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DECISION DOCUMENT FOR TEN BASE REALIGNMENT AND CLOSURE SITES WITH
TRANSMITTAL LETTER NAS KEY WEST FL
4/25/2002
TETRA TECH NUS



TETRA TECH NUS, INC.

AIK-02-0068

April 5, 2002

Project Number HK 7593

Commander
Department of the Navy
SOUTH DIV NAVFACENCOM
ATTN: Joel Sanders (Code ES31)
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0032

Subject: Decision Document for Ten Base Realignment and Closure (BRAC) Sites, Rev. 4
Naval Air Facility, Key West, Florida

Dear, Mr. Sanders:

Enclosed is the CD that contains the PDF file for the final version of the Decision Document for Ten Base Realignment and Closure (BRAC) Sites, Rev. 4, Naval Air Facility, Key West, Florida. A CD is being distributed to the members of the NAF Key West Partnering Team for their review and comment or concurrence and to meet TtNUS's contractual obligation under CTO 0032. A hard-copy version of this document will be distributed to the members of the Restoration Advisory Board. This version incorporates all comments received on the Rev. 3 document. Change bars are incorporated into this version to denote the portions of the document that have changed since the Rev. 3 document was issued. I am planning on receiving comments or concurrence on this document from the Partnering Team members within the next 30 days.

Please call me at (803) 649-7963, extension 345, if you have any questions regarding the enclosed CD.

Sincerely,

C. M. Bryan
Project Manager

CMB:spc

Enclosure

c: Ms. Debbie Wroblewski (Cover Letter Only)	Ms. M. Stafford, RAB (hard copy)
Mr. T. Ballard, EPA	Mr. M. Ingram, RAB (hard copy)
Mr. T. Vaught, FDEP	Ms. R. Haag, South Florida Water Management District (hard copy)
Mr. R. Courtright, NAS Key West (CD and hard copy)	Mr. M. Perry/File
Mr. R. Demes, NAS Key West	File: 7593-7-15.5
Ms. R. Orlandi, RAB (hard copy)	

Decision Document

for

Ten Base Realignment and Closure (BRAC) Sites

**Naval Air Facility
Key West, Florida**



**Southern Division
Naval Facilities Engineering Command**

Contract Number N62467-94-D-0888

Contract Task Order 0032

April 2002

DECISION DOCUMENT
for
TEN BASE REALIGNMENT AND CLOSURE (BRAC) SITES

NAVAL AIR FACILITY
KEY WEST, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406

Submitted by:
Tetra Tech NUS, Inc.
661 Andersen Drive
Foster Plaza 7
Pittsburgh, Pennsylvania 15220

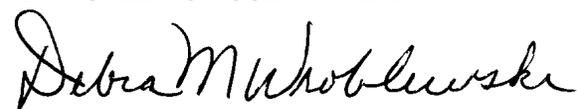
CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0032

APRIL 2002

PREPARED UNDER THE SUPERVISION OF:

CHUCK BRYAN
TASK ORDER MANAGER
TETRA TECH NUS, INC.
AIKEN, SOUTH CAROLINA

APPROVED FOR SUBMITTAL BY:



DEBBIE WROBLEWSKI
PROGRAM MANAGER
TETRA TECH NUS, INC.
PITTSBURGH, PENNSYLVANIA

TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
ACRONYMS	VIII
1.0 THE DECLARATION.....	1-1
1.1 SITE NAMES AND LOCATIONS.....	1-1
1.2 STATEMENT OF BASIS AND PURPOSE	1-1
1.3 DESCRIPTION OF THE SELECTED REMEDIES	1-2
1.3.1 Hamaca Hawk Missile Site Sewage Lift Station	1-2
1.3.2 Areas Around SD-05 and SD-08 at the Hamaca Hawk Missile Site	1-2
1.3.3 Truman Annex DRMO Waste Storage Area.....	1-3
1.3.4 Truman Annex DRMO Area between Buildings 261 and 284	1-3
1.3.5 Truman Annex Seminole Battery.....	1-3
1.3.6 Truman Annex Former Location of Building 136.....	1-3
1.3.7 Truman Annex Building 103	1-4
1.3.8 Truman Annex Buildings 102 and 104	1-4
1.3.9 Truman Annex Building 223 Former Hazardous Waste Storage Area.....	1-4
1.3.10 Truman Annex Former Lube Area	1-5
1.3.11 Poinciana Housing.....	1-5
1.4 DECLARATION STATEMENT	1-5
1.5 SIGNATURE AND ACCEPTANCE OF THE REMEDY	1-6
2.0 DECISION SUMMARY	2-1
2.1 SITE NAMES, LOCATIONS, DESCRIPTIONS, AND HISTORICAL INFORMATION.....	2-1
2.1.1 Hamaca Hawk Missile Site Sewage Lift Station and Areas Around Sediment Samples SD-05 and SD-08	2-1
2.1.2 Truman Annex DRMO Waste Storage Area.....	2-2
2.1.3 Truman Annex DRMO Area Between Buildings 261 and 284.....	2-2
2.1.4 Truman Annex Former Location of Building 136	2-2
2.1.5 Truman Annex Building 103	2-2
2.1.6 Truman Annex Buildings 102 and 104	2-3
2.1.7 Truman Annex Building 223 Former Hazardous Waste Storage Area.....	2-3
2.1.8 Truman Annex Former Lube Area	2-3
2.1.9 Poinciana Housing.....	2-3
2.2 PREVIOUS INVESTIGATIONS AND ENFORCEMENT ACTIVITIES.....	2-4
2.2.1 Previous Investigations.....	2-4
2.2.2 Enforcement Actions.....	2-9
2.2.3 Highlights of Community Participation	2-10
2.3 SCOPE AND ROLE OF RESPONSE ACTION	2-11
2.3.1 Hamaca Hawk Missile Site Sewage Lift Station	2-11
2.3.2 Area Around SD-05 and SD-08 at Hamaca Hawk Missile Site	2-11
2.3.3 Truman Annex DRMO Waste Storage Area.....	2-11
2.3.4 Truman Annex DRMO Area Between Buildings 261 and 284.....	2-12
2.3.5 Truman Annex Former Location of Building 136	2-12
2.3.6 Truman Annex Building 103	2-12
2.3.7 Truman Annex Buildings 102 and 104	2-13
2.3.8 Truman Annex Building 223 Former Hazardous Waste Storage Area.....	2-13
2.3.9 Truman Annex Former Lube Area	2-14
2.3.10 Poinciana Housing.....	2-15
2.4 SUMMARY OF SITE CHARACTERISTICS	2-15
2.4.1 Sources of Contamination	2-15
2.4.2 Description of Contamination.....	2-17

TABLE OF CONTENTS (CONTINUED)

<u>SECTION</u>	<u>PAGE</u>
2.4.3	Contaminant Migration.....2-21
2.5	SUMMARY OF SITE RISKS.....2-24
2.5.1	Human Health Risk Evaluation2-25
2.5.2	Environmental Evaluation2-28
2.5.3	Summary of Risk Characterization2-29
2.6	THE SELECTED REMEDIES.....2-30
2.6.1	Hamaca Hawk Missile Site Sewage Lift Station2-30
2.6.2	Areas Around Sediment Samples SD-05 and SD-08 at Hamaca Hawk Missile Site.....2-31
2.6.3	Truman Annex DRMO Waste Storage Area.....2-31
2.6.4	Truman Annex DRMO Area Between Buildings 261 and 284.....2-31
2.6.5	Truman Annex Former Location of Building 136.....2-31
2.6.6	Truman Annex Building 1032-31
2.6.7	Truman Annex Buildings 102 and 1042-32
2.6.8	Truman Annex Building 223 Former Hazardous Waste Storage Area.....2-32
2.6.9	Truman Annex Former Lube Area2-32
2.6.10	Poinciana Housing.....2-32
2.7	STATUTORY DETERMINATIONS.....2-32
2.7.1	Protection of Human Health and the Environment2-33
2.7.2	Compliance with ARARs.....2-33
2.7.3	Long-Term Effectiveness and Permanence2-34
2.7.4	Reduction of Toxicity, Mobility, or Volume through Treatment.....2-34
2.7.5	Short-Term Effectiveness2-34
2.7.6	Implementability.....2-34
2.7.7	Cost-Effectiveness.....2-35
2.7.8	State Acceptance.....2-35
2.7.9	Community Acceptance.....2-35
2.8	EXPLANATION OF SIGNIFICANT DIFFERENCES2-35
2.8.1	Truman Annex DRMO Waste Storage Area.....2-36
2.8.2	Truman Annex Former Location of Building 136.....2-36
2.8.3	Truman Annex Building 1032-36
2.8.4	Truman Annex Building 223 Former Hazardous Waste Storage Area.....2-37
REFERENCE	R-1
APPENDIX A	RESPONSIVENESS SUMMARY
APPENDIX B	APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
APPENDIX C	FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION CONCURRENCE LETTER
APPENDIX D	A RESIDUAL RISK ASSESSMENT FOR RECEPTORS AT NAF KEY WEST BRAC SITES

TABLE OF CONTENTS (CONTINUED)

TABLES

<u>NUMBER</u>		<u>PAGE</u>
2-1	Maximum Detected Values for Remaining Contamination by Site NAF Key West, Florida	2-38
2-2	Risk and HI Estimates and the Allowable time for Recreational Child and Landscape and Utility Workers Per BRAC Site (No PAHs) NAF Key West, Florida	2-39
2-3	Risk and HI Estimates and the Allowable Time for Recreational Child and Landscape and Utility Workers Per BRAC Site (Including PAHS), NAF Key West, Florida	2-40

FIGURES

<u>NUMBER</u>		<u>PAGE</u>
2-1	Location Map BRAC Properties	2-41
2-2	Hamaca Hawk Missile Site Sewage Lift Station	2-42
2-3	Areas Around Sediment Samples SD-05 & SD-08 at Hamaca Hawk Missile Site	2-43
2-4	Truman Annex DRMO Waste Storage Area	2-44
2-5	Truman Annex DRMO Area Between Buildings 261 & 284	2-45
2-6	Truman Annex Former Location of Building 136	2-46
2-7	Truman Annex Building 103	2-47
2-8	Truman Annex Buildings 102 & 104	2-48
2-9	Truman Annex Building 223 Hazardous Waste Storage Area	2-49
2-10	Truman Annex Former Lube Area	2-50
2-11	Poinciana Housing Soil	2-51
2-12	Poinciana Housing Groundwater	2-52

