery Watson in 1993 and IT Corporation in 1994.

TABLE 2.28

EXPOSURE POINT CONCENTRATIONS FOR GROUNDWATER
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Dam, Florida

Constituent	Geraghty & Miller Samples Collected 1991 No. Samples Collected & Avg.	Montgomery Watson Samples Collected 1993 No. Samples Collected	total Number Samples Averaged 1991-93	UCL	G&M Max	MW Max	Value Used in Risk Calculation [1]
VOCs (µg/l)							
Bromodichloromethane	3	2	5	5.0	ND	4	4
Chloroform	3	2	5	11.1	ND	9	9
Dibromochloromethane	3	2	5	4.5	ND	2	2
TPHs (µg/l)	NA	2	2	NC	NA	882	882
PESTICIDES (µg/l)							
Alpha BHC	3	2	5	0.154	ND	0.03	0.03
DDD	3	2	5	7.24E+13	8.7	10	10
METALs (mg/L)							
Aluminum	3	2	5	51,019	4.3	0.126	4.3
Arsenic	3	2	5	973,871	0.96	0.54	0.96
Cadmium	3	2	5	0.020	ND	0.0055	0.0055
Chromium VI	3	2	5	1.96	0.026	ND	0.26
Lead	3	2	5	0.16	0.024	ND	0.024
Manganese	3	2	5	7.19	0.099	0.017	0.017

µg/L micrograms per Liter
mg/L miligram per Liter
- - Not Recalculated
ND Not Detected
NA Not Applicable
NC Not Calculated

[1] UCLs are used as exposure point concentrations unless calculation produces a UCL greater than the maximum detected concentration, in which case the maximum detected concentration is used. The UCL value is for the combined sample sets.

TABLE 2-29

EXPOSURE POINT CONCENTRATIONS IN SURFACE SOIL SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Chemical	Geraghty & Miller[1]				Montgomery Watson[1]		IT Corp	Total No. Samples[6]	UCL Concentration[7]	Maximum Detected Concentration	Value Used in Risk Calculations[a]
	Samples Collected 1989[1]	Samples Remaining	Samples Collected 1991[3]	Samples Remaining 1995	Samples Collected 1993[4]	Samples Remaining 1995	Samples Remaining 1994[9]				
VOCs (µg/kg)											
Benzene	0	0	3	1	2	0	13	14	58,738	24	24
BNAs (µg/kg)											
Benzo(a)anthracene	1	0	1	2	2	0	13	15	1,663	1,400	1,400
Benzo(a)pyrene	1	0	1	2	2	0	13	15	1,505	970	970
Benzo(b)fluo ranthene	1	0	1	2	2	0	13	15	1,362	2,000	1,362
Dibenzo(a,h)anthracene	1	0	1	2	2	0	13	15	2,094	280	280
Pesticides (µg/kg)											
Chlordane Isomers	12	1	15	10	4	1	13	25	1,143	3,500	1,143
DDE	12	1	15	10	4	1	13	25	762	2,200	762
DDT	12	1	15	10	4	1	13	25	1,541	4,600	1,541
Endrin Ketone	0	1	15	10	4	1	13	25	56.1	1,200	56
Heptachlor Epoxide	0	0	15	10	4	1	13	24	7.7	94	7.7
Metals (mg/kg)											
Aluminum	0	0	3	1	2	0	13	14	7,501	17,700	7,501
Arsenic	12	1	3	1	2	0	29	31	18.0	45	18
Barium	12	1	3	1	2	0	13	15	65.2	451	65.2
Chromium VI	12	1	3	1	2	0	13	15	26.7	62	26.7
Manganese	0	0	3	1	2	0	13	14	90.9	119	90.9
Silver	0	0	3	1	2	0	13	14	10.4	20	10.4
Vanadium	0	0	3	1	2	0	13	14	11.8	26.5	11.8

µg/kg Micrograms per kilogram
mg/kg Miligram per kilogram
- - Not Recalculated
Shaded Cellls indicate the number of samples remaining from original sampling event (in column to the left) after IT Corporation excavation and sampling in 1994/1995.

1 When a location was sampled in duplicate, the data is combined for risk assessment and is reported as one sample collected
2 Geraghty & Miller, 1989 Data Points; P2SB-3 S
3 Geraghty & Miller, 1991 Data Points: P2-SL-0016-2, P2-SL-0019-2, P2-SL-0020-2, P2-SL-0021-2, P2-SL-0023-2, P2-SL-0026-2, P2-SL-0027-2, P2-SL-0029-2, P2-SL-0029-4, P2-SL-0030-2
4 Montgomery Watson 1993 Data Points: P2-SL-0032
5 IT Corporation 1994 Data Points: ESA 302/3, ESA 302/4, ESA 302/5, ESA 302/6, ESA 302/7, ESA 302/8, ESA 302/9, ESA 302/10, ESA 302/11, ESA 30/12, ESA 302/13, ESA 302/14, ESA 302/16, ESA 302/17, ESA 302/18, ESA 302/22 E5.1, N5.1, SW10.1, FCN2.4, CSNA.l, CSNB.1,CSE.18, CSSB.1, SB1.18, CS25.1, CS28.1, CS29.1 CS30.1
6 Total number of samples used in the risk assessment database; the sum of the shaded cells in each row.
7 The UCL concentration was calculated assuming a lognormal distribution of the data.
8 The UCL concentration is used as the exposure point concentration unless it is greater than the maximum detected concentration, in which case the maximum detected concentration is used.

TABLE 2-30

EXPOSURE POINT CONCENTRATIONS IN SUBSURFACE SOIL SAMPLES
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Constituent	Geraghty & Miller [1]				Montgomery Watson [1]		IT Corp	Total No. Samples [2]	UCL Concentration [7]	Maximum Detected Concentration	Value Used in Risk Calculations [8]
	samples Collected 1998 [3]	Samples Remaining 1995	Samples Collected 1991 [4]	Samples Remaining 1995	Samples Collected 1993	Samples Remaining 1995 [5]	Samples Remaining 1994 [5]				
BNAs(µg/kg)											
Benzo(a)pyrene	12	7	3	2	0	0	27	36	1,038	1,000	1,000
Pesticides (µg/kg)											
Chlordane Isomers	12	7	15	12	2	1	27	47	550	1,890	550
Metals (mg/kg)											
Aluminum	0	0	3	2	0	0	27	29	3,328	52,800	3,328
Antimony	12	7	3	2	0	0	27	36	49	14.6	14.6
Arsenic	12	7	3	2	0	0	27	36	20.7	47.3	20.7
Chromium VI	12	7	3	2	0	0	27	36	13.6	145	13.6
Manganese									57	167	57.2
Silver	0	0	3	2	0	0	27	29	5.6	19.7	5.6
Vanadium	0	0	3	2	0	0	27	29	11	109	11.0

(µg/kg) Micrograms per kilogram
mg/kg Miligram per kilogram
- - Not Recalculated
Shaded cells indicate the number of samples remaining from orignal sampling event (in column to the left) after IT Corporation excavation and sampling in 1994/995.

1 When a location was sampled in duplicate, the data is combinedd for risk asessment and is reported as one sample collected.

2 Total number of samples used in the risk assessmemt database; the sum of the shaded cells in ceach row. Count includes P2 SL-0028 and P2-SL-0033 for pesticides only. However, removal status unknown and data is not incorporated within the database.

3 G&M, 1989. Data points: P2 SB-3 D, P2 SB-4 D, P2 SB-5 D, P2 SB-6 D, P2 SB-7 D, P2 SB-10 D, P2 SB-11 D

4 G&M 1991 Data Points: P2 SL-0016-4, P2 SL-0019-4, P2 SL-0020-4, P2 SL-0021-4, P2 SL-0022-4, P2 SL-0023-4, P2 SL-0024-4, P2 SL-0025-4, P2 SL-0026-4, P2 SL-0027-4, P2 SL-0029-4, P2 SL-0030-4.

5 MW 1993 Data Point: P2 SL-0032

6 ITCorp 1994 Data Points: NE.3, SW5.3, SE5.3, NW5.3, FCSN3.4, FCSN4.4, FCN1.6, NW15.1, NW15.3, CSNA.3, CSNB.3, CSSB .3, SB3.18, CS27.3, CS24.3, CS25.3, CS15.3, CS28.3, CS29.3, CS30.3, FC56.3, FCS5.3,FCS3.3, FCS2.3, FCS1.3, FCS4.5, FCS7.5

7 The UCL concentration was calculated assuming a lognormal distribution of the data

8 The UCL concentration is used as the exposure point concentration unless it is greater than the maximum detected concentration, in which case the maximum detected concentration is used.

Lastly the arithmetic mean, the maximum concentration detected, and the 95 percent upper confidence limit (UCL) on the mean (one tailed test, assuming log normal distribution) is presented. The information presented in these tables is discussed in the following subsections. An example of the data reduction used to calculate the mean and UCL for the chemicals detected is shown in Table 2-31.

Exposure Scenarios. Exposure pathways identified at OU-7 are shown in Table 2-32 and are associated with soils and groundwater. Most of the chemicals detected at the site have low environmental mobility.

Exposure points that can be identified for current or future use of the site include the groundwater and soils at OU-7. Metals which were found as COPCs in the groundwater include aluminum, arsenic, cadmium, chromium, lead, and manganese. The pesticides alpha-BHC and DDD, and the VOCs bromodichloromethane, dichlorobromomethane and chloroform were also identified as COPCs in groundwater. There are no potable wells located on-site. In the immediate vicinity (within one mile) of the site there are two wellfields (Nos. 1 and 2). These wells are no longer in use. Additionally, migration to the groundwater at the two non-potable wells south of the site is not expected to occur because several drainage ditches and canals occur between the site and these wells. Thus, there is currently little potential for exposure to affected groundwater.

The site is covered with crushed limestone, weathered limestone, gravel, and sparse vegetation. No base workers have job duties that require them to work at OU-7 for 8 hours per day, 5 days per week. For purposes of this assessment, it was assumed that a base worker could be at the site as long as 2 hours per day, 5 days per week to store or retrieve materials. As a conservative assumption, all three routes of exposure to soil were considered: incidental ingestion of soil, dermal (skin) contact with soil, and inhalation of particulates and vapors. The amount of dust, vapors, and soil contact is not likely to be significantly restricted by the gravel and sparse vegetative cover, so potential exposure rates were not reduced by a vegetation factor.

The OU-7 area has been retained by the 482nd Air Force Reserve as part of the cantonment area. As such, this area has been rebuilt as part of the Base Supply, Civil Engineering, and POL Operations area. Operable Unit 7 now includes a new civil engineering complex building, three shops, a storage area, miscellaneous building and a much expanded parking area. Buildings or asphalt paved areas now cover OU-7 and thus eliminate any potential exposures, direct or indirect via soil contact for future site workers. However, this future land

TABLE 2-31

EXAMPLE DATA REDUCTION CALCULATION FOR ARSENIC IN GROUNDWATER SAMPLES AT OU-7, ENTOMOLOGY STORAGE AREA Homestead Air Reserve Base, Florida

Sample Designation	Analytical Result (µg/l)	Value Used (µg/l)	Log Transformed Data
P2-HS-16	38	38	3.64
P2-I-a6	29J	29	3.37
P2-MW-1 (‹91)	960	960	6.87
P2-MW-1 (‹93	540	540	6.29
P2-DMW-0001	2.50	2.50	0.92

$$\mathbf{UCL} = \mathbf{e}^{\left(\bar{x} + \left(0.5 s^2 + \frac{s H}{\sqrt{n-1}}\right)\right)}$$

where:

Arithmetic mean of transformed data	$\bar{x}$ = 4.22
Total number of samples	n = 5
Degrees of freedom	n - 1 = 4
Standard Deviation	s = 2.41
H-statistic of transformed data (¼ =0.05)	H = 11.259
Upper Confidence Limit (in mg/L)	UCL = 9.7E+08

- All statistics were calculated using one-half the detection limit for non-detects, where applicable.

TABLE 2-32

POTENTIAL PATHWAYS OF EXPOSURE TO CHEMICALS DETECTED AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Medium	Pathway/Route	Potentially-Exposed Population	Comments
Groundwater (potable use)	Ingestion, dermal contact, and inhalation of constituents in groundwater.	None currently identified. Hypothetical future on-site residents unlikely due to nature and history of Site.	No potable wells are located between Site SS-7 and the groundwater discharge point (drainage ditches or Boundary Canal). No active potable wells are located within a 1-mile radius of the site. Future potable use of groundwater is unlikely due to high total dissolved solids associated with salt-water intrusion. However, for purposes of this risk assessment, ingestion of groundwater by a hypothetical future on-site resident was quantitatively evaluated.

TABLE 2-32

POTENTIAL PATHWAYS OF EXPOSURE TO CHEMICALS DETECTED AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Medium	Pathway/Route	Potentially-Exposed Population	Comments
Soil (Weathered Bedrock)	Incidental ingestion of and dermal contact with affected surface soils/dust and inhalation of affected dust.	Current base workers accessing the area to drop off or retrieve piping. Hypothetical future residents (children and adults) on-site unlikely.	Most of the sit e is covered with sparse grass or gravel, so contact with soil, dust, or volatilized constituents is possible. The site is located approximately one-half mile south of base housing and is used currently by base personnel; the potential for future development of the site is limited due to the surrounding land use and deed restrictions.
Soil (Subsurface)	Incidental ingestion of and dermal contact with affected surface soils/dust and inhalation of affected dust.	Future construction worker excavating site.	Construction worker is exposed to subsurface soil contaminants during excavating.

re-use would require construction and thus potential exposure for the construction worker. Exposure pathways for potential future construction workers include incidental ingestion of dirt and inhalation of fugitive dust.

The future construction worker could be exposed to both surface and subsurface soils via ingestion and inhalation of particulates. Inhalation of vapors and dermal exposure are not quantified because a relatively low contribution to overall site risk is expected given the nonvolatile character of OU-7 COPCs. This scenario, of 1-year duration, used subchronic oral and inhalation RfDs, when they were available. Hexavalent chromium had a subchronic oral RfD (2.OE-02 mg/kg/day) and barium had a subchronic inhalation RfD (1.0E-03 mg/kg/day) which differed from the chronic values.