ACRONYMS

ABSEFF	absorption efficiency
ACBM	asbestos containing building material
ARAR	applicable or relevant and appropriate requirement
AST	above-ground storage tank
BAP	Bermeilo, Ajamil, and Partners, Inc.
BB&L	Blasland, Bouck, & Leed, Inc.
B&RE	Brown and Root Environmental, Inc.
BEI	Bechtel Environmental, Inc.
bls	below land surface
BRAC	Base Realignment and Closure Act
BRP	Base Reuse Plan
CAR	Contamination Assessment Report
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cm	centimeter
COPC	chemical of potential concern
DoD	Department of Defense
DRMO	Defense Reutilization and Marketing Office
EBS	Environmental Baseline Survey
EE/CA	Engineer's Evaluation/Cost Analysis
EPA	United States Environmental Protection Agency
EPC	exposure point concentration
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
FNAI	Florida Natural Areas Inventory
FOST	Finding of Suitability to Transfer
HI	Hazard Index
HQ	Hazard Quotient
ICR	incremental cancer risk
IRA	Interim Remedial Action
LBP	lead based paint
LOAEL	lowest observed adverse effect level
LRA	Local Redevelopment Authority
LUCs	land-use controls
MCL	Maximum Contaminant Level
MDC	maximum detected concentration
mg/kg	milligram per kilogram

mg/kg/day	milligram per kilogram per day
µg/kg	microgram per kilogram
µg/L	microgram per Liter
NAF	Naval Air Facility
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NFA	No Further Action
NOAEL	no observed adverse effect level
NPL	National Priorities List
OSHA	Occupational Safety and Health Association
PAH	polynuclear aromatic hydrocarbons
PCB	polychlorinated biphenyl
RAB	Restoration Advisory Board
RAP	Remedial Action Plan
RBC	risk-based criteria
RCRA	Resource Conservation and Recovery Act
RfD	Reference dose
RFI/RI	RCRA Facility Investigation/Remedial Investigation
RME	reasonable maximum exposure
RRA	Residual Risk Assessment
SAL	Screening Action Level
SAR	Supplemental Assessment Report
SARA	Superfund Amendments and Reauthorization Act
SF	Slope factor
SI	Site Inspection
SSC	Species of Special Concern
SSI	Supplemental Site Inspection
SVOC	semivolatile organic compound
TRC	Technical Review Committee
TtNUS	Tetra Tech NUS, Inc.
UCL	upper confidence limit
U.S.C.	United States Code
USN-NFEC	United States Navy-Naval Facilities Engineering Command
USN-NPWC	United States Navy-Naval Public Works Center
USN-SUPSHIP	United States Navy-Supervisor of Shipbuilding, Conversion, and Repair Environmental Detachment
UST	underground storage tank
VA	Veterans Administration

1.0 THE DECLARATION

1.1 SITE NAMES AND LOCATIONS

The following Naval Air Facility (NAF) Key West sites are addressed by this Decision Document:

- Hamaca Hawk Missile Site Sewage Lift Station
- Areas Around Sediment Samples SD-05 and SD-08 at the Hamaca Hawk Missile Site
- Truman Annex Defense Reutilization and Marketing Office (DRMO) Waste Storage Area
- Truman Annex DRMO Area Between Buildings 261 and 284
- Truman Annex Seminole Battery*
- Truman Annex Former Location of Building 136
- Truman Annex Building 103
- Truman Annex Buildings 102 and 104
- Truman Annex Building 223 Former Hazardous Waste Storage Area
- Truman Annex Former Lube Area
- Poinciana Housing

*Since the Public Comment Period, it has been decided that Seminole Battery will be retained by the Navy and is being removed from the Base Realignment and Closure (BRAC) program.

All of these sites are located on the island of Key West, Florida.

1.2 STATEMENT OF BASIS AND PURPOSE

This combined Decision Document presents the selected remedies for 10 of the above-listed 11 BRAC sites at NAF Key West, Key West, Florida. This document focuses on remedies for only 10 of the sites because Seminole Battery will be retained by the Navy and has been removed from BRAC. The remedial decisions for the BRAC sites were made in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). These decisions are based on site data (available for review in the information repository for NAF Key West) and decisions made by the NAF Key West Partnering Team made up of representatives from the Navy, the United States Environmental Protection Agency (EPA), and the Florida Department of Environmental Protection (FDEP).

1.3 DESCRIPTION OF THE SELECTED REMEDIES

The remedies selected in this Decision Document address the remaining contamination that was left in place, and include controls that are required to prevent/minimize exposure and monitoring that will be performed to identify and prevent potential future adverse impacts to human health and the environment.

1.3.1 Hamaca Hawk Missile Site Sewage Lift Station

The selected remedy is to provide land-use controls (LUCs) because contamination at the site has been sufficiently remediated for planned reuse. The remedial action selected for Hamaca Hawk Missile Site Sewage Lift Station (Figure 2-2) addresses the arsenic contamination remaining in soil following the removal of approximately 45 cubic yards of contaminated soil as part of an Interim Remedial Action (IRA) in 1999.

The major components of the selected remedy are engineering controls and institutional controls. Soil excavation at Hamaca Hawk Missile Site Sewage Lift Station was impeded by building foundations to the south. This impediment provides an engineering control to remaining soil contamination, preventing exposure of human and ecological receptors to the contaminated soil. The institutional controls at the Sewage Lift Station will include a deed restriction that requires anyone who disturbs the structure identified as a permanent cover and/or containment material comply with appropriate laws and regulations as discussed in Section 2.6.

1.3.2 Areas Around SD-05 and SD-08 at the Hamaca Hawk Missile Site

The selected remedy for the areas around SD-05 and SD-08 at the Hamaca Hawk Missile Site (Figure 2-3) is no further action. In 1999, as part of an IRA, a 60-foot by 60-foot area of sediment was removed from the area around SD-05 to a depth of 1 foot. No confirmation sampling was performed at this location because the sidewalls consisted of bedrock and mangrove root mass. The IRA also removed a 25-foot by 25-foot by 2 foot deep area of soil from the area around SD-08. Of the confirmation samples collected around SD-08, all contaminants detected were below their respective action levels.

The soil removal activities were performed in accordance with the FDEP Brownfields Cleanup Criteria Rule, No Further Action Criteria [62-785.680 Florida Administrative Code (F.A.C.)] that provided a relevant and appropriate regulatory basis for the site action levels.

1.3.3 Truman Annex DRMO Waste Storage Area

The selected remedy for Truman Annex DRMO Waste Storage Area (Figure 2-4) is LUCs because contamination at the site has been sufficiently remediated for proposed reuse. In 1999, as part of an IRA, 12,000 cubic yards of contaminated soil were removed from the DRMO Waste Storage Area to depths of 2 and 4 feet below land surface (bls). The soil removal activities were performed in accordance with the FDEP Brownfields Cleanup Criteria Rule, No Further Action Criteria [62-785.680 F.A.C.] that provided a regulatory basis to determine engineering controls for the site.

Soil excavation at DRMO was impeded by asphalt road surfaces and underground utilities. LUCs, including restrictions recorded in property transfer documents, will be required to ensure the integrity of these engineering controls. The institutional controls at the DRMO Waste Storage Area will also include deed restrictions that require anyone who disturbs the structure identified as a permanent cover and/or containment material comply with appropriate laws and regulations. For example, as a result of elevated chemical concentrations in soil, future workers who disturb this area must be in compliance with appropriate laws and regulations as discussed later in Section 2.6.

1.3.4 Truman Annex DRMO Area between Buildings 261 and 284

The selected remedy for Truman Annex DRMO Area Between Buildings 261 and 284 (Figure 2-5) is no further action because contamination at the site has been sufficiently remediated for planned reuse. An IRA at DRMO Between Buildings 261 and 284 performed in 1999 removed approximately 300 cubic yards of soil to bedrock. No chemicals of concern were detected above action levels in confirmation samples. The Supplemental Site Inspection (SSI) Report for BRAC Parcels (TtNUS, 1999a) indicates that the IRA performed at the site in 1999 reduced the threat to human health and the environment to acceptable levels in accordance with CERCLA, the NCP, and the FDEP Brownfields Cleanup Criteria Rule, No Further Action Criteria [62-785.680 F.A.C.].

1.3.5 Truman Annex Seminole Battery

Seminole Battery will be retained by the Navy. Therefore, this parcel will be removed from the BRAC Program.

1.3.6 Truman Annex Former Location of Building 136

The selected remedy for the Truman Annex Former Location of Building 136 (Figure 2-6) is LUCs because the site has been sufficiently remediated for planned reuse. The IRA performed in 1999 at the

Former Location of Building 136 removed approximately 3,000 cubic yards of contaminated soil to a depth of 2 feet bls. Arsenic was detected in one confirmation sample above its action level. However, the location where arsenic was left in place is beneath an existing structure (road), which provides an engineering control to cap soil and limit possible exposure. The soil removal activities were performed in accordance with the FDEP Brownfields Cleanup Criteria Rule, No Further Action Criteria [62-785.680 F.A.C.] that provided a regulatory driver to determine engineering controls for the site.

The institutional controls at the former location of Building 136 will include deed restrictions that require anyone who disturbs the structure identified as a permanent cover and/or containment material comply with appropriate laws and regulations. For example, as a result of elevated arsenic concentrations in soil, future workers who disturb this area must be in compliance with appropriate laws and regulations as discussed later in Section 2.6.

1.3.7 Truman Annex Building 103

The selected remedy for Building 103 (Figure 2-7) is no further action. The IRAs performed in 1999 and 2000 at Building 103 removed contaminated soil to depths ranging from 2 to 6 feet bls at two different areas. No chemicals meeting the definition of a CERCLA release (CERCLA chemicals of concern) were detected in confirmation samples at either of these locations at concentrations in excess of their action levels. The change in the selected remedy from the proposed plan is discussed in detail in Section 2.6 and Section 2.8.

1.3.8 Truman Annex Buildings 102 and 104

The selected remedy for Truman Annex Buildings 102 and 104 (Figure 2-8) is no further action because contamination at the site has been sufficiently remediated for planned reuse. The IRA performed in 1999 at Buildings 102 and 104 excavated two separate areas of contaminated soil to a depth of 2 feet. A total of 1,022 cubic yards of contaminated soil was excavated from the area around Buildings 102 and 104. No CERCLA chemicals of concern were detected at concentrations above their action levels.

1.3.9 Truman Annex Building 223 Former Hazardous Waste Storage Area

The selected remedy for Building 223 Former Hazardous Waste Storage Area (Figure 2-9) is LUCs because contamination at the site has been sufficiently remediated for proposed reuse. The IRAs performed in 1999, 2000, and 2001 at Building 223 Former Hazardous Waste Storage Area removed contaminated soil and concrete pads at the site. Arsenic in excess of the action level (2.7 mg/kg) was left in place at one location on the floor of the excavation. Therefore, institutional controls will apply at the

site. The change in the selected remedy from the proposed plan is discussed in detail in Sections 2.6 and 2.8.

The institutional controls at Building 223 will include deed restrictions that require anyone who disturbs the area identified as a permanent soil cover and/or containment material comply with appropriate laws and regulations. For example, as a result of elevated arsenic concentrations in soil, future workers who disturb the soil cover in this area must be in compliance with appropriate laws and regulations as discussed later in Section 2.6.

1.3.10 Truman Annex Former Lube Area

The selected remedy at the Truman Annex Former Lube Area (Figure 2-10) is no further action because contamination has been sufficiently remediated for planned reuse. The IRA performed in 1999 at the Former Lube Area removed approximately 62 cubic yards of contaminated soil to a depth of 2 feet bls. The 95 percent confidence level set by the NAF Key West Partnering Team required that all contaminants in exposed soils above 2 feet be below their respective action levels. This level was achieved at the site as a result of the soil removal. No further action is recommended at the Former Lube Area.

1.3.11 Poinciana Housing

The selected remedy for Poinciana Housing (Figures 2-11 and 2-12) is LUCs. Surface soils do not contain any elevated levels of contaminants. Excavation of subsurface soil (more than 2 feet bls) was not deemed practical. In addition, the site's groundwater is not used for irrigation or consumption because the residents of Poinciana Housing receive their water via municipal/state supply.

The LUCs at Poinciana Housing will include deed restrictions that require anyone who disturbs subsurface soils in the area of MW-01 must comply with appropriate laws and regulations as discussed in Section 2.6. Institutional controls will be put in place to address activities that would expose workers or the public to groundwater from this area. In addition, the Navy will be required to perform annual groundwater monitoring at MW-01.

1.4 DECLARATION STATEMENT

It has been determined by the Navy, EPA, and FDEP that LUCs as described in Section 1.3 and further detailed in Section 2.6 will be required at Hamaca Hawk Missile Site Sewage Lift Station, Truman Annex DRMO Waste Storage Area, the Truman Annex Former Location of Building 136, Truman Annex Building 223 Former Hazardous Waste Storage Area, and Poinciana Housing. Areas around SD-05 and SD-08 at

the Hamaca Hawk Missile Site, Truman Annex DRMO Area between Buildings 261 and 284, Truman Annex Buildings 102 and 104, Truman Annex Building 103, and the Truman Annex Former Lube Area will require no further action.

SIGNATURE AND ACCEPTANCE OF THE REMEDY



Scott A. Glass, P.E.

Base Realignment and Closure Environmental Coordinator

Southern Division

Naval Facilities Engineering Command

Charleston, South Carolina

6/20/02
Date

Concurrence of the remedies for the 10 BRAC sites by FDEP is documented in Appendix C. FDEP has issued a separate letter of concurrence.

2.0 DECISION SUMMARY

2.1 SITE NAMES, LOCATIONS, DESCRIPTIONS, AND HISTORICAL INFORMATION

This Decision Document is issued to describe the Department of the Navy's selected remedies for the following 10 sites located at NAF Key West, Key West, Florida (Figure 2-1).

- Hamaca Hawk Missile Site Sewage Lift Station
- Areas Around Sediment Samples SD-05 and SD-08 at the Hamaca Hawk Missile Site
- Truman Annex DRMO Waste Storage Area
- Truman Annex DRMO Area Between Buildings 261 and 284
- Truman Annex Former Location of Building 136
- Truman Annex Building 103
- Truman Annex Buildings 102 and 104
- Truman Annex Building 223 Former Hazardous Waste Storage Area
- Truman Annex Former Lube Area
- Poinciana Housing

These sites have been investigated or remediated under the NAF Key West BRAC program. The histories of these sites have been developed primarily from the Site Inspection (SI) Report for Nine BRAC Parcels (TtNUS, 1999b), the SSI Report for BRAC Parcels (TtNUS, 1999a), the SI Report for Poinciana Housing BRAC Parcel (B&RE, 1998) and the SSI Report for Poinciana Housing BRAC Parcel (TtNUS, 1999c). Summaries of the sites' histories are provided in the following paragraphs.

Polynuclear aromatic hydrocarbons (PAHs) such as benzo(a)pyrene that come from motor vehicle emissions are excluded from the definition of release under CERCLA. Therefore, PAHs found along roadways or in soils adjacent to roadways and parking areas do not fall under CERCLA regulation and are not addressed in this document. However, PAHs are taken into consideration in risk calculations where appropriate. This change from the proposed plans is further discussed in Section 2.8.

2.1.1 Hamaca Hawk Missile Site Sewage Lift Station and Areas Around Sediment Samples SD-05 and SD-08

Hamaca Hawk Missile Site (Figures 2-1 through 2-3) is located at the east end of Key West. Based on historical maps and aerial photographs, it is thought that the site was originally made up of salt ponds that were filled by the U.S. Army. This missile site was built in 1964 as a defense site to repel a possible Cuban and Russian attack. The site was used for coastal defense until the early 1980s, when it was

transferred to the Navy. The Navy did not use the property, but allowed homeless veterans to stay there in 1994 and 1995.

The Hamaca Hawk Missile Site is bordered on the south by Key West International Airport, where petroleum products are stored and used. The northern border is the Flagler Canal, a man-made canal connected to the Atlantic Ocean. The canal is used by private boats and appears to overflow onto the site at times. Woodlands and wetlands border the property to the east and west.

2.1.2 Truman Annex DRMO Waste Storage Area

Truman Annex DRMO Area includes Buildings 795, 284, and 261 and two large, fenced storage areas known as the Former Oil Container and Scrap Metal and Refugee Item Storage Area, collectively referred to as the DRMO Waste Storage Area. The DRMO Waste Storage Area (Figure 2-4) primarily stored metal debris. In addition, motors, vehicles, boats, refugee debris, and fuel trucks have been stored in those areas. Maps from the 1940s and 1950s indicate the presence of public works warehouses and oil racks within the storage areas.

2.1.3 Truman Annex DRMO Area Between Buildings 261 and 284

In the recent past, Building 261 (Figure 2-5) was used to store hazardous materials, and Building 284 stored inert materials. Oil may have been spread over this area in the past to control dust.

2.1.4 Truman Annex Former Location of Building 136

Building 136 (Figure 2-6) was located near the southern end of the East Quay Wall. The area has served as a docking and support facility for more than a century. Most records of the area date back to the period of World War II. In the late 1980s, the East Quay Wall waterfront was refurbished along with the Outer Mole Pier. Building 136 (Shipfitters and, prior to 1951, the Plate and Mold Shop) was demolished, and the debris was buried in and around the building's footprint until the mid-1990s. The debris was later removed for disposal.

2.1.5 Truman Annex Building 103

Truman Annex Building 103 (Figure 2-7) is located near the East Quay Wall. Building 103 is the former Central Power Plant and is still standing, but is out of service. Hazardous materials, specifically volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and inorganic compounds, are believed to have been used in the building. In addition, polychlorinated biphenyls (PCBs) are known to

have been present in transformers at Building 103. In the mid-1980s, these transformers were removed from the building. A petroleum Contamination Assessment Report (CAR) was prepared for the area around Buildings 102, 103, and 104 to address soils and groundwater impacted by petroleum products. The CAR recommended the preparation of a Remedial Action Plan (RAP) that was approved in April 1995 by FDEP (USN-NFEC, 1992, 1993).

2.1.6 Truman Annex Buildings 102 and 104

Truman Annex Buildings 102 and 104 (Figure 2-8) are located near the East Quay Wall, on either side of Building 103. Building 102 (Former Torpedo Overhaul and Storehouse) and Building 104 (Former Battery Overhaul and Storage) are still standing, but are out of service. Knowledge of the operations in these buildings is limited to naval submarine support activities. Hazardous materials, specifically VOCs, SVOCs, and inorganics, have probably been used in the buildings. Soils beneath the buildings have been identified as underground storage tank (UST) sites and are addressed as part of the Resource Conservation and Recovery Act (RCRA) UST program.

2.1.7 Truman Annex Building 223 Former Hazardous Waste Storage Area

Building 223 (Equipment Repair Shop) was built by the Army. The Navy subsequently used it as storage for Port Services. Little is known about previous activities in the building; however, the name implies that naval support equipment was repaired at the building. The closed hazardous waste storage area is south of Building 223. Metals, fuels, solvents, and inorganics were considered potential sources of contamination at Building 223, which was used as an equipment repair shop and a plumbing shop. These materials were likely stored in the hazardous waste storage area.

2.1.8 Truman Annex Former Lube Area

The Former Lube Area (Figure 2-10) is located across the street from Building 223 (Equipment Repair Shop) just south of the entrance to Fort Zachary Taylor State Park. Fuels, used oils, solvents, and metals were potential contaminants at the Former Lube Area.

2.1.9 Poinciana Housing

Poinciana Housing (Figures 2-11 and 2-12) lies on 33 acres on the east end of Key West and consists of 212 townhouse-type units constructed in 1966. The site is located in a residential/commercial area; recreational areas nearby include boating, a sports complex, malls, etc. Since 1942, the property has

been used as residential housing, with the Navy acquiring the property in 1947. No industrial activities have taken place at the site since its acquisition by the Navy.

2.2 PREVIOUS INVESTIGATIONS AND ENFORCEMENT ACTIVITIES

2.2.1 Previous Investigations

The following summaries of previous investigation are based on information from the SI (TtNUS, 1999b), the SSI (TtNUS, 1999a), the Poinciana Housing SI (B&RE, 1998), the Poinciana Housing SSI (TtNUS, 1999c), and material provided by the NAF Key West Partnering Team.

2.2.1.1 Hamaca Hawk Missile Site Sewage Lift Station

Existing documents include the United States Navy-Naval Public Works Center (USN-NPWC) Lead and Asbestos Survey of Hamaca Hawk Missile Site (USN-NPWC, 1995a), the United States Navy-Supervisor of Shipbuilding and Conversion and Repair, Environmental Detachment (USN-SUPSHIP) Predraft Environmental Baseline Survey (EBS) Realignment Parcels (USN-SUPSHIP, 1996), the Hamaca Hawk Missile Site CAR (BB&L, 1997), and the Supplemental Assessment Report (SAR) (BB&L, 1998). No previously existing soil, sediment, surface-water, or groundwater analytical data were included in the analysis of potential contamination at the Hamaca Hawk Missile Site (TtNUS, 1999b).

Based on the 1995 inspection performed by the NPWC, both lead-based paint (LBP) and asbestos-containing building materials (ACBMs) are present in the Hamaca Hawk Missile Site facilities and infrastructure. The CAR and SAR reported on the investigation of a discharge of diesel fuel at the former 2,000-gallon above-ground storage tank (AST). The reports concluded with a finding of no further action (TtNUS, 1999b).

The SI Report (TtNUS, 1999b) investigated several areas at the Hamaca Hawk Missile Site including the Drainage Area, the Sewage Lift Station, Generator Building I-6536, the Former Missile Maintenance Bay, and the Former Transformer Storage Area. At the Sewage Lift Station, arsenic was detected in excess of its action level in soil. Further action for the Sewage Lift Station was recommended in the SI Report. An IRA was performed in 1999 at the Sewage Lift Station as a result of this sampling.

The 1999 IRA at the Sewage Lift Station removed 2 feet of arsenic-contaminated soil to the concrete foundations to the south [AST and pumphouse structures and former Veterans Administration (VA) building], bedrock to the east, and below the action level for arsenic to the west (Figure 2-2). Clean fill was placed in the excavation to reduce the possibility of exposure to potentially contaminated soil below

2 feet. Since the foundation provides an engineering control on the south side of the excavation and the bedrock impedes further excavation to the east, LUCs were recommended for the site.