In the unforeseen event that the site is closed, the possibilities for future exposures could include the development of the land for residential use. Exposure pathways for these hypothetical future residents have been evaluated but are not deemed approximate for evaluating site risk. Future residential scenarios evaluated include direct contact with the soils, incidental ingestion of the soils, and inhalation of fugitive dust or vapors.

There are no potable wells on the base between OU-7 and the groundwater discharge point at the drainage ditches or Boundary Canal. There are no active potable wells within a 1-mile radius of the site. The base water supply is obtained currently from a wellfield located off-base and more than 1.5 miles southwest of OU-7. Although the old on-base wells are still on-line and are used during peak consumption periods to augment the off-site wells, this pumping is infrequent and does not alter the groundwater on-site (Geraghty & Miller, 1992a). Future potable use of the groundwater in the vicinity of OU-7 is unlikely due to saltwater intrusion. On-base wells that were used previously to supply potable water have been replaced by the off-base wellfield due to the effects of salt-water intrusion. Therefore, it is unlikely that new wells would be located in the area.

Although it is unlikely that potable wells would be installed in the vicinity of the site, a conservative assumption made in this risk assessment is that a potable well is installed in the groundwater plume, downgradient of the site. Exposure of hypothetical future residents to affected groundwater via ingestion, inhalation, and dermal contact is considered a potential exposure pathway.

In summary, workers accessing the site to store or retrieve materials are the most likely population potentially exposed to the on-site surficial soils. The future plans for this site

include a new civil engineering complex building, three shops, a storage area, miscellaneous building and a much expanded parking area. This plan for future paving and building structures would cover all existing soils and thus eliminate any potential exposures for future site workers. However, foreseeable future land use would include construction. Therefore, the potential construction worker exposure pathway was included in this risk analysis. In the unforeseen event that the site is closed, hypothetical future exposure pathways might include residential development of the site in which residents are potentially exposed. Table 2-32 summarizes the potential exposure pathways for OU-7.

2.7.4 Toxicity Assessment

This section of the risk assessment provides information on the human health effects of site specific contaminants of potential concern. The information presented in this section provides a basis for the dose-response assessment carried out in the quantitative risk assessment.

Evaluation of the toxic potential of a chemical involves the examination of available data that relate observed toxic effects to doses. Generally, there are two categories of information that are considered in this part of a quantitative risk assessment:

- Information on the potential acute or chronic non-cancer effects of chemicals, and
- Information on the potential for chemicals to initiate or promote cancers.

A wide variety of factors must be considered in using health effects data in qualitative or quantitative assessments. As discussed in the following subsections, there may be a variety of relationships between dose and effects. Also, the fact that some chemicals display thresholds (i.e., there are doses below which the chemical does not cause an effect) must be considered.

Non-Carcinogenic Effects. In general, non-carcinogenic effects (acute or chronic systemic) are considered to have threshold values, while carcinogenic effects are considered to not have thresholds. Toxicity studies for the former focus on identifying where this threshold occurs. The threshold can be related to a reference dose (RfD). A chronic RfD is an estimate of a daily exposure level for which people, including sensitive individuals, do not have an appreciable risk of suffering significant adverse health effects. Exposure doses above an RfD could possibly cause health effects.

Carcinogenic Effects. Studies of carcinogenicity tend to focus on identifying the slope of the linear portion of a curve of dose versus response. A plausible upper-bound value of the slope is called the cancer slope factor (CSF) or cancer potency factor (CPF). The product of the CSF and the exposure dose is an estimate of the risk of developing cancer. In accordance with current scientific policy concerning carcinogens, it is assumed that any dose, no matter how small, has some associated response. This is called a non-threshold effect. In this assessment, the no-threshold effect was applied to all probable carcinogens.

Toxicological Properties. The risks associated with exposure to constituents detected at OU7 are a function of the inherent toxicity (hazard) of the constituents and exposure dose. This section addresses the inherent toxicological properties of the constituents. The exposure doses are estimated in the Exposure Assessment section which follows.

A distinction is made between carcinogenic and non-carcinogenic effects. Two general criteria are used to describe these effects: excess lifetime cancer risk for constituents which are thought to be potential human carcinogens and the hazard quotient (HQ) for constituents that cause non-carcinogenic effects. For potential carcinogens, the current regulatory guidelines (USEPA, 1989a) use an extremely conservative approach in which it is assumed that any level of exposure to a carcinogen could hypothetically cause cancer. This is contrary to the traditional toxicological approach to toxic chemicals, in which finite thresholds are identified, below which toxic effects are not expected to occur. This traditional approach still is applied to non-carcinogenic chemicals.

Toxicity Values. In general, CSFs, cancer classifications, RfDs, and RfCs are taken from IRIS (1996) or, in the absence of IRIS data, the USEPA Health Effects Assessment Summary Tables (HEAST) (USEPA, 1995). Because toxicity values for dermal exposure are rarely available, several adjustments were made to toxicity values for use in calculating dermal dose as per Region IV supplemental guidance to RAGS issued in March of 1994. The PAH CSFs were not adjusted to assess dermal exposure since the portal of entry differs in the outcome of tumors from oral and dermal exposure (USEPA, 1989a). Oral toxicity constants (both RfD and CSFs) were adjusted for dermal use via the application of oral absorption efficiency values obtained from Region IV supplemental guidance to RAGS issued in March of 1994. The factors used to correct both exposure dose calculations for dermal absorption from soil and the factors used to adjust oral toxicity constants (RfDs and CSFs) for use in calculating risks and hazard indices via dermal exposure are provided in Table 2-33. Unadjusted oral and inhalation RfDs are provided in Table 2-34. CSFs, cancer type or tumor sites, and

TABLE 2-33

DERMAL AND ORAL ABSORPTION EFFICIENCIES FOR CHEMICALS OF POTENTIAL CONCERN AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

	Adsorption Efficiencies			
Constituents	**Dermal**	a	**Oral**	b
VOCS				
Benzene	0.01		0.80	c
Bromodichloromethane	0.01		0.80	c
Chloroform	0.01		0.80	c
Dibromochloromethane			0.80	c
BNAs				
Benzo(a)anthracene	0.01		0.50	c
Benzo(a)pyrene	0.01		0.50	c
Benzo(b)fluoranthene	0.01		0.50	c
Dibenzo(a,h)anthracene	0.01		0.50	c
TPHs (as n-nonane)				
Pesticides				
Alpha-BHC	0.01		0.50	c
Chlordane isomers	0.01		0.50	c
DDD	0.01		0.50	c
DDE	0.01		0.50	c
DDT	0.01		0.50	c
Endrin Ketone	0.01		0.50	c
Heptachlor epoxide	0.01		0.50	c
Metals				
Aluminum	0.001		0.02	c
Antimony	0.001		0.02	c
Arsenic	0.001		0.02	c
Barium	0.001		0.02	c
Cadmium	0.001		0.02	c
Chromium (VI)	0.001		0.02	c
Lead	0.001		0.02	c
Manganese	0.001		0.02	c
Silver	0.001		0.02	c
Vanadium	0.001		0.02	c

Notes:

a Used to adjust dermal dose calculation for absorption from soil as per Region IV Supplemental Guidance to RAGS Bulletin, Vol. 1 No. 1, USEPA, Atlanta, Georgia, March 1994.

b Used to adjust oral toxicity constants (RfDs and CPFs) to estimate effects via dermal exposure. Values as per Region IV Supplemental Guidance to RAGS Bulletin, Vol. 1 No. 1, USEPA, Atlanta, Georgia, March 1994.

c default value

d National Research Council (1982).

TABLE 2-34

REFERENCE DOSES FOR CHEMICALS OF POTENTIAL CONCERN AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Constituent	Chronic Oral RfD (mg/kg/day)		Subchronic Oral RfD (mg/kg/day)		Chronic Inhalation RfD (mg/kg/day)		Subchronic Inhalation RfD (mg/kg/day)	
VOCS								
Benzene	3.00E-04	a	NA		1.70E-03	a	NA	
Bromodichloromethane	2.00E-02	b	2.00E-02	c	NA		NA	
Chloroform	1.00E-02	b	1.00E-02	c	NA		NA	
Dibromochloromethane	2.00E-02	b	2.00E-01	c	NA		NA	
BNAs								
Benzo(a)anthracene(1)	3.00E-02	b	3.00E-01	c	NA		NA	
Benzo(a)pyrene(1)	3.00E-02	b	3.00E-01	c	NA		NA	
Benzo(b)fluoranthene(1)	3.00E-02	b	3.00E-01	c	NA		NA	
Dibenzo(a,h)anthracene(1)	3.00E-02	b	3.00E-01	c	NA		NA	
TPHs (as n-nonane)(2)	6.00E-01	d	NA		NA		NA	
Pesticides								
Alpha-BHC (3)	3.00E-04	b	3.00E-04	c	NA		NA	
Chlordane isomers	6.00E-05	b	6.00E-05	c	NA		NA	
DDD (4)	5.04E-04	b	5.04E-04	c	NA		NA	
DDE (4)	5.04E-04	b	5.04E-04	c	NA		NA	
DDT	5.04E-04	b	5.04E-04	c	NA		NA	
Endrin Ketone (5)	3.00E-04	b	3.00E-04	c	NA		NA	
Heptachlor epoxide	1.30E-05	c	1.30E-05	c	NA		NA	
Metals								
Aluminum	1.00E+00	a	NA		NA		NA	
Antimony	4.00E-04	b	4.00E-04	c	NA		NA	
Arsenic	3.00E-04	b	3.00E-04	c	NA		NA	
Barium	7.00E-02	b	7.00E-02	c	1.00E-04	c	1.00E-03	c
Cadmium (water)	5.00E-04	b	NA		NA		NA	
Cadmium (food)	1.00E-03	b	NA		NA		NA	
Chromium (VI)	5.00E-03	b	2.00E-02	c	NA		NA	
Lead	NA		NA		NA		NA	
Manganese	2.40E-02	b	NA		1.43E-05	b	NA	
Silver	5.00E-03	b	5.00E-03	c	NA		NA	
Vanadium	7.00E-03	c	7.00E-03	c	NA		NA	

a ECAO
b IRIS, 1996
c USEPA, 1995
d Massachusetts DEP, 1994
(1) The pyrene RfD was used as a surrogate for PAH RfDs
(2) The n-Nonane RfD was used as a surrogate for TPHs RfD
(3) The gamma-BHC RfD was used as a surrogate for the alpha-BHC RfD
(4) The DDT RID was used as a surrogate for the DDD and DDE RfDs
(5) The endrin RfD was used as a surrogate for the Endrin Ketone RfD

carcinogen classifications for the COPCs at the site are presented in Table 2-35. Derivation of the adjusted RfDs and CSFs is shown in Table 2-36.

There are no USEPA-verified acceptable doses (i.e., RfDs) for lead. Considerable controversy currently exists concerning the appropriate acceptable doses for lead. The best method for evaluating exposure to lead is through the measurement of lead in blood or blood lead levels. Lead was evaluated in this risk assessment based on acceptable blood lead levels for young children using the USEPA (1994a) IEUBK model (LEAD 0.99d).

USEPA Region IV has adopted an approach to TPH developed by the State of Massachusetts DEP (Massachusetts DEP, 1994). This approach uses the toxicity values of certain hydrocarbon compounds (e.g. n-hexane, n-nonane, eicosane) as surrogate toxicity values for fractions of TPH (Andrews and Snyder, 1991). The toxicity of hydrocarbons tends to decrease with increasing carbon chain length. n-Hexane has an RfD of 0.06, n-nonane an RfD of 0.6, and eicosane an RfD of 6.

After review and discussion with USEPA Region IV, n-nonane was used to calculate noncancer risks associated with exposure to Total Recoverable Petroleum Hydrocarbons (TRPHs) and tentatively identified compounds (TICs) shown to be petroleum related. The toxicity of hydrocarbons generally decreases as chain length increases (Andrews and Snyder, 1991). The light-end hydrocarbons (e.g., n-hexane) present in TPH tend to attenuate by weathering faster than heavier components, leaving the long-chain, less toxic components of TPH. Thus, use of n-nonane as a toxicity surrogate for the TPH represents a conservative (protective) approach.

2.7.5 Risk Characterization

This section of the risk assessment describes how calculated exposure doses are converted into health risks. This section characterizes risks as part of a quantitative risk assessment for the site. Risk characterization involves the integration of health effects information developed as part of the dose-response assessment with exposure estimates developed as part of the exposure assessment. The result is a quantitative estimate of chronic and noncarcinogenic risks based on the presumption that a threshold dose is required to elicit a response, as well as a quantitative estimate of carcinogenic risks presumed to exist regardless of the dose. These estimates are usually presented in either probabilistic terms (e.g., one-in-one-million), or with reference to specific benchmark or threshold levels. Because risk estimates are based on a combination of measurements and assumptions, it is important to

TABLE 2-35

CANCER SLOPE FACTORS, TUMOR SITES, AND USEPA CANCER CLASSIFICATIONS FOR CHEMICALS OF POTENTIAL CONCERN AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Constituent	CSF (mg/kg/day)-1 Oral		CSF (mg/kg/day)-1 Inhalation		Tumor Site Oral	Tumor Site Inhalation	USEPA Classification
VOCs							
Benzene	2.9E-02	b	2.9E-02	b	Leukemia	Leukemia	A
Bromodichloromethane	6.2E-02	b	NA		kidney	NA	B2
Chloroform	6.1E-03	b	8.1E-02	c	kidney	liver	B2
Dibromochloromethane	8.4E-02	b	NA		liver	NA	C
BNAs							
Benzo(a)anthracene [(1)]	7.3E-01	b	6.1E-01	a	stomach	respiratory tract	B2
Benzo(a)pyrene	7.3E+00	b	6.1E+00	a	stomach	respiratory tract	B2
Benzo(b)fluoranthene [(1)]	7.3E-01	b	6.1E-01	a	stomach	respiratory tract	B2
Didenzo(a,h)anthracene [(1)]	7.3E+00	b	6.1E+00	a	stomach	respiratory tract	B2
Pesticides							
Alpha-BHC	6.3E+00	b	6.3E+00	c	liver	liver	B2
Chlorodane Isomers	1.3E+00	b	1.3E+00	b	liver	liver	B2
DDD	3.4E-01	b	NA		liver	NA	B2
DDE	3.4E-01	b	NA		liver	NA	B2
Heptachlor epoxide	9.1E+00	b	9.1E+00	c	liver	liver	B2
Metals							
Arsenic	1.5E+00	b	1.5E+01	b	skin	respiratory tract	A
Cadmium	NAP		6.3E+00	b	NAP	respiratory tract	B1
Chromium (VI)	NAP		4.1E+01	b	NAP	lung	A
Lead	NA		NA		NA	NA	B2

mg/kg/day Milligrams pet kilogram per day.
NA Not available.
NAP Not applicable since it is considered carcinogenic via inhalation only.

a ECAO
b IRIS, 1996
c USEPA, 1995
(1) The CSF for benzo(a)pyrene was used as a surrogate value for this compound. A Toxicity Equivalency Factor (TEF)based on the relative potency of the chemical to benzo(a)pyrene is used to adjust the benzo(a)pyrene CSF for each carcinogenic PAH.