2.2.1.2 Areas Around SD-05 and SD-08 at Hamaca Hawk Missile Site

As discussed above, Hamaca Hawk Missile Site was investigated several times prior to the SI and SSI performed by TtNUS. During the SI, sediment and surface water were sampled at the Hamaca Hawk Missile Site. The SI sample results for sediment sample SD-05 indicated levels of an inorganic (lead) and a pesticide (4,4'-DDE) in excess of their applicable action levels. In 1999, an IRA was performed to remove contaminated sediment by means of a 60-foot by 60-foot by 1-foot deep excavation (Figure 2-3). After the excavation was complete, the sidewalls consisted of bedrock or mangrove root mass. Because there was no sediment to sample, no confirmation samples were taken. No clean fill was needed in the excavation.

The SI sample for SD-08 indicated levels of three inorganics (aluminum, lead, and vanadium) and a pesticide (4,4'-DDE) in excess of their applicable action levels. The IRA included a soil excavation 25-foot by 25-foot by 2 feet deep. Clean fill was placed in the excavation to reduce the possibility of exposure to potentially contaminated soil below 2 feet. Confirmation sampling was performed following the excavation. No analytes were detected at concentrations in excess of their action levels.

2.2.1.3 Truman Annex DRMO Waste Storage Area

Existing documents for Truman Annex DRMO Waste Storage Area include the USN-NPWC Lead and Asbestos Survey of Truman Pier (USN-NPWC, 1996) and the USN-NFEC NAF Key West Predraft EBS Truman Annex; Excess Property (USN-NFEC, 1996a)]. No soil or groundwater data existed prior to the SI performed by TtNUS.

Several areas required sampling and analysis under the BRAC SI. DRMO Waste Storage Area was investigated for soil contamination. Groundwater in this area was also investigated. Fuels, oils, and metals from past uses as a storage area for oil containers, scrap metal, and refugee items were considered to be potential surface soil contaminants. Several metals and one SVOC were identified in excess of action levels and further action was recommended.

Delineation sampling was performed during the SSI. Based on laboratory results of these samples, antimony, lead, and benzo(a)pyrene were found to exceed action levels. Lead concentrations indicated a significant noncarcinogenic health risk based on the residential scenario. Carcinogenic risk was also posed by arsenic. An IRA was recommended at DRMO Waste Storage Area. In 1999, an IRA was performed by excavating contaminated soils as described in the BRAC Fast Track Soil Removal

Completion Report (BEI, 1999). Excavation areas were determined based on SSI delineation sampling. The IRA removed approximately 12,000 cubic yards of contaminated soils from depths of 2 feet and 4 feet bls (Figure 2-4). Contaminants were left in place in the sidewalls of the excavation at several locations where the excavation was completed to existing structures (roads and paved areas). The existing structures provide protection to limit exposure to soils beneath them. Clean fill was placed in the excavation to reduce the possibility of exposure to the potentially contaminated soil remaining below the depth of excavation. LUCs were recommended for the site (TtNUS, 1999a).

2.2.1.4 Truman Annex DRMO Area Between Buildings 261 and 284

As stated previously, existing documents for Truman Annex DRMO Area include the USN-NPWC Lead and Asbestos Survey of Truman Pier (USN-NPWC, 1996) and the USN-NFEC NAF Key West Predraft EBS Truman Annex; Excess Property (USN-NFEC, 1996a). No soil or groundwater data existed prior to the SI performed by TtNUS.

Solvents, fuels, and pesticides were considered potential contaminants at the area between Buildings 261 and 284. The SI sampling results indicated levels of lead, benzo(a)pyrene, and Aroclor-1260 in excess of their applicable action levels. Due to these findings, further action was recommended in the SI. An IRA was performed in 1999 by excavating the soil in an area 40 feet by 140 feet to a depth of 2 feet (Figure 2-5). Confirmation sampling was performed, and no analytes were found to exceed their applicable action levels. Clean fill was placed in the excavation to reduce the possibility of exposure to potentially contaminated soil below 2 feet. No further action was recommended for the site in the SSI.

2.2.1.5 Truman Annex Former Location of Building 136

Existing documents for the Truman Annex Former Location of Building 136 include the USN-NFEC NAF Key West Predraft EBS Truman Annex; Excess Property (USN-NFEC, 1996a) and the USN-NFEC Draft EBS Truman Annex Outer Mole Pier 8/Buildings 149, 1374, 4080 (USN-NFEC, 1997).

Debris, lead, metals, solvents, and oils were considered potential soil contaminants at the Former Location of Building 136 from building operations including the Plate and Mold Shop and the demolished Building 136 that was reportedly buried on-site. SI sampling revealed arsenic, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene in excess of their action levels. The detected arsenic concentration was indicative of potential carcinogenic human health risks, and further action was recommended in the SI Report. Delineation sampling was performed in 1998 during the SSI, confirming the SI results and identifying an additional contaminant of concern (iron) at a concentration that exceeded its applicable action level. The IRA performed in 1999 at the Former Location of Building 136 removed almost 3,000 cubic yards of contaminated soil to a depth of 2 feet (Figure 2-6). Confirmation samples

were collected and analyzed following completion of the planned excavation as defined in the Bechtel Environmental, Inc. (BEI) Workplan (BEI, 1998). Results from this confirmation sampling showed the need for additional excavation. Soil was excavated to asphalt and concrete roads surrounding the site. Clean fill was placed in the excavation to reduce the risk of exposure to possible contamination remaining in soil below 2 feet. One contaminant of concern (arsenic) was detected at a concentration above its action level. Since an engineering control exists (road) at the location where arsenic was detected, LUCs were recommended in the SSI.

2.2.1.6 Truman Annex Building 103

In addition to documents listed in Section 2.2.1.5, additional documents pertaining to Truman Annex Building 103 include the USN-NFEC CAR Addendum for Electric Power Plant Building 103, (USN-NFEC, 1993), the USN-NFEC CAR for Electric Power Plant Building 103 (USN-NFEC, 1992), and the USN-NFEC RAP for Electric Power Plant Building 103 (USN-NFEC, 1994).

Fuel, oils, and PCBs were considered potential contaminants in surface soil at Building 103. These contaminants may have entered the soil during the period when Building 103 was used as a Power Plant. SI sampling detected several SVOCs and one PCB in excess of action levels. Concentrations of the detected analytes were indicative of potential carcinogenic human health risks. Further action was recommended for Building 103 in the SI Report.

Two soil excavations were performed at the Truman Annex Building 103, removing soil to depths ranging from 2 to 6 feet (Figure 2-7) as a result of the SI. A total of 1,022 cubic yards of contaminated soil was removed. No chemicals meeting the definition of a CERCLA release (CERCLA chemicals of concern) were detected at either of these locations above action levels during confirmation sampling. Clean fill was placed in the excavations to reduce any receptor exposure to potentially contaminated soil below 2 feet. The SSI Report prepared following this removal event recommended LUCs for Truman Annex Building 103.

As a response to public comment, an additional excavation was performed following the SSI to remove one remaining area of contamination where Aroclor-1254 was detected above its action level at 2160 µg/kg. A 10-foot by 10-foot area was excavated to a depth of two feet. Confirmation samples were collected, and no chemicals of concern were detected above their action levels. The area was backfilled to reduce any receptor exposure to potentially contaminated soil below two feet.

2.2.1.7 Truman Annex Building 102 and 104

Existing documents for Truman Annex Buildings 102 and 104 include the USN-NFEC NAF Key West Predraft EBS Truman Annex; Excess Property (USN-NFEC, 1996a) and the USN-NFEC Draft EBS Truman Annex Outer Mole Pier 8/Buildings 149, 1374, 4080 (USN-NFEC, 1997).

Acids, solvents, and fuel from building operations were considered as potential sources of soil contaminants at Buildings 102 and 104. Concentrations of benzo(a)pyrene and indeno(1,2,3-cd)pyrene were indicative of potential carcinogenic human health risks, and further action was recommended in the SI. The IRA at Buildings 102 and 104 at Truman Annex removed 2 feet of contaminated soil at each building (Figure 2-8). No CERCLA chemicals of concern were detected above action levels during confirmation sampling. Clean fill was placed in the excavation to bring the ground level back to grade. No further action was recommended for Truman Annex Buildings 102 and 104 in the SSI.

2.2.1.8 Truman Annex Building 223 Former Hazardous Waste Storage Area

Existing documents for Building 223 Former Hazardous Waste Storage Area include the USN-NFEC NAF Key West Predraft EBS Truman Annex; Excess Property (USN-NFEC, 1996a); the USN-NFEC NAF Key West Closure Report on Building 1276 (USN-NFEC, 1995); and the USN-NFEC NAF Key West Closure Report on Building 1287 (USN-NFEC, 1996b).

Metals, fuels, and solvents were considered potential sources of contamination at the Building 223 Former Hazardous Waste Storage Area. A single inorganic, arsenic, was detected above its action level and was indicative of potential carcinogenic and noncarcinogenic human health risks. Further action was recommended for the site in the SI Report. An IRA was performed in 1999 by excavating a 25-foot by 25-foot by 2-foot deep area (Figure 2-9). Confirmation samples were taken, and additional excavation was performed based on these sample results. Arsenic levels still remained in excess of the action level in the excavation sidewalls.

Therefore, as a response to public comment, additional excavations took place to remove remaining arsenic contamination, including removal of two concrete slabs. A second area north of Building 223 was also excavated due to arsenic contamination. Clean fill was placed in the excavation to reduce any receptor exposure to possible elevated levels of arsenic remaining in soil below 2 feet deep. One subsurface soil sample remains where arsenic was detected above its action level.

2.2.1.9 Truman Annex Former Lube Area

Existing documents for the Truman Annex Former Lube Area are the same as for the Building 223 Hazardous Waste Storage Area.

Fuels, used oils, solvents, and metals from ASTs (east side) supporting former garage facilities were considered to be potential surface soil contaminants at the Truman Annex Former Lube Area. The SI sampling revealed arsenic in soil in excess of its action level at one location. In 1999, an excavation 25-foot square and 2 feet deep was performed as part of an IRA at the site. Confirmation sampling was performed, and no analytes were detected in excess of action levels. Clean fill was placed in the excavation to return the site to grade. No further action was recommended for the Former Lube Area in the SSI Report.

2.2.1.10 Poinciana Housing

Based on inspections performed by the NPWC in 1995 and by CAPE Environmental in 1997, both LBP and ACBMs are present in Poinciana Housing structures. Lead was also detected in soil samples collected at Poinciana Housing during these investigations (USN-NPWC, 1995b; CAPE, 1997).

During the Poinciana Housing SI in 1998, arsenic was detected in groundwater at one well (MW-01) in excess of its action level. Quarterly monitoring in 1998 and 1999 also detected arsenic in excess of its action level in the same well. In 1999, the Poinciana Housing SSI resulted in the identification of two locations where arsenic in subsurface soils (greater than 2 feet bls) exceeded its action level. As a result, subsurface soil and groundwater land use controls are required based on subsurface soil and groundwater arsenic levels detected in the area of well MW-01.

Although arsenic contamination was found in subsurface soil, no contamination was found in surface soil. A 95 percent upper confidence level (UCL) of the mean contaminant concentration was calculated for arsenic in surface soil. The 95 percent UCL indicates with 95 percent confidence that the average concentration of arsenic in surface soil is not greater than the action level. No surface soil remedial action is recommended.