TABLE 2-36

ADJUSTED TOXICITY VALUES USED TO ASSESS DERMAL EXPOSURE AT OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Constituent	Oral Toxicity Values				Oral Absorption Efficiency	Source	Dermal Toxicity Values (Adjusted Oral)		
	RfDo	Source	CsFo	Source			RfDa	CSFa	
VOCs									
Benzene	3.0E-04	a	2.9E-02	b	0.80	d	2.4E-04	3.6E-02	
Bromodichloromethane	2.0E-02	b	6.2E-02	b	0.80	d	1.6E-02	7.8E-02	
Chloroform	1.0E-02	b	6.1E-03	b	0.80	d	8.0E-03	7.6E-03	
Dibromochloromethane	2.0E-02	b	8.4E-02	b	0.80	d	1.6E-02	1.1E-01	
BNAs									
Benzo(a)anthracene	3.0E-02	c	7.3E-01	b	0.50	d	1.5E-02	1.5E+00	1
Benzo(a)pyrene	3.0E-02	c	7.3E+00	b	0.50	d	1.5E-02	1.5E+01	1
Benzo(b)fluoranthene	3.0E-02	c	7.3E-01	b	0.50	d	1.5E-02	1.5E+00	1
Didenzo(a,h)anthracene	3.0E-02	c	7.3E+00	b	0.50	d	1.5E-02	1.5E+01	1
TPHs (as n-nonane	6.0E-01	k	NA		0.50	d	3.0E-01	NA	
Pesticides									
Alpha-BHC	3.0E-04	f	6.3E+00	b	0.50	d	1.5E-04	1.3E+01	
Chlorodane Isomers	6.0E-05	b	1.3E+00	b	0.50	d	3.0E-05	2.6E+00	
DDD	5.0E-04	g	2.4E-01	b	0.50	d	2.5E-04	4.8E-01	
DDE	5.0E-04	g	3.4E-01	b	0.50	d	NA	6.8E-01	
DDT	5.0E-04	b	3.4E-01	b	0.50	d	2.5E-04	6.8E-01	
Endrin Ketone	3.0E-04	h	NA		0.50	d	1.5E-04	NA	
Heptachlor epoxide	1.3E-05	j	9.1E+00	b	0.50	d	6.5E-06	1.8E+01	
Metals									
Aluminum	1.0E+00	b	NA		0.20	d	2.0E-01	NA	
Antimony	4.0E-04	b	NA		0.20	d	8.0E-05	NA	
Arsenic	3.0E-04	b	1.5E+00	b	0.95	i	2.9E-04	1..6E+00	
Barium	7.0E-02	b	NA		0.20	d	1.4E-02	NA	
Cadmium (water)	5.0E-04	b	NAP		0.20	d	1.0E-04	NA	
Cadmium (food)	1.0E-03	b	NAP		0.20	d	2.0E-04	NA	
Chromium (VI)	5.0E-03	b	NAP		0.20	d	1.0E-03	NA	
Lead	NA	b	NA		0.20	d	NA	NA	
Manganese	2.4E-02	b	NA		0.20	d	4.8E-03	NA	
Silver	5.0E-03	b	NA		0.20	d	1.0E-03	NA	
Vanadium	7.0E-03	b	NA		0.20	d	1.4E-03	NA	

CSFa Adjusted cancer slope factor (mg/kg/day) ^ - 1.
CSFo Oral cancer slope factor (mg/kg/day) ^ - 1.
NA Not available.
NAP Not applicable. Carcinogenic only by inhalation route.
RfDa Adjusted reference dose (mg/kg/day).
RfDo Oral reference dose (mg/kg/day).

a ECAO
b IRIS
c Pyrcne RfD used as surrogate for PAH RfDs.
d Default Value.
e N-Nonane RID used as surrogate for TPH RfD
f gamma-BHC RfD used as surrogate for alpha-BHC RfD
9 DDT RfD used as surrogate for DDD and DDE RfDs.
h Endrin RfD used as surrogate for Endrin Ketone RfD
i National Research Council (1982)
j USEPA (1995)
k Massachusetts DEP, 1994
1 PAH slope factors were not adjusted to assess dermal exposure since the portal of entry differs in the outcome of tumors from oral and dermal exposure (USEPA. 1989a).

provide information on sources of uncertainty in risk characterization. The key elements of risk characterization included in this section are: an estimation of human dose, an estimation of risk, a presentation of risk, and an uncertainty analysis.

2.7.5.1 Carcinogenic Risks. Public health risks are evaluated separately for carcinogenic and non-carcinogenic effects. The excess lifetime cancer risk is an estimate of the increased risk of cancer which results from lifetime exposure, at specified average daily dosages, to constituents detected in media at the site. Excess lifetime cancer risk, equal to the product of the exposure dose and the slope factor, is estimated for each known, probable, or possible carcinogenic constituent in each medium. The risk values provided in this report are an indication of the increased risk, above that applying to the general population, which may result from the exposure scenarios described in the Exposure Assessment Section 2.7.3. The risk estimate is considered to be an upperbound estimate; therefore, it is likely that the true risk is less than that predicted by the model. Current regulatory methodology assumes that excess lifetime cancer risks can be summed across routes of exposure and constituents to derive a "Total Site Risk" (USEPA, Risk Assessment Guidance for Superfund Sites, 1989a). The USEPA OSWER Directive 9355.0-30, Role of the Risk Assessment in Superfund Remedy Selection Decisions (1991e) has stated that sites with an excess lifetime cancer risk less than 10^{-4} (1 in 10,000) generally do not warrant remedial action. However, the state of Florida's target cancer risk is 10^{-6}.

The incremental risk is calculated for each exposure scenario based on the following basic equation:

Cancer Risk = Exposure Dose x Slope Factor

where the slope factor (SF) is in units of $(mg/kg/day)^{-1}$ based on a compound specific cancer bioassay dose response curve.

The exposure dose is adjusted over a 70-year lifetime. The summation of dose is in keeping with the concept that for genotoxic agents there exists no threshold dose and implies that total, lifetime exposure is of greater importance than the actual dose during the exposure event(s). Ingestion and inhalation risks are calculated separately since compounds often have different SFs for differing routes of exposure. The different SFs relate to the pharmacokinetics inherent in each chemical/organ and the specific routes of uptake.

Slope factors are derived by EPA in an intentionally conservative way, that is, the actual risk is not expected to exceed the predicted risk, and could be considerably lower. Cancer risks

calculated using these conservative slope factors and reasonable maximum exposure estimates are upper bound estimates of excess cancer risk potentially arising from exposure to the chemicals in question. A number of assumptions have been made in the derivation of these values, many of which are likely to overestimate exposure and toxicity. The actual incidence of excess cancers is likely to be lower than these estimates and may be zero.

Lifetime daily intakes, using an averaging time of up to 70 years, effectively prorates the total cumulative dose over a lifetime. This approach is based on the assumption for carcinogens that a high dose received over a short period of time at any age is equivalent to a corresponding low dose received over a lifetime (USEPA, 1989a). This assumption is unlikely to be true for all carcinogens, and introduces uncertainty into the assessment of potential risk. This assumption may also lead to an overestimate or underestimate of potential risk, depending upon the actual timing of exposure and the mechanism of action of individual carcinogens.

The magnitude of cancer risk relative to Superfund site remediation goals in the National Contingency Plan ranges from 10^{-4} (one-in-ten-thousand) to 10^{-6} (one-in-one-million) depending on the site, proposed usage, and chemicals of concern (USEPA, 1989a). Within this range, the level of risk which is considered to be acceptable at a specific site is a risk management decision and is decided on a case-specific basis. It is generally accepted that risks above this range require attention. The one-in-a-million level of risk (expressed as IE-06) is often referred to as the *de minimis* level of risk; risks calculated below this range would not require attention. The IE-06 risk level does not equate to an actual cancer incidence of one-in-a-million. For substances that may cause cancer, the risk assessment process uses animal data to predict the probability of humans developing cancer over a 70-year lifetime. The numbers are given as upper bounds; the real risk is expected to be less. The one-in-a-million risk level is a theoretical prediction that no more than one person out of a million lifetimes would contract cancer due to an environmental exposure. By the way of comparison, the average person in the U.S. incurs a background risk of cancer (from all causes) of about one chance in four (0.25). Adding a risk of 0.000001 to a background risk of 0.25 is of little significance to any single individual. These small risk levels may be of concern only if the exposed population includes many millions of people.

2.7.5.2 Chronic Health Risks. The HQ is the ratio of the estimated exposure dose to the RfD. This ratio is used to evaluate non-carcinogenic health effects due to exposure to a constituent. An HQ greater than I indicates that the estimated exposure dose for that constituent exceeds acceptable levels for protection against non-carcinogenic effects.

Although an HQ of less than 1 suggests that non-carcinogenic health effects should not occur, an HQ of slightly greater than 1 is not necessarily an indication that adverse effects will occur. The sum of the HQs is termed the hazard index (HI). Current regulatory methodology assumes that HIs can be summed across exposure routes for all media at the site to derive a "Total Site Risk." The USEPA OSWER Directive 9355.0-30, Role of Risk Assessment in Superfund Remedy Selection Decisions (1991e) has stated that sites with a non-carcinogenic HQ less than 1.0 generally do not warrant remedial action.

The USEPA has developed a set of health based benchmark numbers, called reference doses, or RfDs, as guideposts in a risk assessment. Reference doses are an adaptation of the earlier toxicological measure of "acceptable daily dose" or ADI The unit of a reference dose is mg contaminant/kg body weight/day. The potential for adverse effects on human health (other than cancer) is evaluated by comparing an intake over a specific time period with a reference dose derived for a similar exposure period.

The hazard index is the ratio (unitless) of the estimated exposure dose (D) of a compound to a reference dose (RfD) judged to be without adverse effects given long-term exposure. Thus, the index is used as a measure of potential noncarcinogenic health risks. Due to the margin of safety built into the RfD value, exceedence of the number has no immediate meaning with regard to specific health effects, the frequency of effects, or the magnitude of effects. However, exceedcnce of the number should serve as an indicator that the potential for unacceptable exposure does exist and further evaluation needs to be considered. The effects of noncarcinogens in the body vary greatly with regard to potential target organs, threshold dose, and "severity" of effect. Therefore, the individual toxicity for each compound needs to be assessed.

If the hazard index is less than 1.0, then no chronic health effects are expected to occur. If the hazard index is greater than 1.0, then adverse health risks are possible. In the case of noncarcinogenic effects, chronic exposure below a threshold dose results in a non-response or a diminished response.

2.7.5.3 Risks Associated With Exposure to Groundwater. Risks for a hypothetical future resident exposed to groundwater are shown in Table 2-37. The excess lifetime cancer risk and HI are 2E-02 and 90, respectively. The excess lifetime cancer risk level associated with hypothetical future resident conditions at the site is above the USEPA remediation-based risk benchmarks for carcinogens (10^{-4} to 10^{-6}) and above the state of Florida's criterion of IE06. The hazard index also exceeds the risk benchmark of one.

TABLE 2-37

GROUNDWATER INGESTION EXPOSURE DOSES AND RISK CALCULATIONS FOR A HYPOTHETICAL FUTURE ADULT RESIDENT AT OU-7, ENTOMOLOGY STORAGE AREA Homestead Air Reserve Base, Florida

Constituent	Cgw (mg/L)	GWExD (mg/kg-day)	Toxicity Values	Calculated Risk
CANCER EFFECTS			CSFo	
VOCs				
Bromodichloromethane	0.004	4.7E-05	6.2E-02	2.9E-06
Chloroform	0.009	1.1E-04	6.1E-03	6.4E-07
Dibromochloromethane	0.002	2.3E-05	8.4E-02	2.0E-06
Pesticides				
Alpha-BHC	0.00003	3.5-07	6.3E+00	2.2E-06
DDD	0.01	1.2E-04	2.4E-01	2.8E-05
Metals				
Arsenic	0.96	1.1E-02	1.50E+00	1.7E-02
Cadmium	0.0125	1.5E-04	NAP	NAP
Chromium	0.026	3.1E-04	NAP	NAP
Lead	0.024	2.8E-04	-	-
			-	-
			ELCR =	2E-02
NON-CANCER EFFECTS			RfDo	
VOCs				
Bromodichloromethane	0.004	1.1E-04	2.00E-02	5.5E-03
Chloroform	0.009	2.5E-04	1.00E-02	2.5E-02
Dibromochloromethane	0.002	5.5E-05	2.00E-02	2.7E-03
TPHs	0.882	2.4E-02	6.00E-01	4.0E-02
Pesticides	0.0003	8.2E-07	3.00E-04	2.7E-04
Alpha-BHC	0.01	2.7E-04	5.00E-04	5.5E-01
DDD				
Metals				
Aluminum	4.3	1.2E-01	1.00E+00	1.2E-01
Arsenic	0.96	2.6E-02	3.00E-04	8.8E+01
Cadmium	0.0125	3.4E-04	5.00E-04	6.8E-01
Chromium (VI)	0.026	7.1E-04	5.00E-03	1.4E-01
Lead	0.024	6.6E-04	-	-
Manganese	0.099	2.7E-03	2.40E-02	5.4E-01
			HI =	9E+01

-	Insufficient data; USEPA-verified toxicity value not available.
NAP	Cancer slope factor and/or reference dose applies to inhalation pathway only, not to ingestion.
Cgw	Constituent exposure point concentration in groundwater in milligrams per liter (mg/L) (see Table 4-2).
GWExD	Ground-water exposure dose in milligrams per kilogram per day (mg1kg/day).
CSFo	Cancer Slope Factor, Oral
RfDo	Reference Dose, Oral
ELCR	Excess lifetime cancer risk.
HI	Hazard index (sum of the hazard quotients).

In accordance with current USEPA Region IV guidance (USEPA, 1995d), the inhalation and dermal exposure to VOCs during showering are assumed to be equivalent to the ingestion dose. This is based on a growing body of evidence that risk estimates from ingestion of VOCs in potable water, inhalation of volatiles from showering, and dermal exposure to volatiles during showering or bathing are similar (Andelman, 1985; Andelman, et.al., 1986, 1987; McKone, 1987, and Jo, et.al., 1990). Given this assumption, risks via the inhalation and dermal routes for groundwater contact can be calculated using the oral dose (mg/kg/day-1) and multiplying by the inhalation slope factor for carcinogens and dividing by the RfCs for noncarcinogens. No inhalation RfCs were available for bromodichloromethane, chloroform, and dibromochloromethane, thus, oral RfDs are used for these compounds. Therefore, the total risk via groundwater contact including oral, dermal and inhalation exposures is 2E-02 for cancer risk and 90 for noncancer risk. Inorganics, including arsenic are not expected to volatilize from the water droplet, thus, the primary exposure routes via groundwater use would be ingestion and to a small degree dermal. The dermal dose is expected to be two to three orders of magnitude less than oral dose.

The primary contributor to the carcinogenic risk estimate is arsenic. This compound was detected in five of five samples at a range of concentrations of 25 µg/l to 960 µg/L. Only two of the samples contained concentrations of arsenic below the state and federal drinking water standard of 50 µg/l. The arsenic risk level is based on unfiltered samples; therefore, this level probably overestimates concentrations in a hypothetical potable well. Finally, as stated in the exposure section, future potable use of the groundwater at the site is unlikely because of the high level of dissolved solids associated with the salt-water intrusion.

The pesticide DDD has a cancer risk estimate of 3E-05. DDD was detected in three out of five groundwater samples. Compounds with cancer risk estimates greater than IE-06 include bromodichloromethane, dibromochloromethane, and alpha-BHC. These compounds were detected in one out of five groundwater samples. As stated in the exposure section, future potable use of the groundwater at the site is unlikely because of the high level of dissolved solids associated with the salt-water intrusion.

2.7.5.4 Risks Associated With Exposure to Soils. Base Worker. Risks for a potential current base worker who regularly accesses OU-7 are calculated in Table 2-38. The excess lifetime cancer risk and HI are 2E-6 and 0.02, respectively. These risk levels are below the USEPA remediation-based risk benchmarks and slightly above the state of Florida's target risk of 1E-06.

TABLE 2-38

SOIL EXPOSURE DOSES AND RISK CALCULATIONS FOR A POTENTIAL CURRENT BASE WORKER AT OU-7, ENTOMOLOGY STORAGE AREA Homestead Air Reserve Base, Florida

Constituent	Cs (mg/kg)	SExDo (mg/kg-day)	SExDd (mg/kg-day)	SExDi	Toxicity Values			Calculated Risk/HI
CANCER EFFECTS					CSFo	CSFd	CSFi	
VOCs								
Benzene	0.024	8.7E-10	5.5E-10	3.8E-08	2.9E-02	3.6E-02	2.9E-02	1.1E-09
BNAs								
Benzo(a)anthracene	1.4	5.1E-08	3.2E-08	1.1E-12	7.3E-01	7.3E-01	6.1E-01	6.1E-08
Benzo(a)pyrene	0.97	3.5E-08	2.2E-08	7.4E-13	7.3E+00	7.3E+00	6.1E+00	4.2E-07
Benzo(b)fluoranthene	1.362	4.9E-08	3.1E-08	1.0E-12	7.3E-01	7.3E-01	6.1E-01	5.9E-08
Didenzo(a,h)anthracene	0.28	1.0E-08	6.4E-09	2.1E-13	7.3E+00	7.3E+00	6.1E+00	1.2E-07
Pesticides/PCBs								
Chlorodane Isomers	1.143	4.2E-08	2.6E-08	8.7E-13	1.3+00	2.6E+00	1.3E+00	1.2E-07
DDE	0.762	2.8E-08	1.8E-08	5.8E-13	3.4E-01	6.8E-01	3.4E-01	2.1E-08
DDT	1.541	5.6E-08	3.5E-08	1.2E-12	3.4E-01	6.8E-01	3.4E-01	4.3E-08
Heptachlor Epoxide	0.0077	2.8E-10	1.8E-10	5.9E-15	9.1E+00	1.8E+01	9.1E+00	5.8E-09
Metals								
Arsenic	18	6.5E-07	4.1E-08	1.4E-11	1.5E+00	1.6E+00	1.5E+01	1.0E-06
Chromium(VI)	26.7	9.7E-07	6.1E-08	2.0E-11	NAP	NAP	14.1E+01	8.4E-10
						ELCR		2E-06
NON-CANCER EFFECTS					RfDo	RfDd	RfDi	
VOCs								
Benzene	0.024	2.4E-09	1.5E-09	1.1E-07	3.0E-04	2.4E-04	1.7E-03	7.7E-05
BNAs								
Benzo(a)anthracene	1.4	1.4E-07	9.0E-08	3.0E-12	3.0E-02	1.5E-02	3.0E-02	1.1E-05
Benzo(a)pyrene	0.97	9.9E-08	6.2E-08	2.1E-12	3.0E-02	1.5E-02	3.0E-02	7.4E-06
Benzo(b)fluoranthene	1.362	1.4E-07	8.8E-08	2.9E-12	3.0E-02	1.5E-02	3.0E-02	1.0E-05
Didenzo(a,h)anthracene	0.28	2.8E-08	1.8E-08	6.0E-12	3.0E-02	1.5E-02	3.0E-02	2.2E-06
Pesticides/PCBs								
Chlorodane Isomers	1.143	1.2E-07	7.4E-08	2.4E-12	6.0E-05	3.0E-05	6.0E-05	4.4E-03
DDE	0.762	7.8E-08	4.9E-08	1.6E-12	5.0E-04	2.5E-04	5.0E-04	3.5E-04
DDT	1.542	1.6E-07	9.9E-08	3.3E-12	5.0E-04	2.5E-04	5.0E-04	7.1E-04
Endrin Ketone	0.0561	5.7E-09	3.6E-09	1.2E-13	3.0E-04	1.5E-04	3.0E-04	4.3E-05
Heptachlor epoxide	0.0077	7.8E-10	5.0E-10	1.6E-14	1.3E-05	6.5E-06	1.3E-05	1.4E-04
Metals								
Aluminum	7,501	7.6E-04	4.8E-05	1.6E-08	1.0E+00	2.0E-01	1.0E+00	1.0E-03
Arsenic	18	1.8E-06	1.2E-07	3.8E-11	30E-04	2.9E-04	3.0E-04	6.5E-03
Barium	65	6.6E-06	4.2E-07	1.4E-10	7.0E-02	1.4E-02	1.0E-04	1.3E-04
Chromium(VI)	26.7	2.7E-06	1.7E-07	5.7E-11	5.0E-03	1.0E-03	5.0E-03	7.2E-04
Manganese	91	9.3E-06	5.9E-07	1.9E-10	2.4E-02	4.8E-03	1.4E-05	5.2E-04
Silver	10.4	1.1E-06	6.7E-08	2.2E-11	5.0E-03	1.0E-03	5.0E-03	2.8E-04
Vanadium	11.8	1.2E-06	7.6E-08	2.5E-11	7.0E-03	1.4E-03	7.0E-03	2.3E-04
						HI		2E-02

ELCR	Excess lifetime cancer risk.	CSFo	Cancer Slope Factor, Oral
Hl	Hazard index (sum of the hazard quotients)	CSFd	Cancer Slope Factor. Dermal
Cs	Concentration of chemical in soil (mg/kg)	CSFi	Cancer Slope Factor, Inhalation
SExDo	Soil exposure dose, oral route	RfDo	Reference Dose, Oral
SExDd	Soil exposure dose, dermal route	RfDd	Reference Dose.,Dermal
SExDi	Soil exposure dose, inhalation route	RfDi	Reference Dose, Inhalation
NAP	Not applicable., carcinogenic via inhalation pathway only		

Hypothetical Future Residents. The risks for hypothetical future residents exposed to onsite soils are calculated in Tables 2-39 (adult, 24-year exposure period) and 2-40 (young child, 6-year exposure period). For an adult, the estimated excess lifetime cancer risk and HI are 2E-05 and 0.2, respectively. The excess lifetime cancer risk and HI for the child are 5E-05 and 2, respectively. The adult cancer risk estimates and the adult hazard index are below the USEPA remediation-based risk benchmark, and above the state of Florida target risk of 1E-06. The child cancer risk does not exceed the USEPA one in ten thousand upperbound but does exceed the state of Florida target risk of 1E-06. The hazard index for the child is above the benchmark of 1.0. The principal contributors to the excess cancer risk level are arsenic, PAHs, and chlordane. The principal contributors to the hazard index are arsenic and chlordane.

Arsenic was detected in 30 of 31 surface soil samples in concentrations ranging from 0.49 to 44.5 mg/kg. Although this exceeds the site-specific background concentration of 1.6 mg/kg, this range of concentrations is comparable to reported literature values for typically uncontaminated soils and the common range for eastern soils in the U.S. (GRI, 1987, Shacklette and Boerngen, 1984). PAHs were detected in 3 to 6 of the 15 samples collected in surface soils. The sum of the maximum PAH concentrations detected is 4.5 ppm. This concentration is within the range of concentrations reported for urban soils of 0.06 to 5.8 ppm (Menzie, et. aL, 1992). Chlordane was detected in 15 of 25 samples in concentrations ranging from 0.07 to 3.5 ppm. The individual excess cancer risk attributable to chlordane is at the benchmark of 1E-6 for the adult resident and at 2E-6 for the child. However, the maximum concentration detected is well above levels detected in areas unaffected by industrial activities (U.S. National Soils Monitoring Program, 1970-72). But the detection of this compound is not unusual, as this site is a former pesticide storage area and chlordane is still used in the -control of underground termites. The hazard index for the child resident exceeds the benchmark of one due to the sum of compounds detected. No individual noncancer risk estimate is greater than one.

Hypothetical Future Construction Worker. Risks for future construction workers who would access OU-7 are calculated in Table 2-41. The risks are estimated for construction worker exposure to surface and subsurface soils via inhalation and ingestion routes of exposure. The excess lifetime cancer risk and HI for ingestion and inhalation of surface soil are 3E-6 and 0.5, respectively. The excess lifetime cancer risk and HI for ingestion and inhalation of subsurface soils are 3E-6 and 0.6, respectively. The cancer risk estimate is slightly above the state of Florida target cancer risk, but below the USEPA remediation-

TABLE 2-39

SOIL EXPOSURE DOSES AND RISK CALCULATIONS FOR A HYPOTHETICAL CURRENT BASE WORKER AT OU-7, ENTOMOLOGY STORAGE AREA Homestead Air Reserve Base, Florida