2.2.2 Enforcement Actions

No enforcement actions have been taken at the 10 BRAC sites.

2.2.3 Highlights of Community Participation

The Navy and NAF Key West have implemented a comprehensive public involvement program for many years. Starting in January 1989, a Technical Review Committee (TRC) met, on average, twice a year to discuss issues related to investigative activities at NAF Key West. The TRC was composed mostly of government personnel; however, a few private citizens occasionally attended the meetings.

In the fall of 1995, the Navy converted the TRC into a Restoration Advisory Board (RAB), and five community representatives joined the RAB. The RAB is co-chaired by a community member and a Navy member. RAB meetings are held approximately every four months. The SI, SSI, and Proposed Plans for the 10 BRAC sites were discussed at several RAB meetings.

Community relations activities related to the remedy selection process for the 10 BRAC sites include the following:

- The documents concerning the investigations and analyses at the 10 BRAC sites and copies of the Proposed Plans were placed in the Information Repository at the Monroe County Library, Key West, Florida.
- A newspaper announcement on the availability of the documents and the public comment period/meeting date was placed in the *Key West Citizen* on September 19, 1999.
- The Navy established a 30-day public comment period starting September 19, 1999, and ending October 19, 1999, to present the Proposed Plans. Written comments were received during the 30-day public comment period from the Director of the Local Redevelopment Authority (LRA) and one of the community RAB members. Responses to the written comments are included in the Responsiveness Summary (Appendix A).
- A public meeting was held September 27, 1999, to answer questions concerning the Proposed Plans for the 10 BRAC sites. Approximately 20 people, including federal, state, and local government representatives attended the meeting. Responses to oral comments raised by members of the public during the meeting are summarized in the Responsiveness Summary (Appendix A).
- On December 6, 1999, a meeting was held with the RAB to share with the community the significant comments received on the proposed plans and the Navy's proposed responses to comments. As a result of this follow-up meeting, the NAF Key West Partnering Team was able to come to agreement

- on several changes to the proposed remedies described in the proposed plans. These changes are discussed further in sections 2.6 and 2.8 of this document.

2.3 SCOPE AND ROLE OF RESPONSE ACTION

2.3.1 Hamaca Hawk Missile Site Sewage Lift Station

The remedial action described in this portion of the Decision Document addresses the remaining soil contamination associated with Hamaca Hawk Missile Site Sewage Lift Station, as identified in the SSI Report and Proposed Plan. Past operations at the site are believed to be the source of soil contamination at the site.

Human health risks were calculated for remaining contamination at Hamaca Hawk Missile Site Sewage Lift Station and are discussed in Section 2.5 of this document. Approximately 45 cubic yards of arsenic-contaminated soil were removed from the Sewage Lift Station. However, confirmation sampling located one arsenic detection at 21.4 mg/kg above its action level of 2.7 mg/kg. This exceedance was located beneath a concrete foundation adjacent to the VA Building, which provides protection from exposure, so no further excavation was performed. However, LUCs, including restrictions recorded in property transfer documents, will be required to ensure the integrity of this engineering control.

2.3.2 Area Around SD-05 and SD-08 at Hamaca Hawk Missile Site

Metals and pesticides were the most frequently detected contaminants in the sediment at Hamaca Hawk Missile Site.

The IRA at SD-05 removed 1 foot of sediment from the area around the sample location. No confirmation samples were taken because the sidewalls consisted of bedrock or mangrove root mass. The IRA removed 2 feet of soil from the area around SD-08. A total of 93 cubic yards of soil and sediment were removed. Confirmation sampling showed that the SI analytes of concern, 4,4'-DDE, aluminum, lead, and vanadium, were reduced to below action levels. Clean fill was placed in the excavation around SD-08 to return the area to grade. No further action is planned at the areas around SD-05 and SD-08 at the Hamaca Hawk Missile Site.

2.3.3 Truman Annex DRMO Waste Storage Area

Metals and SVOCs were the most frequently detected contaminants at the DRMO Waste Storage Area. The IRA removed more than 12,000 cubic yards of contaminated soil to depths of 2 to 4 feet. A total of

112 confirmation samples were collected from the perimeter of the excavation. Several inorganics were detected above action levels, although reductions in their concentrations were observed. Locations of these exceedances are in areas where the excavation was completed to an existing structure (i.e., underground utilities that prohibit excavation or roads and concrete pads that provide controls to cap soil and limit possible exposure). Human health risks were calculated for remaining contamination at Truman Annex DRMO Waste Storage Area and are discussed in Section 2.5 of this document.

LUCs are the selected remedy for the Truman Annex DRMO Waste Storage Area. The previous soil removal eliminated the need for additional remedial action. The LUCs, including restrictions recorded in property transfer documents, will be required to ensure the integrity of the engineering controls.

2.3.4 Truman Annex DRMO Area Between Buildings 261 and 284

In the past, Building 261 was used to store hazardous materials. During the SI sampling, lead, benzo(a)pyrene, and Aroclor-1260 were detected above their respective action levels. The IRA performed in 1999 at this area removed approximately 300 cubic yards of soil to caprock. Confirmation samples were collected, and no analytes were detected above action levels. Clean fill was placed in the excavation. No further action is the selected remedy at the Truman Annex DRMO Area Between Buildings 261 and 284.

2.3.5 Truman Annex Former Location of Building 136

The SI sample results for this site indicated three SVOCs [benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene] at concentrations in excess of their respective action levels of 100 µg/kg, 1,400 µg/kg, and 1,400 µg/kg. Arsenic was also found at a concentration in excess of the NAF Key West Partnering Team's selected action level of 2.7 mg/kg. IRA delineation sampling identified an additional metal (iron) in excess of its action level of 23,000 mg/kg. The IRA at the Former Location of Building 136 removed almost 3,000 cubic yards of contaminated soil to a depth of 2 feet. After the IRA, arsenic was left in place above its action level at one location because the excavation was completed to an existing structure (road) that provides an engineering control to prevent exposure. Clean fill was placed in the excavation to return the site to grade. Human health risks were calculated for remaining contamination at Truman Annex Former Location of Building 136 and are discussed in Section 2.5 of this document.

2.3.6 Truman Annex Building 103

The SI sample results at Building 103 indicated several SVOCs and one PCB in excess of action levels. The Engineer's Evaluation/Cost Analysis (EE/CA) for Alternatives for BRAC Fast Track Soil Removal Parcels (TtNUS, 1998a) and the Action Memorandum for BRAC Fast Track Soil Removal Parcels

(TtNUS, 1998b) briefly describe contamination at Building 103, remedial alternatives evaluated for the IRA, and costs associated with remediation. The IRA at Building 103 removed a total of 1,022 cubic yards of contaminated soil from the area between Buildings 103 and 104 and an area west of Building 103. Confirmation samples indicated that no contaminants of concern with concentrations in excess of action levels remain at Building 103. Clean fill was placed in the excavation to return the site to grade. Human health risks were calculated for remaining contamination at Truman Annex Building 103 and those calculations confirmed a risk remained at the site due to the detection of a single PCB in a soil sample to the north of Building 103.

An additional IRA was performed north of Building 103 to remove an isolated detection of a PCB in soil. The 2000 IRA removed 11 cubic yards of contaminated soil to a depth of 2 feet. Clean fill was placed in the excavation to return the site to grade. Confirmation samples indicated that no PCB contaminants with concentrations in excess of action levels remained at the excavation site. Human health risks were calculated for remaining contamination at Truman Annex Building 103 and are discussed in Section 2.5 of this document. No further action is the selected remedy at Truman Annex Building 103.

2.3.7 Truman Annex Buildings 102 and 104

The SI sample results for Buildings 102 and 104 indicated two SVOCs [benzo(a)pyrene and indeno(1,2,3-cd)pyrene] in excess of action levels. Although the chemicals are excluded under the CERCLA definition of a release, further action was recommended in the SI. The SSI sampling revealed three inorganic compounds in excess of action levels beneath the buildings. However, the areas under these buildings have been identified as UST sites and are addressed as part of the RCRA UST program. The EE/CA and the Action Memorandum briefly describe contamination at Buildings 102 and 104, remedial alternatives evaluated for the IRA, and costs associated with remediation. The IRA at Buildings 102 and 104 excavated two separate areas of contaminated soil to a depth of 2 feet. Clean fill was placed in the excavation to bring the ground level back to grade. Human health risks were calculated for remaining contamination at Truman Annex Buildings 102 and 103 and are discussed in Section 2.5 of this document. No further action is the selected remedy at Truman Annex Buildings 102 and 104.

2.3.8 Truman Annex Building 223 Former Hazardous Waste Storage Area

The SI sampling results indicated two inorganic (arsenic) concentrations in excess of its action level (2.7 mg/kg) at two locations with concentrations of 3.2 mg/kg (F03-SS-03) and 16.8 mg/kg (F03-SS-04) north of Building 223, and near the Hazardous Waste Storage Area, respectively. The SSI report describes in detail the 1999 IRA performed and locations and results of confirmation samples taken at the site. Approximately 62 cubic yards of contaminated soil were removed from the Building 223 Former Hazardous Waste Storage Area to a depth of 2 feet. However, the soil excavation was impeded by

concrete foundations and a base road. Arsenic contamination remained in excess of its action level as shown by confirmation samples taken at the site in 1999. Human health risks were calculated for remaining contamination at Truman Annex Building 223 Former Hazardous Waste Storage Area and those calculations confirmed a risk remained at the excavation site.

An additional IRA was performed at the Building 223 Former Hazardous Waste Storage Area to remove arsenic contaminated soils. The 2000 IRA removed 6 cubic yards of contaminated soil to a depth of 2 feet. The Former Hazardous Waste Storage Area structure and concrete slab were also removed during the excavation. One confirmation sample (B223-01) taken from the floor of the excavation had an arsenic concentration greater than the action level. Clean fill was placed in the excavation to return the site to grade.

However, the one location (F03-SS-03) of soil arsenic exceedance (3.2 mg/kg) remained to the north of Building 223. An excavation was performed in February 2001 to remove this remaining contamination. Confirmation samples indicated that arsenic was below its action level. Human health risks are calculated for this remaining contamination at Truman Annex Building 223 and are discussed in section 2.5 of this document.

LUCs are the selected remedy for the area between the pads at the former Hazardous Waste Storage Area. LUCs are necessary at the site, including deed restrictions (institutional controls) that require anyone who disturbs the soil at the site to comply with appropriate laws and regulations as discussed in Section 2.6.

2.3.9 Truman Annex Former Lube Area

The SI sampling results indicated only one inorganic (arsenic) at one location in excess of its action level of 2.7 mg/kg. Further action was recommended in the SI Report. An IRA was performed in 1999 at the Former Lube Area, excavating approximately 62 cubic yards of contaminated soil to a depth of 2 feet. The SI analyte of concern, arsenic, showed a reduction in concentration from 5.2 mg/kg before excavation to values ranging from 0.63 to 1.9 mg/kg after excavation. The 95 percent confidence level required by the NAF Key West Partnering Team states that all contaminants in exposed soils above 2 feet be below action levels; this level was achieved at the site. Clean fill was placed in the excavation and graded. No further action is the selected remedy at the Truman Annex Former Lube Area.