Constituent	Cs (mg/kg)	SExDo (mg/kg-day)	SExDd (mg/kg-day)	SExDi	Toxicity Values			Calculated Risk/HI
CANCER EFFECTS					CSFO	CSF	CFI	
V.C.								
Benzene	0.024	1.1E-08	3.6E-09	9.9E-07	2.9E-02	3.6E-02	2.9E-02	1.1E-09
BNAs								
Benzo(a)anthracene	1.4	6.6E-07	2.1E-07	2.7E-11	7.3E-01	7.3E-01	6.1E-01	6.3E-07
Benzo(a)pyrene	0.97	4.6E-07	1.4E-07	1.9E-11	7.3E+00	7.3E+00	6.1E+00	4.4E-06
Benzo(b)fluoranthene	1.362	6.4E-07	2.0E-07	2.7E-11	7.3E-01	7.3E-01	6.1E-01	6.1E-07
Didenzo(a,h)anthracene	0.28	1.3E-07	4.2E-08	5.5E-12	7.3E+00	7.3E+00	6.1E+00	1.3E-06
Pesticides/PCBs								
Chlorodane Isomers	1.143	5.4E-07	1.7E-07	2.2E-11	1.3+00	2.6E+00	1.3E+00	1.1E-06
DDE	0.762	3.6E-07	1.1E-07	1.5E-11	3.4E-01	6.8E-01	3.4E-01	2.0E-07
DDT	1.541	7.2E-07	2.3E-07	3.0E-11	3.4E-01	6.8E-01	3.4E-01	4.0E-07
Heptachlor Epoxide	0.0077	3.6E-09	1.1E-09	1.5E-13	9.1E+00	1.8E+01	9.1E+00	5.4E-08
Metals								
Arsenic	18	8.5E-06	2.7E-07	3.5E-10	1.5E+00	1.6E+00	1.5E+01	1.3E-05
Chromium(VI)	26.7	1.3E-05	4.0E-07	5.2E-10	NAP	NAP	4.1E+01	2.2E-08
						ELCR		2E-05
NON-CANCER EFFECTS					RfDo	RfDd	RfDi	
VOC.								
Benzene	0.024	3.3E-08	1.0E-08	2.9E-06	3.0E-04	2.4E-04	1.7E-03	1.8E-03
BNAs								
Benzo(a)anthracene	1.4	1.9E-06	6.1E-07	8.0E-11	3.0E-02	1.5E-02	3.0E-02	1.0E-04
Benzo(a)pyrene	0.97	1.3E-06	4.2E-07	5.6E-11	3.0E-02	1.5E-02	3.0E-02	7.2E-05
Benzo(b)fluoranthene	1.362	1.9E-06	5.9E-07	7.8E-11	3.0E-02	1.5E-02	3.0E-02	1.0E-04
Didenzo(a,h)anthracene	0.28	3.8E-07	1.2E-07	1.6E-11	3.0E-02	1.5E-02	3.0E-02	2.1E-05
Pesticides/PCBs								
Chlorodane Isomers	1.143	1.6E-06	4.9E-07	6.5E-11	6.0E-05	3.0E-05	6.0E-05	4.3E-02
DDE	0.762	1.0E-06	3.3E-07	4.4E-11	5.0E-04	2.5E-04	5.0E-04	3.4E-03
DDT	1.541	2.1E-06	6.7E-07	8.8E-11	5.0E-04	2.5E-04	5.0E-04	6.9E-03
Endrin Ketone	0.0561	7.7E-08	2.4E-08	3.2E-12	3.0E-04	1.5E-04	3.0E-04	4.2E-04
Heptachlor epoxide	0.0077	1.1E-08	3.3E-09	4.4E-13	1.3E-05	6.5E-06	1.3E-05	1.3E-03
Metals								
Aluminum	7,501	1.0E-02	3.2E-04	4.3E-07	1.0E+00	2.0E-01	1.0E+00	1.2E-02
Arsenic	18	2.5E-05	7.8E-07	1.0E-09	3.0E-04	2.9E-04	3.0E-04	8.5E-02
Barium	65	8.9E-05	2.8E-06	3.7E-09	7.0E-02	1.4E-02	1.0E-04	1.5E-03
Chromium(VI)	26.7	3.7E-05	1.2E-06	1.5E-09	5.0E-03	1.0E-03	5.0E-03	8.5E-03
Manganese	91	1.2E-04	3.9E-06	5.2E-09	2.4E-02	4.8E-03	1.4E-05	6.4E-03
Silver	10.4	1.4E-05	4.5E-07	6.0E-10	5.0E-03	1.0E-03	5.0E-03	3.3E-03
Vanadium	11.8	1.6E-05	5.1E-07	6.8E-10	7.0E-03	1.4E-03	7.0E-03	2.7E-03
						HI		2E-01

ELCR	Excess lifetime cancer risk.	CFO	Cancer Slope Factor, Oral
HI	Hazard index (sum of the hazard quotients)	CSF	Cancer Slope Factor, Dermal
Cs	Concentration of chemical in soil (mg/kg)	CFI	Cancer Slope Factor, Inhalation
SExDo	Soil exposure dose, oral route	RfDo	Reference Dose, Oral
SExDd	Soil exposure dose, dermal route	RfDd	Reference Dose.,Dermal
SExDi	Soil exposure dose, inhalation route	RfDi	Reference Dose, Inhalation
NAP	Not applicable., carcinogenic via inhalation pathway only		

TABLE-240

SOIL EXPOSURE DOSES AND RISK CALCULATIONS FOR A HYPOTHETICAL FUTURE CHILD RESIDENT AT OU-7, ENTOMOLOGY STORAGE AREA Homestead Air Reserve Base, Florida

Constituent	CS (mg/kg)	SExDo (mg/kg-day)	SExDd (mg/kg-day)	SExDi (mg/kg-day)	Toxicity values			Calculated Risk/HI
CANCER EFFECTS					CSFo	CSFd	CSFi	
VOCs								
Benzene	0.024	2.6E-08	4.8E-09	2.3E-06	2.9E-02	3.6E-02	2.9E-02	6.8E-08
BNAs								
Benzo(a)anthracene	1.4	1.5E-06	2.8E-07	3.2E-11	7.3E-01	7.3E-01	6.1E-01	1.3E-06
Benzo(b)pyrene	0.97	1.1E-06	1.9E-07	2.2E-11	7.3E+00	7.3E+00	6.1E+00	9.2E-06
Benzo(b)fluoranthene	1.362	1.5E-06	2.7E-07	3.1E-11	7.3E-01	7.3E-01	6.1E-01	1.3E-06
Dibenzo(a,h)anthracene	0.28	3.1E-07	5.6E-08	6.4E-12	7.3E+00	7.3E+00	6.1E+00	2.6E-06
Pesticides/PCBs								
Chlordane Isomers	1.143	1.3E-06	2.3E-07	2.6E-11	1.3E+00	2.6E+00	1.3E+00	2.2E-06
DDE	0.762	8.4E-07	1.5E-07	1.7E-11	3.4E-01	6.8E-01	3.4E-01	3.9E-07
DDT	1.541	1.7E-06	3.1E-07	3.5E-11	3.4E-01	6.8E-01	3.4E-01	7.8E-07
Heptachlor Epoxide	0.0077	8.4E-09	1.5E-09	1.8E-13	9.1E+00	1.8E+01	9.1E+00	1.0E-07
Metals								
Arsenic	18	2.0E-05	3.6E-07	4.1E-10	1.5E+00	1.6E+00	1.5E+01	3.0E-05
Chromium (VI)	26.7	2.9E-05	5.3E-07	6.1E-10	NAP	NAP	4.1E+01	2.5E-08
						ELCR		5E-05
NON-CANCER EFFECTS					RfDo	RfDd	RfDi	
VOCs								
Benzene	0.024	3.1E-07	5.6E-08	2.7E-05	3.0E-04	2.4E-04	1.7E-03	1.7E-02
BNAs								
Benzo(a)anthracene	1.4	1.8E-05	3.3E-06	3.7E-10	3.0E-02	1.5E-02	3.0E-02	8.1E-04
Benzo(b)pyrene	0.97	1.2E-05	2.3E-06	2.6E-10	3.0E-02	1.5E-02	3.0E-02	5.6E-04
Benzo(b)fluoranthene	1.362	1.7E-05	3.2E-06	3.6E-10	3.0E-02	1.5E-02	3.0E-02	7.9E-04
Dibenzo(a,h)anthracene	0.28	3.6E-06	6.5E-07	7.5E-11	3.0E-02	1.5E-02	3.0E-02	1.6E-04
Pesticides/PCBs								
Chlordane Isomers	1.143	1.5E-05	2.7E-06	3.1E-10	6.0E-05	3.0E-05	6.0E-05	3.3E-01
p,p'-DDE	0.762	9.7E-06	1.8E-06	2.0E-10	5.0E-04	2.5E-04	5.0E-04	2.7E-02
p,p'-DDT	1.541	2.0E-05	3.6E-06	4.1E-10	5.0E-04	2.5E-04	5.0E-04	5.4E-02
Endrin Ketone	0.0561	7.2E-07	1.3E-07	1.5E-11	3.0E-04	1.5E-04	3.0E-04	3.3E-03
Heptachlor Epoxide	0.0077	9.8E-08	1.8E-08	2.1E-12	1.3E-05	6.5E-06	1.3E-05	1.0E-02
Metals								
Aluminum	7,501	9.6E-02	1.8E-03	2.0E-06	1.0E+00	2.0E-01	1.0E+00	1.0E-01
Arsenic	18	2.3E-04	4.2E-06	4.8E-09	3.0E--04	2.9E-04	3.0E-04	7.8E-01
Barium	65	8.3E-04	1.5E-05	1.7E-08	7.0E-02	1.4E-02	1.0E-04	1.3E-02
Chromium (VI)	26.7	3.4E-04	6.2E-06	7.1E-09	5.0E-03	1.0E-03	5.0E-03	7.5E-02
Manganese	91	1.2E-03	2.1E-05	2.4E-08	2.4E-02	4.8E-03	1.4E-05	5.5E-02
Silver	10.4	1.3E-04	2.4E-06	2.8E-09	5.0E-03	1.0E-03	5.0E-03	2.9E-02
Vanadium	11.8	1.5E-04	2.8E-06	3.2E-09	7.0E-03	1.4E-03	7.0E-03	2.4E-02
						HI		2E+00

ELCR	Excess lifetime cancer risk.	CSFo	Cancer Slope factor, Oral
HI	Hazard index (sum of the hazard quotients)	CSFd	Cancer Slope Factor, Dermal
Cs	Concentration of chemical in soil (mg/kg)	CSFi	Cancer Slope Factor, Inhalation
SExDo	Soil exposure dose, oral route	RfDo	Reference Dose, Oral
SExDd	Soil exposure dose, dermal route	RfDd	Reference Dose, Dermal
SExDi	Soil exposure dose, inhalation route	RfDi	Reference Dose, Inhalation
NAP	Not applicable, carcinogenic via inhalation pathway only.		

TABLE 2-41

SOIL EXPOSURES DOSES AND RISK CALCULATIONS
FOR A HYPOTHETICAL FUTURE CONSTRUCTION WORKER AT
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

	Cs		Surface Soil		Toxicity Values		Surface Soil Calculated Risk/HI	Subsurface Soil		Subsurface Soil Calculated Risk/HI
Constituent	**Surface (mg/kg)**	**Subsurface (mg/kg)**	**SExDo (mg/kg-day)**	**SExDi (mg/kg-day)**				**SExDo (mg/kg-day)**	**SExDi (mg/kg-day)**	
CANCER EFFECTS					CSFo	CSFi				
VOCs										
Benzene	0.024	Not a COPC	1.6E-09	2.1E-07	2.9E-02	2.9E-02	6.0E-09	NC	NC	NC
BNAs										
Benzo(a)anthracene	1.4	Not a COPC	9.4E-08	8.2E-13	7.3E-01	6.1E-01	6.9E-08	NC	NC	NC
Benzo(b)pyrene	0.97	1	6.5E-08	5.7-13	7.3E+00	6.1E+00	4.8E-07	6.7E-08	5.9E-13	4.9E-07
Benzo(b)fluoranthene	1.362	Not a COPC	9.1E-08	8.0E-13	7.3E-01	6.1E-01	6.7E-08	NC	NC	NC
Dibenzo(a,h)anthracene	0.28	Not a COPC	1.9E-08	1.6-13	7.3E+00	6.1E+00	1.4E-07	NC	NC	NC
Pesticides/PCBs										
Chlordane Isomers	1.143	0.55	7.7E-08	6.7E-13	1.30E+00	1.30E+00	10E-07	3.7E-08	3.2E-13	4.8E-08
p.p'-DDE	0.762	Not a COPC	5.1E-08	4.5-13	3.4E-01	3.4E-01	1.7E-08	NC	NC	NC
p,p'-DDT	1.541	Not a COPC	1.0E-07	9.0E-13	3.4E-01	3.4E-01	3.5E-08	NC	NC	NC
Heptachlor Epoxide	0.0077	Not a COPC	5.2E-10	4.5E-15	9.1E+00	9.1E+00	4.7E-09	NC	NC	NC
Metals										
Arsenic	18	20.7	1.2E-06	1.1E-11	1.5E+00	1.5E+01	1.8E-06	1.4E-06	1.2E-11	2.1E-06
Chromium (VI)	26.7	13.6	1.8E-06	1.6E-11	NAP	4.1E+01	6.4E-10	9.1E-07	8.0E-12	3.3E-10
						ELCR	3E-06		ELCR	3E-06

ELCR	Excess lifetime cancer risk.	CSFo	Cancer Slope Factor, Oral
HI	Hazard index (sum of the hazard quotients)	CSFd	Cancer Slope Factor, Dermal
Cs	Concentration of chemical in soil (mg/kg)	CSFi	Cancer Slope Factor, Inhalation
SExDo	Soil exposure dose, oral route	RfDo	Reference Dose, Oral
SExDd	Soil exposure dose, dermal route	RfDd	Reference Dose, Dermal
SExDi	Soil exposure dose, inhalation route		
NAP	Not applicable, carcinogenic via inhalation pathway only	RfDi	Reference Dose, Inhalation
NC	Not calculated, not a COPC		

TABLE 2-41

SOIL EXPOSURE DOSES AND RISK CALCULATIONS
FOR A HYPOTHETICAL FUTURE CONSTRUCTION WORKER AT
OU-7, ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

	Cs		Surface Soil		Toxicity Values		Surface Soil Calculated Risk/HI	Subsurface Soil		Subsurface Soil Calculated Risk/HI
Constituent	**Surface (mg/kg)**	**Subsurface (mg/kg)**	**SExDo (mg/kg-day)**	**SExDi (mg/kg-day)**				**SExDo (mg/kg-day)**	**SExDi (mg/kg-day)**	
NON CANCER EFFECTS					RfDo	RfDi				
VOCs										
Benzene	0.024	Not a COPC	1.1E-07	1.4E-05	3.0E-04	1.7E-03	8.8E-03	NC	NC	NC
BNAs										
Benzo(a)anthracene	1.4	Not a COPC	6.6E-06	5.8E-11	3.0E-01	3.0E-01	2.2E-05	NC	NC	NC
Benzo(b)pyrene	0.97	1.0	4.6E-06	4.0E-11	3.0E-01	3.0E-01	1.5E-05	4.7E-06	4.1E-11	1.6E-05
Benzo(b)fluoranthene	1.362	Not a COPC	6.4E-06	5.6E-11	3.0E-01	3.0E-01	2.1E-05	NC	NC	NC
Dibenzo(a,h)anthracene	0.28	Not a COPC	1.3E-06	1.2E-11	3.0E-01	3.0E-01	4.4E-06	NC	NC	NC
Pesticides/PCBs										
Chlordane Isomers	1.143	0.55	5.4E-06	4.7E-11	6.0E-05	6.0E-05	8.9E-02	2.6E-06	2.3E-11	4.3E-02
p.p'-DDE	0.762	Not a COPC	3.6E-06	3.1E-11	5.0E-04	5.0E-04	7.2E-03	NC	NC	NC
p,p'-DDT	1.541	Not a COPC	7.2E-06	6.3E-11	5.0E-04	5.0E-04	1.4E-02	NC	NC	NC
Endrin Ketone	0.0561	Not a COPC	2.6E-07	2.3E-12	3.0E-04	3.0E-04	8.8E-04	NC	NC	NC
Heptachlor Epoxide	0.0077	Not a COPC	3.6E-08	3.2E-13	1.3E-05	1.3E-05	2.8E-03	NC	NC	NC
Metals										
Aluminum	7.501	3.328	3.5E-02	3.1E-07	1.0E+00	1.0E+00	3.5E-02	1.6E-02	1.4E-07	1.6E-02
Antimony	Not a COPC	14.6	NC	NC	4.0E-04	4.0E-04	NC	6.9E-05	6.0E-10	1.7E-01
Arsenic	18	20.7	8.5E-05	7.4E-10	3.0E-04	3.0E-04	2.8E-01	9.7E-05	8.5E-10	3.2E-01
Barium	65	Not a COPC	3.1E-04	2.7E-09	7.0E-02	1.0E-03	4.4E-03	NC	NC	NC
Chromium (VI)	26.7	13.6	1.3E-04	1.1E-09	2.0E-02	2.0E-02	6.3E-03	6.4E-05	5.6E-10	3.2E-03
Manganese	91	57	4.3E-04	3.7E-09	2.4E-02	1.4E-05	1.8E-02	2.7E-04	2.3E-09	1.1E-02
Silver	10.4	5.6	4.9E-10	4.3E-10	5.0E-03	5.0E-03	9.8E-03	2.6E-05	2.3E-10	5.3E-03
Vanadium	11.8	11	5.5E-05	4.8E-10	7.0E-03	7.0E-03	7.9E-03	5.2E-05	4.5E-10	7.4E-03
						HI	5E-01		HI	6E-01