2.3.10 Poinciana Housing

In 1998, the SI detected arsenic in excess of its action level in groundwater (50 µg/L) in monitoring MW-01. Quarterly monitoring in 1998 and 1999 also detected arsenic in excess of its action level in the same well. In 1999, the SSI identified two locations where arsenic in subsurface soil (greater than 2 feet bls) exceeded its action level of 2.7 mg/kg. However, excavation of soil greater than 2 feet bls was not deemed practical for this site. In addition, the site groundwater is not used for irrigation or consumption because the residents of Poinciana Housing receive their water via municipal/state supply. The selected remedy at Poinciana Housing is LUCs which would protect the public by impeding any digging/excavation activities and access to groundwater in the area of monitoring well MW-01.

2.4 SUMMARY OF SITE CHARACTERISTICS

The site characterizations for the 10 BRAC sites were completed in phases. In 1997 and 1998, the initial SI was performed, and samples were collected and analyzed to determine the nature of contaminants present at the BRAC sites. In 1998, delineation sampling and additional characterization sampling were performed as part of the SSI. IRAs were performed during the winter and spring of 1999 at all the BRAC sites except for Poinciana Housing. All IRAs performed as part of the SSI involved soil and sediment excavations. Confirmation sampling was performed immediately following the IRAs to determine if further action was necessary.

2.4.1 Sources of Contamination

The potential sources of contamination at the 10 BRAC sites are presented in the following sections. This information is based primarily on the SI and SSI reports.

2.4.1.1 Hamaca Hawk Missile Site Sewage Lift Station

Building activities are potential sources of contamination at Hamaca Hawk Missile Site Sewage Lift Station.

2.4.1.2 Areas Around SD-05 and SD-08 at Hamaca Hawk Missile Site

The storage and/or use of petroleum products, solvents, electrical batteries, lead, hazardous waste, and pesticides at Hamaca Hawk Missile Site are potential sources of sediment contamination.

2.4.1.3 Truman Annex DRMO Waste Storage Area

The storage and/or use of fuels, oil, and metals are potential sources of soil contamination at the DRMO Waste Storage Area.

2.4.1.4 Truman Annex Area Between Buildings 261 and 284

The storage and/or use of solvents, fuels, and pesticides are potential sources of soil contamination at the Truman Annex Area between Buildings 261 and 284.

2.4.1.5 Truman Annex Former Location Building 136

Debris, lead, metals, solvents, and oils from Building 136 operations, including the Plate and Mold Shop and any demolished Building 136 debris that was buried on-site, are potential sources of soil contamination.

2.4.1.6 Truman Annex Building 103

Fuel, oils, and PCBs from building operations (Power Plant) are potential sources of soil contamination at Building 103.

2.4.1.7 Truman Annex Buildings 102 and 104

Acids, solvents, and fuel from building operations (torpedo and battery overhaul) are potential sources of soil contamination at Buildings 102 and 104.

2.4.1.8 Truman Annex Building 223 Former Hazardous Waste Storage Area

Metals, fuels, and solvents are potential sources of soil contamination at Building 223 Former Hazardous Waste Storage Area.

2.4.1.9 Truman Annex Former Lube Area

Fuels, used oils, solvents, and metals from ASTs supporting former garage facilities are potential sources of soil contamination at the Former Lube Area.

2.4.1.10 Poinciana Housing

Hazardous substances and petroleum products stored and used at the housing area are potential sources of soil and groundwater contamination.

2.4.2 Description of Contamination

The following descriptions of contamination are based on information from the SI and SSI Reports. All contaminants remaining above action levels are presented in Table 2-1 by site.

2.4.2.1 Hamaca Hawk Missile Site Sewage Lift Station

Arsenic was detected above its 2.7 mg/kg action level in two surface soil samples collected during the 1998 SI.

Arsenic showed a reduction in concentration from 28.8 mg/kg at one location before the IRA to exceedance of 21.4 mg/kg after the IRA. However, this exceedance was located beneath a concrete foundation adjacent to the VA Building. Due to the foundation location and the protection provided by it, no further excavation was performed. Clean fill was placed in the excavation to return the site to grade.

2.4.2.2 Areas Around SD-05 and SD-08 at Hamaca Hawk Missile Site

SI results for sediment sample SD-05 indicated concentrations of cadmium, bis(2-ethylhexyl)phthalate, and 4,4'-DDE in excess of FDEP action levels of 0.676 mg/kg, 182 µg/kg and 2.07 µg/kg, respectively. In the same sample, butyl benzyl phthalate was detected in excess of its EPA action level of 63 µg/kg, and lead was found to exceed the NAF Key West Partnering Team selected action level for sediment of 34.18 mg/kg. Results for sediment sample SD-08 indicated concentrations of aluminum, lead, and vanadium above NAF Key West Partnering Team selected action levels of 2,664 mg/kg, 34.18 mg/kg, and 10.44 mg/kg, respectively. In the same sample, 4,4'-DDE was also detected above the FDEP action level of 2.07 µg/kg.

Following the IRA, no confirmation sampling could be performed at the location of SD-05 because the sidewalls consisted of bedrock or mangrove root mass. At the area around SD-08, SI analytes of concern 4,4'-DDE, aluminum, lead, and vanadium were reduced to below their action levels. During the SI, 4,4'-DDE was detected at 7.5 µg/kg, but was not detected in any of the confirmation samples. Aluminum was reduced from 3,680 mg/kg to a maximum detected concentration (MDC) of 568 mg/kg, and lead was reduced from 81.6 mg/kg to 5.1 mg/kg. The last analyte of concern, vanadium, was reduced from

14.4 mg/kg to 3.4 mg/kg. Clean fill was placed in the excavation around SD-08 to return the area to grade.

2.4.2.3 Truman Annex DRMO Waste Storage Area

The 1998 SI results for samples taken at the DRMO Waste Storage Area indicated levels of two inorganics, lead and antimony, and one SVOC, benzo(a)pyrene (excluded under CERCLA near road and parking areas), in excess of their respective FDEP residential action levels of 500 mg/kg, 26 mg/kg, and 100 µg/kg. Delineation sampling at the DRMO Waste Storage Area was performed during the 1998 SSI. One additional inorganic, arsenic, was detected in excess of its NAF Key West Partnering Team selected action level of 2.7 mg/kg at six locations during this sampling event.

Following the IRA at the DRMO Waste Storage Area, reductions were observed for the remaining analytes of concern; however, these analytes are still present at concentrations in excess of their action levels. Arsenic showed a reduction in MDC from 6.2 mg/kg before excavation to 4 mg/kg following excavation. Antimony showed a reduction from 41.1 mg/kg before the excavation to 30.6 mg/kg following the excavation. Lead also showed a reduction in concentration from 7,690 mg/kg before excavation to an MDC of 2,890 mg/kg following excavation. Manganese was detected at 656 mg/kg in excess of its action level of 370 mg/kg. Manganese had not been previously detected above its action level at DRMO Waste Storage Area. Even though reductions in concentrations were observed following excavation for these analytes, levels in excess of their respective action levels still remain in the sidewalls of the excavation. However, these locations are in areas where the excavation was completed to an existing structure (road or concrete pad), which provides controls to cap soil and limit possible exposure.

2.4.2.4 Truman Annex DRMO Area Between Buildings 261 and 284

SI sample results for samples taken between Buildings 261 and 284 indicated levels of lead, benzo(a)pyrene (excluded from CERCLA along roads), and Aroclor-1260 in excess of their respective FDEP residential action levels.

Following the IRA, eight confirmation samples were taken from the sidewalls of the excavation area. Aroclor-1260 also showed a reduction in concentration from 2,700 µg/kg to non-detectable levels. Lead showed a reduction from 978 mg/kg before the excavation to an MDC of 75.6 mg/kg following excavation. No other analytes were found to exceed FDEP or NAF Key West Partnering Team selected action levels.

2.4.2.5 Truman Annex Former Location of Building 136

The SI results for the Former Location of Building 136 indicated three SVOCs, benzo(a)pyrene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene, at concentrations in excess of their respective FDEP residential action levels of 100 µg/kg, 1,400 µg/kg, and 1,400 µg/kg. Arsenic was also found at a concentration in excess of the NAF Key West Partnering Team's selected action level of 2.7 mg/kg. IRA delineation sampling conducted during the SSI identified an additional inorganic (iron) in excess of its EPA action level of 23,000 mg/kg. Action levels were adjusted using EPA guidance to appropriately compare composite sample data collected during delineation sampling.

Following the IRA, iron showed a reduction in concentration at two sample locations from 15,000 mg/kg and 894 µg/kg before excavation to 2,390 mg/kg and 701 µg/kg after excavation. Arsenic showed reductions from a range of 2.7 mg/kg to 4.5 mg/kg at seven locations before excavation to only one result above the action level at 2.9 mg/kg following excavation. However, the location where arsenic was left in place in excess of its action level is in an area where the excavation was completed to an existing structure (road) that provides engineering controls to cap soil and limit possible exposure. Clean fill was placed in the excavation to return the site to grade.

2.4.2.6 Truman Annex Building 103

The SI results at Building 103 indicated several SVOCs and one PCB in excess of FDEP action levels. Benzo(a)pyrene was found in excess of its 100 µg/kg FDEP action level with a concentration of 31,800 µg/kg. Benzo(a)anthracene, benzo(b)fluoranthene, and indeno(1,2,3-cd)pyrene were found to exceed their FDEP action level of 1,400 µg/kg with concentrations of 40,100 µg/kg, 48,900 µg/kg, and 15,600 µg/kg respectively. Benzo(k)fluoranthene was found to exceed its FDEP action level of 14,000 µg/kg with a concentration of 20,900 µg/kg. Although these PAHs are excluded under CERCLA near roads and parking areas, remedial actions were executed. Aroclor-1254, a PCB, was found to exceed its FDEP action level of 900 µg/kg at two locations with respective concentrations of 1,820 µg/kg and 2,160 µg/kg.

Following the 1999 IRA, 11 confirmation samples were collected from the perimeters of the two excavations and analyzed for SVOCs and PCBs. Following the excavation, the area west of Building 103 showed a reduction of Aroclor-1254 to below the detection limit. No contaminants of concern were detected above action levels following the IRA at Building 103.

The sampling location north of Building 103 (E09-SS-02) where Aroclor-1254 was found at 2,160 µg/kg is in excess of its FDEP action level. The NAF Key West Partnering Team evaluated this finding and determined that a 10-foot by 10-foot area would be excavated at that location to a depth of 2 feet. The

2000 IRA removed a 14-foot by 14-foot area to a depth of 2 feet. Four confirmation samples were collected for the perimeter and analyzed for PCBs. Each sample was found to be below the detection limit for PCBs (900 ug/kg). This is discussed in Section 2.8 of this document.