ELCR	Excess lifetime cancer risk.	CSFo	Cancer Slope Factor, Oral
HI	Hazard index (sum of the hazard quotients)	CSFd	Cancer Slope Factor, Dermal
Cs	Concentration of chemical in soil (mg/kg)	CSFi	Cancer Slope Factor, Inhalation
SExDo	Soil exposure dose, oral route	RfDo	Reference Dose, Oral
SExDd	Soil exposure dose, dermal route	RfDd	Reference Dose, Dermal
SExDi	Soil exposure dose, inhalation route	RfDi	Reference Dose, Inhalation
NAP	Not applicable, carcinogenic via inhalation pathway only		
NC	Not calculated, not a COPC		

based risk benchmarks for the cancer and noncancer risk estimates for surface and subsurface soil. Arsenic is the primary contributor to risks greater than 1E-6. However, as discussed above, the arsenic concentrations are comparable to reported literature values, but greater than site-specific background concentrations.

The dermal exposure of the base worker to PAHs is approximately half that by the oral route, and the dermal exposure of the base worker to metals is an order of magnitude lower than the oral exposure. Given that the construction worker is assumed to have a much greater oral uptake of soil than the base worker (480 mg/day compared to 50 mg/day), and the dermal exposure of the base and construction worker would be expected to be similar because Air Reserve Base and OSHA regulations require construction workers to wear shirts and long pants; the dermal route of exposure is considered negligible compared to other routes for the construction worker.

2.7.5.5 Lead. The USEPA has identified a 10 to 15 µg/dL blood lead level as a range of potential concern for health effects in children (Federal Register, 1988b). The results from the IEUBK model using soil and groundwater data are listed in Table 2-42. The model predicted that 99% of children exposed to lead at concentrations at OU-7 would have blood lead concentration below the 10 µg/dL acceptable blood lead level. For this site, the model assumes the child is exposed to a concentration of 25 mg/kg of lead (represents the 95 % UCL) in surface soil and 24 µg/l of lead (represents the maximum concentration) in groundwater. The model used USEPA default exposure assumptions and used the EPCs calculated from the site data, conservatively assuming a lognormal distribution.

Although the maximum concentration of lead detected in unfiltered groundwater samples (24µg/1) is greater than the federal treatment technique level in drinking water (15 µg/1), this concentration is not anticipated to be the delivered concentration in drinking water, as water treatment prior to use would be expected to remove the metal in particulate form from water. Lead was detected in one of five groundwater samples. At present, the shallow groundwater is not used as a drinking water supply. Further, the use of the shallow groundwater in the future as a potable supply is highly improbable. Saltwater intrusion under the base has caused the replacement of on-base supply wells with off-base supply wells. So it is likely that saltwater intrusion would preclude the use of groundwater at OU-7 for drinking water.

In addition, the low lead concentrations in surface soil (maximum value of 43.4 mg/kg) and subsurface soil (maximum value of 114 mg/kg) are not expected to present a significant contribution to blood lead levels in the base worker or construction worker (USEPA, 1994a).

TABLE 2-42

MODELED BLOOD LEAD LEVELS IN
HYPOTHETICAL CHILDREN (AGED 0 TO 6),
OU-7 ENTOMOLOGY STORAGE AREA
Homestead Air Reserve Base, Florida

Study Site Below	Medium	Concentration[a]	Blood Lead Level[b]		
			Geometric Mean	Percent Below	Percent
			µg/dL	10µg/dL	15µg/dL
SS-7/OU-7	Soil Air[c] Groundwater	25.0 mg/kg negligible 24µg/L	3.4	99	100

a Lesser of 95 percent UCL on the mean or maximum detected concentration.
b Calculated using the USEPA model (version 0.99d) (USEPA, 1994a).
c Air concentration = SPM x Cs x UC1 x UC2.
where:
Cs Soil concentration (mg/kg).
dL Deciliter.
Kg Kilogram.
m3 Cubic meter.
mg Milligram.
µg Microgram.
SPM Suspended particulate matter (0.075 mg/m^3) (Federal Register, 1988a).
UCI Unit conversion 1 (10^{-6} kg/mg).
UC2 Unit conversion 2 (10^3 µg/mg).

In both cases the potential routes of exposure to site soils (dermal, ingestion, and inhalation), combined with the limited exposure duration for these receptors compared to the child receptor, minimize the expected dose received from the soil. Further, the IUEBK model assumes that the child is the most sensitive potential receptor. Based on this premise, if child blood lead levels do not exceed risk-based benchmarks given the conditions at the site, then adult blood lead levels would also not be expected to exceed the risk-based benchmarks.

The levels of lead in the soil at OU-7 are not unusual. Soil surveys have found soils within 25 meters of roadway to have from 30 to 2,000 mg/kg lead above background soil concentrations.

In summary, the lead concentrations in soils and groundwater are not expected to be of concern for the hypothetical future child resident, the current base worker, nor the future construction worker at OU-7.

2.7.5.6 Total Site Risk. A summary of the total site risk estimates for OU-7 is presented in this section. Table 2-43 includes the hazard indices and cancer estimates for all scenarios. Potential current total site risk is equivalent to the risk estimates calculated for a potential current on-site worker exposed to surficial soil at the site. This scenario is evaluated in Table 2-38 with an excess lifetime cancer risk of 2E-6 and an HI of 0.02.

The total hypothetical future site risk for residential use was estimated by assuming that a future child resident could live on the site (6-year period), grow up, and continue to live there as an adult (24-year period), for a total residency period of 30 years. This total site risk is obtained by summing all of the residential exposures considered in the risk assessment: groundwater ingestion by an adult resident, and soil exposure by child (6-year period) and adult (24-year period) residents. These scenarios are evaluated in Tables 2-37, 2-39, and 2-40. The combined risk across on-site pathways (groundwater and soils) for a hypothetical future resident results in a total site excess lifetime cancer risk of 2E-02 and an HI of 92.

For the hypothetical future construction worker, the total future site risk would be based on exposure to a combination of surface and subsurface soils. Exposure point concentrations were not calculated for combined surface and subsurface soil. In practice, the total site risk to the hypothetical future construction worker would lie between the risk calculated for the surface soil and the subsurface soil, i.e., between 2.6E-06 and 2.7E-06, and hazard index between 0.5 and 0.6.

TABLE 2-43

SUMMARY TABLE OF HAZARD INDICES AND CANCER RISKS FOR ALL SCENARIOS OU-7, ENTOMOLOGY STORAGE AREA Homestead Air Reserve Base, Florida

Scenario	Cancer Effects	Hazard Index
Groundwater Exposure for Future Adult Resident (Table 5-1, Section 5.1)	2E-02	90
Soil Exposure for Current Worker (Table 5-2, Section 5.2)	2E-06	0.02
Soil Exposure for Future Adult Resident (Table 5-3, Section 5.2)	2E-05	0.2
Soil Exposure for Future Child Resident (Table 5-4, Section 5.2)	5E-05	2
Surface Soil Exposure for Future Construction Worker (Table 5-5, Section 5.2)	3E-06	0.5
Subsurface Soil Exposure for Future Construction Worker (Table 5-5, Section 5.2)	3E-06	0.6
Total Risk to Future Resident (Child and Adult) (Tables 5-1, 5-3, and 5-4, Section 5.4)	2E-02	92

Note: all risk estimates are rounded to one significant figure.

Uncertainties in the Risk Assessment. The uncertainty associated with a risk estimate is primarily the combination of the uncertainties associated with the exposure estimates and the uncertainties in the toxicity evaluation. Additional uncertainty is inherent in environmental sampling, which itself introduces uncertainty, largely because of the potential for uneven distribution of constituents in environmental media and the use of estimated data, such as J-qualified data. The rest of the discussion presented here focuses on the uncertainties in the exposure assessment and toxicity evaluation. It also presents a perspective on the overall effect of uncertainties on the risk estimates for OU-7.

Risks associated with the future exposure pathways are only meaningful if the pathways are completed. For pathways, such as using shallow groundwater for drinking water, the probability is very low. It is expected that saltwater intrusion in this area already precludes the use of wells in this zone for potable supplies. Thus, use of groundwater at the site by the hypothetical future resident appears remote.

The exposure doses generally represent the reasonable maximum exposure that can be expected to occur. Most of the parameter values used in calculating the exposure, including the exposure point concentrations, were selected so that there was only a five to ten percent probability that the resulting exposure would be underestimated due to an error in an individual value. The analytical data used to estimate risks from groundwater contaminants probably do not lead to significant errors. These same conclusions can be made for soil samples. In cases where contaminated soil acts as a continuing source of groundwater contamination or where contaminants may be produced by biodegradation, the risk may be underestimated. Likewise, exposure doses are calculated based on the assumption that the current conditions would remain constant throughout the exposure period. If the source is eliminated, natural attenuation processes will reduce constituent concentrations and the likelihood of exposure, thus reducing risks for the hypothetical future exposure scenarios.

Exposure point concentrations were calculated assuming a lognormal distribution of concentrations. The entire site was used as an exposure unit. Differing ranges of different receptors were not considered in the calculation of exposure point concentrations, if a receptor had a smaller range than the size of the site. However, the small size of the site (0.13 acres), the assumption of a lognormal distribution of data, and the use of maxima in many cases for the exposure point concentrations, means that the exposure point concentration used for COPCs in this document are conservative.

The most important uncertainties associated with the toxicity evaluation are the absence of a quantitative dose-response relationship for developmental and reproductive effects, and the absence of slope factors and reference doses for some compounds of concern. The developmental and reproductive toxicity of the indicator chemicals has not been quantitatively accounted for in performing the risk assessment, because the dose-response relationship has generally not been characterized for the compounds of concern. Another factor which could lead to an underestimate of the total potential risk at the site is the lack of RfDs or SFs for several compounds of concern. A review of the compounds of concern without RfDs or SFs indicates the following: calcium is an essential nutrient and unless in high doses would have low toxic potential.

The slope factors are upper bound values for a fit of carcinogenicity data to a specific mathematical function (of which the function selected is in itself generally conservative with respect to other mathematical functions that fit the data equally well). Both the slope factors and reference doses incorporate safety factors when extrapolating from animal data to humans (including sensitive individuals), although animals may be more sensitive to a given compound than people. Slope factors and reference doses typically have safety factors of 100 to 1,000. There are some notable exceptions to this, especially when there is human toxicity data available. The uncertainty factor for the RfD for arsenic is 1, implying that the chronic dose necessary to cause a toxic effect is well known (IRIS, 1991). On the other hand, it is possible that some compounds (such as the VOCs) have minimum threshold doses associated with a carcinogenic response in humans that are not observed in animal experiments, due to the differences between rodent and human metabolism. If this is true, the slope factors would be overestimates by one or more orders of magnitude.

Toxicity values derived from the IRIS database system were accompanied with a qualitative description of their “strength of evidence” as determined by the CRAVE Work Group; the corresponding confidence in each toxicity value added to the uncertainty.

The evaluation of health effects associated with arsenic exposure is presently a very controversial area. While existing toxicological models attempt to relate exposure levels to quantifiable carcinogenic and toxic risk, there is no general consensus that all arsenic exposure has negative consequences or that a threshold level of effect does not exist. For example, recent research indicates that arsenic may be nutritionally essential for humans, a requirement that has been demonstrated for four other mammalian species. The presently available technology for estimating cancer risks to humans at low levels may not be appropriate for evaluating arsenic exposure risks.

The Geraghty and Miller sample depths were identified as shallow or deep, which included 0 to 2 feet and 2 to 4 feet below land surface. In some instances, the IT removal action excavated soil from a point to a depth of 3 feet. This results in an uncertainty as to how to use the GM data point. Options included: (1) assume the GM data was representative of the 3 to 4 foot depth interval which was not removed so include the data, (2) assume the 2 to 3 foot soil which was removed and replaced with crushed limestone has been diluted with an equal amount of limestone so use the value at 50% diluted, (3) assume the IT removal data supersedes the GM data and delete the GM data point. The first option was selected.

Sample location P2-SL-0028 was noted to be on Site ST-18 and potentially removed during the excavation and removal of underground storage tanks associated with Site ST-18 rather than OU-7. This sample had been obtained by Geraghty and Miller in 1991. Sample point P2-SL-0033 (0 to 2 and 2 to 4 feet) was intended to duplicate P2-SL-0028. Both data points were excluded from this risk assessment. The surface soil arsenic concentration in P2-SL-0028 was 118 mg/kg while the arsenic in P2-SL-0033 was not analyzed. Although this point is not within the boundaries of OU-7, it is still within the boundaries of the base. It is not evaluated within this RA based on the assumption that the soils associated with this point were excavated during the UST removal at Site ST-18.