2.4.2.7 Truman Annex Buildings 102 and 104

The SI sample results for samples taken at Buildings 102 and 104 indicated two SVOCs [benzo(a)pyrene and indeno(1,2,3-cd)pyrene] in excess of their respective FDEP residential action levels of 100 µg/kg and 1,400 µg/kg. SSI sampling results also indicated three (lead, beryllium, cadmium, and arsenic) in excess of FDEP and NAF Key West Partnering Team selected action levels at locations beneath the buildings. However, the areas under these buildings have been identified as UST sites and they are addressed as part of the RCRA UST program.

Following the IRA, no contaminants of concern were detected above action levels.

2.4.2.8 Truman Annex Building 223 Former Hazardous Waste Storage Area

The SI results for Building 223 Hazardous Waste Storage Area indicated only one inorganic (arsenic) at one location in excess of its NAF Key West Partnering Team's selected action level of 2.7 mg/kg, with a concentration of 16.8 mg/kg.

Following the IRA at Building 223 Hazardous Waste Storage Area, arsenic contamination remains in excess of its NAF Key West Partnering Team selected action level at three sampling locations with respective concentrations of 26.5, 3.1 and 4.7 mg/kg. These concentrations are less than one-third of the level found prior to the excavation.

2.4.2.9 Truman Annex Former Lube Area

The SI results for the Former Lube Area indicated only one inorganic (arsenic) at one location in excess of its NAF Key West Partnering Team selected action level (2.7 mg/kg).

Following the IRA, arsenic showed a reduction in concentration from 5.2 mg/kg before excavation to values ranging from 0.63 to 1.9 mg/kg after excavation. The 95 percent confidence level set by the NAF Key West Partnering Team required that all contaminants in exposed soils 0 to 2 feet bls be below their respective action levels. This goal was achieved at the site.

2.4.2.10 Poinciana Housing

In 1998, the SI detected arsenic in excess of the Florida MCL of (50 µg/L) in monitoring well MW-01. Quarterly monitoring in 1998 and 1999 also detected arsenic in excess of the MCL in the same well. The results for arsenic ranged from 78.3 µg/kg to 624 µg/kg in MW-01. In 1999, the SSI identified two locations where arsenic in subsurface soils (greater than 2 feet bls) exceeded the NAF Key West Partnering Team's selected action level of 2.7 mg/kg. However, a 95 percent confidence level was calculated showing that arsenic does not exceed the 2.7 mg/kg action level in surface soil (0 to 2 feet bls) at Poinciana Housing.

2.4.3 Contaminant Migration

The following summaries of potential contaminant migration pathways are based on information from the SI and SSI Reports.

2.4.3.1 Hamaca Hawk Missile Site

The three locations at Hamaca Hawk Missile Site discussed in this Decision Document contained sediment and soil contaminants as identified during the SI. However, the majority of these contaminated soils were removed from these sites during the IRAs conducted in 1999. The only location where a contaminant was left in place at Hamaca Hawk Missile Site is in soil beneath an existing structure at the Sewage Lift Station location (Figure 2-2). Volatilization, wind erosion, and overland runoff from this location are no longer release pathways to any measurable degree because the contaminant is covered by a permanent structure and no exposure routes exist due to the protection provided by this cover.

2.4.3.2 Truman Annex

The following summaries of potential contaminants for the eight sites at Truman Annex addressed in this Decision Document are based on information from the SI and the SSI Reports. IRAs were performed at all eight sites at Truman Annex because soil contaminants were identified during the SI and SSI sampling events.

2.4.3.2.1 DRMO Area Between Buildings 261 and 284 and the Former Lube Area

All contaminants were removed during the IRAs at the area between Buildings 261 and 284 and the Former Lube Area. Since no contaminants exist above action levels in these areas, contaminant migration is not an issue for these two sites.

2.4.3.2.2 DRMO Waste Storage Area

The contaminant source at the DRMO Waste Storage Area is soil contaminated from past storage activities of oil racks, metals, and equipment. However, 12,000 cubic yards of contaminated soil was removed during the 1999 IRA. The remediated area was backfilled, significantly reducing potential exposure via the surface soil migration pathway. In some cases, contaminants were left in place in the sidewalls of the excavation due to obstructions such as roads, paved parking areas, and underground utilities. In the case of the roads and parking areas, these structures provide controls that cap soil and limit possible exposure and migration. Groundwater data collected during the SI indicate that contaminants from soil have not migrated to the groundwater over time. Therefore, contaminant migration through groundwater flow is not expected.

2.4.3.2.3 Truman Annex Former Location of Building 136

The contaminant source at the Former Location of Building 136 is soil contaminated from past naval support activities. Approximately 3,000 cubic yards of contaminated soil were removed during the 1999 IRA. The remediated area was backfilled, significantly reducing migration via the surface soil migration pathway. The excavation was performed to remove all exposed soils from 0 to 2 feet. A contaminant was left in place in the sidewall of the excavation at one location; however, the excavation was completed to an existing structure (road) that provides an engineering control to cap soils and limit possible exposure and migration. Groundwater data collected during the SI indicate that contaminants from soil have not migrated to the groundwater over time. Therefore, contaminant migration through groundwater flow is not expected.

2.4.3.2.4 Building 103

The contaminant source at Building 103 is soil contaminated from past naval support, including torpedo and battery overhaul activities and the generation of electricity by diesel generators. Approximately 1,000 cubic yards of contaminated soil were removed from two separate excavations during the 1999 IRA. The remediated areas were backfilled, significantly reducing potential exposure via the surface soil migration pathway. One contaminant above its action level was left in place at one location north of Building 103 (E09-SS-02); however, a 10-foot by 10-foot by 2-foot area will be excavated to remove contaminated soil in this area (Figure 2-7). This remedial action is discussed in Section 2.8 of this document. Since no contaminants of concern exist above action levels at Building 103, contaminant migration is not an issue.

Groundwater data collected during the SI and SSI indicate that petroleum products have impacted the groundwater as result of nearby USTs. A CAR and RAP have been developed; implementation of the RAP is pending. Although the groundwater contamination associated with Building 103 is not addressed

as part of this Decision Document, it is being addressed under the Finding of Suitability to Transfer (FOST) documentation.

2.4.3.2.5 Buildings 102 and 104

The contaminant source at Buildings 102 and 104 is soil contaminated from past naval support activities such as torpedo and battery overhaul activities and storage. A large volume of contaminated soil (1,022 cubic yards) was removed from two separate excavations during the IRA conducted in 1999. The remediated areas were backfilled, significantly reducing potential migration via the surface soil migration pathway. No contaminants of concern remain above action levels at Buildings 102 and 104.

Groundwater data collected during the SI and SSI indicate that petroleum products have impacted the groundwater as a result of nearby USTs. A CAR and RAP have been developed; implementation of the RAP is pending. Therefore, the groundwater contamination associated with Buildings 102 and 104 is not addressed as part of this Decision Document; however, it is being addressed under the FOST documentation.

2.4.3.2.6 Building 223 Former Hazardous Waste Storage Area

The contaminant source at the Building 223 Former Hazardous Waste Storage Area is soil contaminated with arsenic from hazardous materials storage activities. Approximately 62 cubic yards of contaminated soil were removed during the IRA conducted in 1999. The remediated area was backfilled, significantly reducing potential exposure via the surface soil migration pathway. At two locations, contaminants were left in place in the sidewall of the excavation, each beneath the former storage area foundation (F3-CONF-06 and F3-CONF-07). As explained in Section 2.3.8, further remedial action to remove arsenic-contaminated soils will be performed. Contaminant migration through groundwater flow is not expected.

2.4.3.3 Poinciana Housing

Analytical results from the Poinciana Housing SSI indicate that an on-site source is responsible for the elevated level of arsenic in groundwater at GMW-01. Arsenic was not detected in upgradient monitoring wells or in a deep well (GMW-02) located near GMW-01. Groundwater at Poinciana Housing is assumed to flow north toward a pond that may support some of the same terrestrial and aquatic vertebrate species associated with mangrove swamp communities. This pond is approximately 480 feet from MW-01 and is the only possible habitat for receptors at Poinciana Housing. A groundwater monitoring report was prepared in December 1998 and includes groundwater modeling to determine the maximum future arsenic concentration in pond groundwater and the time required for migration of the groundwater to the pond (TtNUS, 1998c). This modeling was performed prior to SSI sampling at Poinciana Housing.

Modeling was performed for the lowest and highest detected arsenic concentrations in groundwater, 102 µg/L (detected in February 1998) and 624 µg/L (detected in October 1998), and for two different plume sizes, 100 feet by 100 feet and 200 feet by 200 feet. The results for an arsenic concentration of 102 µg/L range from an arsenic concentration of 89.5 µg/L in 540 years for a 100-square foot plume to a concentration of 81.9 µg/L in 480 years for a 200-square foot plume in groundwater at the receptor. For an arsenic concentration of 625 µg/L in groundwater at GMW-01, the results range from 312.6 µg/L in 400 years for a 100-square foot plume to 247.6 µg/L in 360 years for a 200-square foot plume in groundwater at the receptor. As shown by the modeling, the time required for the arsenic plume to migrate is more than 300 years, according to the most conservative scenario.

In addition, sampling performed during the Poinciana Housing SSI indicated that the contaminant plume is significantly smaller than was assumed in the groundwater model. Arsenic was not detected above its action level (50 µg/L) in any monitoring wells installed at Poinciana Housing during the SSI. Arsenic was not detected above its action level in any surface soil samples. Two subsurface soil samples taken during the SSI detected arsenic above its soil action level (2.7 mg/kg). Both samples were located within 25 feet of monitoring well GMW-01. The locations of the arsenic exceedances are shown in Figure 2-12. For these reasons, the contaminant plume is assumed to be very small and localized, and migration of the plume to the pond is not expected to cause significant ecological risks.

2.5 SUMMARY OF SITE RISKS

Human health risks were evaluated for each BRAC site where chemicals remain in soil above their respective action levels. These chemicals are currently covered with 2 or more feet of clean backfill or engineering control such as a concrete based structure or roadway. In addition, the sites will be managed by institutional controls and, as applicable, engineering controls to prevent unauthorized disturbance of soil at each site. The purpose of residual risk evaluations (RRE) was to provide the decision makers with risk-based information for use in selecting appropriate final remedies at some of the BRAC sites. The sites where RRE were performed included the Hamaca Hawk Missile Site Sewage Lift Station, Truman Annex DRMO Waste Storage Area, Truman Annex Former Location of Building 136, Truman Annex Buildings 102, 103, and 104, and Truman Annex Building 223 Hazardous Waste Storage Area. Exposure scenarios were developed to be consistent with the proposed re-use of property at each of these sites, and the baseline human health risk assessment performed during the Supplemental RCRA Facility Investigation/Remedial Investigation (RFI/RI) Report for Eight Sites at NAF Key West (B&RE, 1998). These scenarios include maintenance, occupational and excavation workers, and adolescent, adult, and lifetime trespassers. No ecological risk calculations were required at these BRAC sites, because ecological risks are mitigated by the lack of terrestrial habitat.