This risk assessment is conducted using data for soil left in place throughout the soil removal and newly generated confirmation data. All excavated soils were replaced with a crushed limestone fill material. Prior to import, the fill was analyzed for volatile organics, chlorinated hydrocarbons, PAHs, TPH, leachable (TCLP) chromium, lead, and cadmium. Arsenic was not an analyte and is not expected to occur above trace levels in the limestone. Therefore, the database does not reflect the area of the site which is “clean”. The UCL calculation is high for two reasons. The “small” numbers or one half detection limits are not present to offset high numbers in the calculation of the UCL and the greater number of data points which would allow more confidence in the UCL are absent.

For purposes of this risk assessment, it was assumed that all of the chromium detected in media at the site was in the hexavalent form. Under most natural conditions in soils and water containing reducing agents, the majority of chromium is in the trivalent oxidation state. Hexavalent chromium is more toxic than trivalent chromium. Thus, the risk estimates calculated in this report for potential exposure to chromium likely overestimate the actual risk.

The non-carcinogenic risks associated with potential lead exposure were not evaluated in a manner similar to other chemicals in this risk assessment (for lack of an RfD). However, the integrated exposure biokinetic/uptake (IEUBK) model developed by the USEPA (version 0.99d) was used to predict blood lead levels in young children. Although any pharmacokinetic model is subject to uncertainties, the predicted blood lead levels (which indicate potential hypothetical future lead exposure at the site is not a major concern) are believed to be a reasonable estimate.

There is also considerable uncertainty associated with the toxicity of mixtures. For the most part, data about the toxicity of constituent mixtures are unavailable. Rather, toxicity studies generally are performed using a single constituent; such is the case for the carcinogenic PAHs. Constituents present in a mixture can interact to yield a new constituent or one can interfere with the absorption, distribution, metabolism, or excretion of another. Constituents may also act by the same mechanism at the same target organ or can act completely independently. The risk assessment assumes that toxicity is additive; the excess lifetime cancer risks and HQ were each summed across constituents. This assumes that the mixture of constituents present at OU-7 has neither synergistic nor antagonistic interactions and that all of the constituents have the same mechanism of action in the same target organ to produce the same toxic endpoints.

The toxicity of all compounds in groundwater and soil has been assumed to be the same as the sum of the individual effects from each compound. Neither synergistic nor antagonistic effects resulting from the interaction of the contaminants have been considered. In addition, transformation products with greater or less severe toxic effects than chemicals discussed herein may form and are not accounted for in this evaluation.

Because of the arguments presented in this section, it can be stated that for those exposure scenarios which have been quantitatively evaluated and for which the most toxic and prevalent compounds at OU-7 have reference doses and slope factors, this risk assessment is expected to be conservative, and the actual risks are expected to be less than those calculated.

2.7.5.7Development of Remedial Goal Options. As risk characterization indicated that the risk benchmarks of IE-04 for ELCR and 1 for HI were exceeded for certain of the scenarios considered, remedial goal options (RGOs) have been generated for OU-7.

Operable Unit 7 has been retained by the 482nd Air Force Reserve as part of the cantonment area. As such, the site has been rebuilt as the new Base Supply, Civil Engineering, and POL

Operations area. This rebuilding includes a new civil engineering complex building, three shops, a storage area, miscellaneous building and a much expanded parking area. Potential exposures to construction workers during excavation and building activities are possible. However paving and building structures cover all existing soils and have eliminate any potential exposures, direct or indirect via soil for future site workers.

Remedial Goal Options (RGOs) are outlined in this document to assess potential cleanup it levels if site cleanup is necessary. RGOs were generated for surface soil for the base worker and residential scenarios, surface and subsurface soil for the construction worker scenario, and for potable use of groundwater.

In the calculation of RGOs, concentrations for each individual chemical corresponding to ELCRs of 1E-04, 1E-05, and 1E-06 (for carcinogenic effects) and HQs of 3, 1, and 0.1 (for noncarcinogenic: effects) are calculated for each chemical that has an ELCR exceeding 1E-06 or a HQ exceeding 0.1. RGOs are specific to a certain risk scenario. RGOs were calculated, as per Florida DEP and USEPA Region IV guidance, by rearranging the site specific risk equations and solving for the concentration term for the target risk. RGOs were generated for those chemicals that were significant contributors to hazard, i.e. chemicals with an individual risk contribution of greater than 1E-06 or HQ of greater than 0.1. The corresponding state and federal guidance and results of the RGO calculations are presented in Table 2-44.

2.7.6 Ecological Risk Assessment

Conditions at OU-7 provide little usable or preferred habitat for terrestrial species. Little vegetation is available for food or cover, and the shallow depth of soil to bedrock is expected to restrict the activities of burrowing animals. Base personnel activity at OU-7 likely inhibit the activities of animals. Although avian species may potentially visit the site, it is highly unlikely that they would derive a significant portion of their diet from the limited resources available at OU-7. Therefore, while constituent concentrations detected at OU-7 might potentially represent ecotoxicological hazard, it is unlikely that terrestrial biota would inhabit or frequent the site.

While there is limited vegetative cover at the site, groundwater may be a potential source of exposure to plants via their root systems. Possible uptake would be modified by a variety of factors such as alkalinity of soils, organic content of soils, possible synergistic or antagonistic effects of multiple compounds, and the individual chemical and physical characteristics of

TABLE 2-44
RISK-BASED REMEDIAL GOAL OPTIONS
HYPOTHETICAL FUTURE ADULT RESIDENT AT
OU-7, ENTOMOLOGY STORAGE AREA
GROUNDWATER (mg/L)

COMPOUNDS	SITE SPECIFIC REMEDIAL GOAL OPTIONS HAZARD INDEX			SITE SPECIFIC REMEDIAL GOAL OPTIONS CARCINOGENIC RISK			EPA MAXIMUM CONTAINMENT LEVEL	Florida Drinking Water Standard
	0.1	1.0	3.0	1E-06	1E-05	1E-04		
VOCs								
Bromodichloromethane	NAP	NAP	NAP	1.4E-03	1.4E-02	1.4E-01	1E-01	NS[c]
Dibromochloromethane	NAP	NAP	NAP	1.0E-03	1.0E-02	1.0E-01	1E-01	NS[c]
Pesticides								
Alpha-BHC	NAP	NAP	NAP	1.4E-05	1.4E-04	1.4E-03	NA	NS[c]
DDD	1.8-03	1.8E-02	5.5E-02	3.5E-04	3.5E-03	3.5E-02	NA	NS[c]
Metals								
Aluminum	3.7E+00	3.7E+02	1.1E+02	NAP	NAP	NAP	5E-02 to 2E-01[a]	0.2[b]
Arsenic	1.1E-03	3.3E-02	3.3E-02	5.7E-05	5.7E-04	5.7E-03	5E-02	5E-02
Cadmium	1.8E-03	5.5E-02	5.5E-02	NAP	NAP	NAP	5E-03	5E-03
Chromium (VI)	1.8E-01	5.5E-01	5.5E-01	NAP	NAP	NAP	1E-01	1E-01
Manganese	1.8E-02	5.5E-01	5.5E-01	NAP	NAP	NAP	0.05[a]	0.05[b]

NAP = Not Applicable

NS = No Standard

ELCR = Excess Lifetime Cancer Risk

HI = Hazard Index

[a] USEPA Secondary Drinking Water Standard

[b] Florida Secondary Drinking Water Standard

[c] There are no Drinking Water Standards for these compounds.

However, Florida Groundwater Guidance Concentrations are available as follows:

bromodichloromethane - 0.6 ug/L; dibromochloromethane - 1 ug/L; alpha-BHC - 0.05 ug/L; and DDD - 0. 1 ug/L.

TABLE 2-44
RISK-BASED REMEDIAL GOAL OPTIONS
AND FDEP SOIL TARGET LEVELS
HYPOTHETICAL CURRENT BASE WORKER (MOWING SCENARIO) AT
OU-7, ENTOMOLOGY STORAGE AREA
SOIL (mg/kg)

COMPOUNDS	SITE SPECIFIC REMEDIAL GOAL OPTIONS HAZARD INDEX			SITE SPECIFIC REMEDIAL GOAL OPTIONS CARCINOGENIC RISK			FDEP Soil Target Levels Based on an of 1E-06 / HI of 1
	0.1	1.0	3.0	1E-06	1E-05	1E-04	
Metals							
Arsenic	NAP	NAP	NAP	1.7E+01	1.7E+02	1.7E+03	3E+00

NAP = Not Applicable
ELCR = Excess Lifetime Cancer Risk
HI = Hazard Index

TABLE 2-44
RISK-BASED REMEDIAL GOAL OPTIONS
AND FDEP SOIL TARGET LEVELS
HYPOTHETICAL FUTURE ADULT RESIDENT AT
OU-7, ENTOMOLOGY STORAGE AREA
SOIL (mg/kg)

COMPOUNDS	SITE SPECIFIC REMEDIAL GOAL OPTIONS HAZARD INDEX			SITE SPECIFIC REMEDIAL GOAL OPTIONS CARCINOGENIC RISK			FDEP Soil Target Levels Based on an ELCR of 1E-06 / HI of 1
	0.1	1.0	3.0	1E-06	1E-05	1E-04	
BNAs							
Benzo(b)pyrene	NAP	NAP	NAP	2.2E+01	2.2E+00	2.2E+01	1E-01
Dibenzo(a,h)anthracene	NAP	NAP	NAP	2.2E-01	2.2E+00	2.2E+01	1E-01
Pesticides/PCBs							
Chlordane Isomers	NAP	NAP	NAP	1.0E+00	1.0E+00	1.0E+02	5E-01
Metals							
Arsenic	NAP	NAP	NAP	1.4E+00	1.4E+01	1.4E+02	7E-01
Thallium	5.0E+00	5.0+01	1.5E+02	NAP	NAP	NAP	NA

NAP = Not Applicable
ELCR = Excess Lifetime Cancer Risk
HI = Hazard Index

TABLE 2-44
RISK-BASED REMEDIAL GOAL OPTIONS
AND FDEP SOIL TARGET LEVELS
HYPOTHETICAL FUTURE CHILD RESIDENT AT
OU-7, ENTOMOLOGY STORAGE AREA
SOIL (mg/kg)

COMPOUNDS	SITE SPECIFIC REMEDIAL GOAL OPTIONS HAZARD INDEX			SITE SPECIFIC REMEDIAL GOAL OPTIONS CARCINOGENIC RISK			FDEP Soil Target Levels Based on an ELCR of 1E-06 / HI of 1
	0.1	1.0	3.0	1E-06	1E-05	1E-04	
BNAs							
Benzo(a)anthracene	NAP	NAP	NAP	1.1E+00	1.1E+01	1.1E+02	1.4E+00
Benzo(b)pyrene	NAP	NAP	NAP	1.1E-01	1.1E+00	1.1E+01	1.0E-01
Benzo(a,h)anthracene	NAP	NAP	NAP	1.1E+00	1.1E+01	1.1E-02	1.4E+00
Dibenzo(a,h)anthracene	NAP	NAP	NAP	1.1E-01	1.1E+00	1.1E+01	1.0E-01
Pesticides/PCBs							
Chlordane Isomers	3.4E-01	3.4E+00	1.0E+01	5.1E-01	5.1E+00	5.1E+01	5.0E-01
Metals							
Aluminum	7.2E+03	7.2E+04	2.2E+05	NAP	NAP	NAP	7.5E+04
Arsenic	2.3E+00	2.3E+01	6.9E+01	6.0E-01	6.0E-01	6.0E+00	7.0E-01

NAP = Not Applicable
ELCR = Excess Lifetime Cancer Risk
HI = Hazard Index

TABLE 2-44
RISK-BASED REMEDIAL GOAL OPTIONS
AND FDEP SOIL TARGET LEVELS
HYPOTHETICAL FUTURE CONSTRUCTION WORKER AT
OU-7, ENTOMOLOGY STORAGE AREA
SUBSURFACE SOIL (mg/kg)

COMPOUNDS	SITE SPECIFIC REMEDIAL GOAL OPTIONS HAZARD INDEX			SITE SPECIFIC REMEDIAL GOAL OPTIONS CARCINOGENIC RISK			FDEP Soil Target Levels Based on an ELCR of 1E-06 / HI of 1
	0.1	1.0	3.0	1E-06	1E-05	1E-04	
BNAs							
Benzo(b)pyrene	NAP	NAP	NAP	2.2E+01	2.2E+00	2.2E+01	1E-01
Dibenzo(a,h)anthracene	NAP	NAP	NAP	2.2E-01	2.2E+00	2.2E+01	1E-01
Pesticides/PCBs							
Chlordane Isomers	NAP	NAP	NAP	1.0E+00	1.0E-01	1.0E+02	5E-01
Metals							
Arsenic	NAP	NAP	NAP	1.4E+00	1.4E+01	1.4E+02	7E-01
Thallium	5.0E+00	5.05E+01	1.5E+02	NAP	NAP	NAP	NA

NAP = Not Applicable
ELCR = Excess Lifetime Cancer Risk
HI = Hazard Index

TABLE 2-44
RISK-BASED REMEDIAL GOAL OPTIONS
AND FDEP SOIL TARGET LEVELS
HYPOTHETICAL FUTURE CONSTRUCTION WORKER AT
OU-7, ENTOMOLOGY STORAGE AREA
SUBSURFACE SOIL (mg/kg)

COMPOUNDS	SITE SPECIFIC REMEDIAL GOAL OPTIONS HAZARD INDEX			SITE SPECIFIC REMEDIAL GOAL OPTIONS CARCINOGENIC RISK			FDEP Soil Target Levels Based on an ELCR of 1E-06 / HI of 1
	0.1	1.0	3.0	1E-06	1E-05	1E-04	
Metals							
Antimony	8.5E+00	8.5E+01	2.6E+02	NAP	NAP	NAP	2.2E+02
Arsenic	6.4E+00	6.4E+01	1.9E+02	9.9E+00	9.9E+01	9.9E+02	3.1E+00

NAP = Not Applicable
ELCR = Excess Lifetime Cancer Risk
HI = Hazard Index

the COCs in groundwater. Comparison with literature toxicity information indicates that the concentrations at OU-7 should not be significant.

In summary, there is no evidence of significant use of the site as habitat by ecological receptors. Urbanization and base operations have already replaced this ecosystem and rendered its current use and likely future use as poor quality habitat. However, the potential for the migration of these compounds into boundary canal and other downgradient water bodies may need to be explored further.

Uncertainties in Ecological Risk. Although the effects of constituents on ecological receptors are a concern, it is difficult to predict if observed effects on individual populations will result in any real damage to the ecosystem. Populations are dynamic; therefore, information concerning the normal range of variability within the population needs to be known. Sublethal effects, which may be very important to overall ecosystem health, are difficult to detect, and constituents present at low concentrations may not kill organisms directly but may greatly diminish their ability to survive and reproduce. Finally, it is important to note that constituent contamination is not the only manner in which humans impact ecosystems. Habitat destruction from development, agriculture, recreation, etc., is likely the major way humans cause ecological impacts (Moriarty, 1988).

2.8 DESCRIPTION OF ALTERNATIVES

The USAF only considered two alternatives in the Feasibility Study (FS) to address the contamination identified at OU-7: Alternative 1 - No Action, and Alternative 2 - Access and Use Restrictions for Soils and Groundwater and Groundwater Monitoring. These two alternatives were screened based on the criteria of effectiveness, implementability, and cost. These two alternatives were then carried forward through complete evaluation. These two alternatives were evaluated against the nine CERCLA criteria requirements for selecting a remedial alternative. These nine criteria include effectiveness, implementability, cost, state acceptance, community acceptance, long-term effectiveness and permanence, reduction of mobility, toxicity, or volume through treatment, compliance with ARARs, short-term effectiveness, and overall protection of human health and the environment. A summary of the two alternatives described in the Feasibility Study is presented below while each is discussed in greater detail in the FS.

2.8.1 Alternative 1 - No Action

The No-Action Alternative is evaluated as required by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the regulation implementing CERCLA, for comparison with other alternatives. The No-Action Alternative takes into account the capping of the site through new construction and includes one 5-year site review involving literature searches, site walks, interviews, and minimal sampling.

Under current land use conditions, this alternative poses an acceptable excess cancer and noncancer risk, per USEPA guidelines. The only completed exposure pathway is that of a base worker dropping off and picking up supplies. The total excess cancer risk to the base worker was estimated at 2E-06, which is considered an acceptable risk by USEPA. The total estimated noncancer risk of 0.02 is also considered acceptable by USEPA.

The present worth analysis is used to evaluate expenditures that occur over different time periods by discounting all future cost to a common base year, usually the current year. This allows the cost of remedial action alternatives to be compared on the basis on a single figure representing the amount of money that, if invested in the base year and disbursed as needed, would be sufficient to cover all cost associated with the remedial action over its planned life. The present-worth cost of this alternative is estimated at $24,270. This cost consist of one 5year site review with an estimated cost of $29,500. The cost of the 5-year site review has been discounted to present value using a 5% discount rate.

2.8.2 Alternative 2 - Access And Use Restrictions For Soil And Groundwater And Groundwater Monitoring

This alternative takes into account the capping of the site through the construction of buildings, pavement, and grassways as an effective barrier to prevent exposure to soil and groundwater contaminants, access and use restrictions, and monitoring well installation and sampling.

Rebuilding over OU-7 as part of the Base Supply, Civil Engineering, and POL Operations Area, effectively provides a natural barrier or cap from exposure to the underlying soil and groundwater. Institutional controls would be enacted to prevent residential development and placement of a potable well.

Access and use restrictions would be developed and enforced by the current landowner, the U.S. Air Force.

This alternative includes land use and access restrictions in the form of digging/excavation restrictions around the areas where elevated concentrations of arsenic were detected in the soil and groundwater (north and south excavation areas). Under the current land use, access to the area is limited given the site is located within the cantonment area, which is fenced and patrolled by Base security. Future land use of the site is inherently limited by its proximity to the airfield and ordnance storage areas. If ownership of the base is transferred to private or non-DOD entities, use restrictions could be established that would prevent schools, playgrounds, hospitals, and housing from being built, and prevent placement of a potable well at OU-7 until contaminants in the soils and/or groundwater are below levels of concern. If the base is deactivated and a transfer of ownership occurs, the new landowner would be responsible for enforcing these restrictions.

This alternative also includes the installation of one new monitoring well as depicted in Figure 2-11. The new well and two existing wells (MW-1-204-1 OLD and MW-1-207-1) will be sampled quarterly for one year, semi-annually for one year, and annually for the next three years if necessary. Samples will be analyzed for organochlorine pesticides, BNAs and TAL metals.

One 5-year site review is included which involves literature searches, site walks, interviews, minimal sampling, and a groundwater sampling review to determine the effectiveness of the remedy. This alternative is protective of human health and the environment under the current and potential future land use conditions and relies on institutional controls to prevent exposure for the hypothetical future residential land use scenario. This alternative does not actively reduce the toxicity, mobility or volume of the potential contaminants in the soil, and relies on control measures to prevent access or exposure to contaminated areas at OU-7.

The present-worth cost of this alternative is estimated at $163,467. This cost consists of an estimated initial capital cost of $21,920, one year of quarterly groundwater sampling, one year of semi-annual groundwater sampling, three years of annual groundwater sampling if necessary with an estimated cost of $124,200, and one 5-year site review with an estimated cost of $29,500. The cost of the annual O&M reviews and the 5-year site review have been discounted to present value using a 5% discount rate.

2.9 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

An evaluation and comparison of the alternatives is presented in Table 2-45. The comparison is based on the nine key criteria required under the National Contingency Plan and CERCLA Section 121 for use in evaluation of remedial alternatives by USEPA. The nine criteria are as follows:

- Overall protection of human health and the environment;
- Compliance with Applicable or Relevant and Appropriate Requirements;
- Long-term effectiveness and permanence;
- Reduction of toxicity, mobility, or volume;
- Short-term effectiveness;
- Cost;
- State acceptance; and
- Community acceptance.

2.9.1 Overall Protection of Human Health and the Environment

The estimated excess cancer and noncancer risks to humans under current and future industrial landuse conditions are within acceptable guidelines set by USEPA. The excess cancer risk for the worst-case scenario, a future construction worker exposed to surface soils, is estimated at $3x10^{-6}$. The noncancer risk is estimated at 0.5. The excess cancer risk range considered acceptable by USEPA is 10^{-4} to 10^{-6}. The noncancer limit considered acceptable by USEPA is 1. Predicted blood lead level for a hypothetical future child resident was estimated at 3.4 µg/dL, which is below the USEPA guideline of 10 µg/dL, and indicates a low level of concern for lead exposure if the site were re-developed for future land use.

Both of the alternatives are protective of human health under current and potential industrial land use conditions based on the site-specific risk assessment performed for OU-7. However, the no-action alternative may not be protective of the environment. Arsenic levels in the groundwater exceed the federal and state MCLs very locally in the south excavation. Alternative 2 is protective of the environment because it addresses the concentrations of arsenic in the groundwater by providing groundwater monitoring to assess the migration of contaminants over time.

TABLE 2-45

COMPARATIVE ANALYSIS OF REMEDIAL ALTERNATIVES, OU-7

Evaluation Criteria	Remedial Alternative Alternative 1 No Action	Remedial Alternative Alternative 2 Capping/Institutional Controls/GW Monitoring
Overall Protection of Human Health & Environment	?	O
Compliance w/ARARs	?	? *
Long-Term Effectiveness and Permanence	?	? *
Reduction of Toxicity, Mobility, or Volume	? (1)	? (1)
Short-Term Effectiveness	O	O
Implementability	Easy	Easy
Estimated Present Worth	$24,270	$163,467

? Does not meet criterion

O Meets criterion

* Has potential to meet criterion

(1) 1994 IRA removed over 4,300 tons of contaminated soils which, if included as a part of this comparative analysis. would satisfy this criterion.

2.9.2 Compliance with ARARs

None of the alternatives meet the groundwater ARARs. Arsenic detected in groundwater is above the federal and state promulgated standards and there are no ARARs for soils. Neither of the alternatives meet the TBC guidelines for soil cleanup levels. However, a waiver to the chemical specific ARARs is appropriate because Alternative 2 will attain the standard of performance considered protective of human health and the environment through access and use restrictions and assesses the compliance of groundwater ARARs through annual groundwater monitoring and a 5-year site review. Alternative 2 also prevents exposure to soils through access and use restrictions.

2.9.3 Long-Term Effectiveness and Permanence

Alternatives 1 does not provide permanent solutions to the remedial action objectives. Alternative 2 permanently reduces the risks from both inhalation and ingestion of soils and groundwater by capping the site and by the use of access and use restrictions at OU-7.

2.9.4 Reduction of Mobility, Toxicity, or Volume Through Treatment

Neither Alternative 1 or 2 involve treatment. However, as discussed above, the 1994 IRA was implemented to reduce the mobility, toxicity, and volume of the contaminated soils and removed the majority of the contaminants of concern which was the source of the groundwater contamination.

2.9.5 Short-Term Effectiveness

Neither Alternatives 1 or 2 are expected to pose significant risk to the community or workers during implementation. There are no anticipated adverse environmental impacts from either of the alternatives.

2.9.6 Implementability

Alternatives 1 and 2 are easily implementable.

2.9.7 Cost

Alternative 1 provides protection to human health, but may not adequately protect the environment and has a 5-year present worth of $24,270. Alternative 2 uses capping and institutional controls to limit access to the contaminated soils and groundwater monitoring to assess compliance with ARARs and to detect any future migration of contaminants over time. Alternative 2 would cost approximately $163,467.

2.9.8 State and Community Acceptance

State and community concerns will be addressed in the proposed plan.

2.10 SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the detailed evaluation of the alternatives and public comments, the U.S. Air Force, in concurrence with the USEPA and the state of Florida, has determined that Alternative 2 - Access and Use Restrictions for Soil and Groundwater and Groundwater Monitoring is the most appropriate course of action at OU-7.

This alternative is protective of human health and the environment under current and future industrial landuse conditions. The groundwater will be monitored quarterly for one year, semi-annually for one year, and annually for three years if necessary to assess any future migration of contaminants over time. After the 5-year monitoring period, EPA, FDEP, and the USAF will evaluate the effectiveness of the remedy and the need for continued groundwater access restrictions. The selected remedy has been accepted by the state and community concerns have been addressed in the Responsiveness Summary of this ROD.

A 5-year review will be conducted to determine whether the remedy remains protective of human health and the environment and to evaluate the need for continued groundwater access restrictions.

2.11 STATUTORY DETERMINATIONS

Under its legal authorities, EPA’s primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. The selected remedy reduces and controls the existing risk to human health by relying on capping

and institutional controls to prevent exposure to soils and groundwater. The selected remedy is protective of the environment by providing capping and groundwater monitoring to detect and/or prevent surface and subsurface exposure to arsenic contaminated soils and groundwater. In addition, Section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws unless a statutory waiver is justified. The selected remedy does not meet ARARs as arsenic has been detected in groundwater at concentrations greater than Federal and State MCLs. No ARARs exist for soil, but the selected remedy does not meet TBC guidelines for soil cleanup levels. However, a waiver to the chemical specific ARARs is appropriate because Alternative 2 will attain the standard of performance considered protective of human health and the environment through access and use restrictions and assesses the compliance of groundwater ARARs through annual groundwater monitoring and a 5-year site review. Alternative 2 also prevents exposure to soils through access and use restrictions. The selected remedy also must be cost-effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. The selected remedy has been determined to be cost-effective and utilizes permanent solutions.

Finally, the statute includes a preference for remedies that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The selected remedy does not involve treatment. However, as previously discussed, the 1994 IRA was implemented to reduce the mobility, toxicity, and volume of the contaminated soils and removed the majority of the contaminants of concern which was the source of the groundwater contamination. The selection of Alternative 2-Access and Use Restrictions for Soil and Groundwater and Groundwater Monitoring satisfies the statutory determinations for this site.

2.12 DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan for OU-7 was released for public comment in November 1997. The Proposed Plan identified Alternative 2 - Access and Use Restrictions for Soil and Groundwater and Groundwater Monitoring as the preferred alternative. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

Homestead Air Force Base, Florida
Operable Unit No. 7,
Entomology Storage Area

Responsiveness Summary for the Record of Decision

RESPONSIVENESS SUMMARY

FOR THE

RECORD OF DECISION

The responsiveness summary serves three purposes. First, it provides regulators with information about the community preferences regarding both the remedial alternatives and general concerns about Operable Unit No. 7, Homestead ARB. Second, the responsiveness summary documents how public comments have been considered and integrated into the decision making process. Third, it provides USEPA with the opportunity to respond to each comment submitted by the public on the record.

The Remedial Investigation/Baseline Risk Assessment Report, Feasibility Study and Proposed Plan for Homestead ARB, OU-7 were released to the public in April 1996, November 20, 1997, and November 20, 1997, respectively. These documents were made available to the public in both the administrative record and an information repository maintained at the Air Force Base Conversion Agency OL-Y office.

A public comment period was held from November 20, 1997 to December 22, 1997 as part of the community relations plan for OU-7. A public meeting was held on November 20, 1997, at 7:00 p.m. at South Dade Senior High School. Public Notices were published in the Miami Herald on November 16, 1997, and in the South Dade News Leader and The Courier on November 17, 1997. At this meeting, the USAF and Dade County Environmental Resource Management (DERM), were prepared to discuss the Remedial Investigation, the Baseline Risk Assessment, the Feasibility Study, and the Preferred Alternative for this OU as described in the Proposed Plan.

There were no comments at the public meeting regarding the selected alternative for OU-7/Site SS-7. Additionally, no comments were received during the public comment period.