2.5.1 Human Health Risk Evaluation

Chemicals used in the human health risk evaluations include any organic with a 95 percent UCL of mean contaminant concentration in excess of its action level and any inorganic having 95 percent UCL of mean contaminant concentration greater than 10 percent of its action level. The 95 percent UCL of a mean contaminant concentration is a statistical calculation that determines with a 95 percent confidence level that the mean contaminant concentration is not above its respective action level. In addition, any chemical remaining above its action level at sites with too few data points to calculate the 95 percent UCL (Hamaca Hawk Missile Site Sewage Lift Station and Truman Annex Building 223 Hazardous Waste Storage Area) was included in the risk calculations. As stated in Section 2.1 and discussed fully in Section 2.6, PAHs located at the BRAC sites are not considered a release under CERCLA because these chemicals are attributed to vehicle traffic because of their locations near roadways. However, risk calculations were performed using the chemicals. Table 2-2 provides calculated risks (excluding PAH data) for the six sites requiring risk calculations. Table 2-3 provides calculated risks, including PAH data, for the BRAC sites requiring human health risk evaluations. Since Truman Annex Buildings 102, 103, and 104 are adjacent to each other, these buildings were considered one site for risk calculations. A detailed discussion of the human health risk calculations is included in Appendix D.

2.5.1.1 Hamaca Hawk Missile Site Sewage Lift Station

Carcinogenic Risks. The estimated reasonable maximum exposure (RME) incremental cancer risk (ICR) for an occupational worker exposed to chemicals of potential concern (COPCs) in soil at Sewage Lift Station (inorganics only) was $1.4E-05$, which is within EPA's target risk range of $1.0E-04$ to $1.0E-06$ and above FDEP's threshold value of $1.0E-06$. The estimated ICR for a maintenance worker exposed to COPCs in soil at Sewage Lift Station (inorganics only) was $1.6E-06$, which was within EPA's target risk range of $1.0E-04$ to $1.0E-06$ and above FDEP's threshold value of $1.0E-06$. The estimated ICR for an adolescent trespasser exposed to COPCs in soil at Sewage Lift Station (inorganics only) was $2.4E-06$, which was within EPA's target risk range of $1.0E-04$ to $1.0E-06$ and above FDEP's threshold value of $1.0E-06$. The estimated ICR for an adult trespasser exposed to COPCs in soil at Sewage Lift Station (inorganics only) was $2.3E-06$, which was within EPA's target risk range of $1.0E-04$ to $1.0E-06$ and above FDEP's threshold value of $1.0E-06$. The estimated ICR for a lifetime trespasser exposed to COPCs in soil at Sewage Lift Station (inorganics only) was $4.7E-06$, which was within EPA's target risk range of $1.0E-04$ to $1.0E-06$ and above FDEP's threshold value of $1.0E-06$. Arsenic was the only carcinogenic COPC at Sewage Lift Station (inorganics only), with the dermal route and ingestion routes contributing to most of the risk.

The estimated ICR for an excavation worker exposed to COPCs in soil at Sewage Lift Station (inorganic constituents only) was $1.6E-07$ which was beneath EPA's lower target risk and FDEP's threshold ICR of $1.0E-06$.

Noncarcinogenic Risks. The estimated RME Hazard Index (HIs) for a maintenance worker, occupational worker, adolescent trespasser, and adult trespasser exposed to COPCs in soil at Sewage Lift Station (inorganic constituents only) were all below the threshold level of 1.0.

2.5.1.2 Truman Annex DRMO Waste Storage Area

Carcinogenic Risks. The estimated RME ICRs for a maintenance worker, occupational worker, adult excavation worker, adolescent trespasser, adult trespasser and lifetime trespasser exposed to COPCs in soil at DRMO (inorganic constituents only) were beneath EPA's lower target risk and FDEP's threshold risk of $1.0E-06$.

The RME ICR for an occupational worker exposed to COPCs in soil at DRMO (inorganic/semivolatile constituents) was $1.6E-06$, which was within EPA's target risk range of $1.0E-04$ to $1.0E-06$ and above FDEP's target threshold risk of $1.0E-06$. Benzo(a)pyrene was the only carcinogenic COPC at DRMO (inorganic/semivolatile constituents), with the dermal and ingestion routes contributing to most of the risk.

The estimated RME ICRs for a maintenance worker, adult excavation worker, adolescent trespasser, adult trespasser and lifetime trespasser exposed to COPCs in soil at DRMO (inorganic/semivolatile constituents) were beneath EPA's lower target risk and FDEP's threshold risk of $1.0E-06$.

Noncarcinogenic Risks. The estimated RME Hazard Index (HIs) for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, and adult trespasser exposed to COPCs in soil at DRMO (inorganic) and inorganic/semivolatile constituents were below the threshold level of 1.0.

2.5.1.3 Truman Annex Former Location of Building 136

Carcinogenic Risks. The estimated RME ICR for an occupational worker receptor exposed to COPCs in soil at Building 136 (inorganics only) was $2.5E-06$, which is within EPA's target risk range of $1.0E-04$ to $1.0E-06$ and above FDEP's threshold risk of $1.0E-06$. Arsenic was the only carcinogenic COPC at Building 136 (inorganics only), with the dermal route and ingestion routes contributing to most of the risk.

The estimated RME ICRs for an maintenance worker, excavation worker, adolescent trespasser, adult trespasser, and lifetime trespasser exposed to COPCs in soil at Building 136 (inorganic constituents only) were beneath EPA's lower target risk range and FDEP's threshold risk of 1.0E-06.

The estimated RME ICR for an occupational worker receptor exposed to COPCs in soil at Building 136 (inorganic/semivolatile) was 4.7E-06, which is within EPA's target risk range of 1.0E-04 to 1.0E-06 and above FDEP's threshold risk of 1.0E-06. The estimated RME ICR for a lifetime trespasser exposed to COPCs in soil at Building 136 (inorganic/semivolatile) was 1.6E-06, which is within EPA's target risk range of 1.0E-04 to 1.0E-06 and above FDEP's threshold risk of 1.0E-06. Arsenic was the primary carcinogenic COPC at Building 136 (inorganic/semivolatile), with the dermal route and ingestion routes contributing to most of the risk.

The estimated RME ICRs for an maintenance worker, excavation worker, adolescent trespasser, and adult trespasser exposed to COPCs in soil at Building 136 (inorganic/semivolatile constituents) were beneath EPA's lower target risk and FDEP's threshold risk of 1.0E-06.

Noncarcinogenic Risks. The estimated RME HIs for an maintenance worker, occupational worker, excavation worker, adolescent trespasser, and an adult trespasser exposed to COPCs in soil at Building 136 (inorganic constituents) and inorganic/semivolatile constituents were below the threshold level of 1.0

2.5.1.4 Buildings 102, 103 and 104

Carcinogenic Risks. The estimated RME ICRs for an maintenance worker, occupational worker, excavation worker, adolescent trespasser, adult trespasser, and lifetime trespasser exposed to COPCs in soil at Buildings 102, 103, and 104 (inorganic) constituents were beneath EPA's lower target risk range and FDEP's threshold risk of 1.0E-06.

The estimated RME ICR for an adult occupational worker exposed to COPCs in soil at Buildings (inorganic/semivolatile constituents) was 2.5E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-06 and above FDEP's threshold risk of 1.0E-06. Benzo(a)pyrene was the only carcinogenic COPC at Buildings (inorganic/semivolatile constituents), with the dermal and ingestion routes contributing to most of the risk.

The estimated RME ICRs for an adult maintenance worker, adult excavation worker, adolescent trespasser, adult trespasser, and lifetime exposed to COPCs in soil at Buildings (inorganic/semivolatile constituents) were less than EPA's lower target risk range and FDEP's threshold risk of 1.0E-06.

Noncarcinogenic Risks. The estimated RME HIs for an maintenance worker, occupational worker, excavation worker, adolescent trespasser, and adult trespasser exposed to COPCs in soil at Buildings 102, 103, and 104 (inorganic constituents only) inorganic/semivolatile constituents were below the threshold level of 1.0.

2.5.1.5 Truman Annex Former Hazardous Waste Storage Area of Building 223

Carcinogenic Risks. Cancer risks were not estimated for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, adult trespasser, or a lifetime trespasser exposed to COPCs in soil at Building 223 (inorganic constituents only) because no carcinogenic COPCs were selected.

Noncarcinogenic Risks. The estimated RME HIs for an maintenance worker, occupational worker, excavation worker, adolescent trespasser, and adult trespasser exposed to COPCs in soil at Building 223 (inorganic constituents only) were below the threshold level of 1.0.

2.5.2 Environmental Evaluation

Key West includes areas that have been developed by the Navy and retain little of ecological value. The Truman Annex BRAC sites are considered fill areas and have no natural communities. However, two mangrove swamp and coastal rock barren communities have been identified at the Hamaca Hawk Missile Site and Poinciana Housing areas. No chemicals remain at these areas that did not attain the 95 percent UCL requirement set by the NAF Key West Partnering Team. Therefore, no ecological risks were calculated for any BRAC sites.

2.5.2.1 Hamaca Hawk Missile Site

A mangrove swamp exists on the eastern half of the Hamaca Hawk Missile Site. Four plant species dominate these areas: red mangrove (*Thizophora mangle*), black mangrove (*Avidennia germinans*), white mangrove (*Laguncularia racemosa*), and buttonwood (*Conocarpus erecta*). The relative abundance of each species varies greatly from area to area as do the density, average height, degree of canopy closure, and diversity of associated herbaceous species.

Remnants of the coastal rock barren community appear to exist on the northwestern portion of the Hamaca Hawk Missile Site property beyond the site fence line. Coastal rock barrens are generally characterized as flat rocklands with much exposed and eroded limestone, sparsely vegetated with stunted, xeric, and halophytic (salt-adapted) shrubs, cacti, algae, and herbs. Buttonwood in some form

often dominates this community. It can vary from bonsai-like shrubs of less than 30 centimeters (cm) in height growing with two or three other stunted halophytes on essentially bare rock pavement to erect, multi-trunked, 10-meter-tall trees growing on deeper marls and associated with a rich variety of xerophytic shrubs, trees, cacti, graminoids, and forbs. At Hamaca Hawk Missile Site, the coastal rock barren community becomes a relatively dense thorn scrub thicket of sclerophyllous vegetation that typically includes epiphytic bromeliads and orchids.

The mangrove rivulus (*Rivulus marmoratus*), a minnow that is a state-listed Species of Special Concern (SSC), could potentially occur in mangrove swamps at Hamaca Hawk Missile Site. Wooded areas at Hamaca Hawk Missile Site provide potential nesting and roosting habitat for the white-crowned pigeon, a state-listed threatened species. Wading birds including little blue herons, snowy egrets, tricolored herons, reddish egrets, and white ibis (all state-listed as SSC) are commonly observed foraging in lagoons, ditches, and other aquatic habitats at Hamaca Hawk Missile Site, as well as along the shoreline at Truman Annex.

Bald eagles and ospreys are occasionally observed in the vicinity of the Hamaca Hawk Missile Site. The Hamaca Hawk Missile Site and East Martello Battery are believed to be the only locations on NAF Key West where endangered or threatened plant species might occur (BAP, 1997).

2.5.2.2 Poinciana Housing

The pond at Poinciana Housing may support some of the same terrestrial and aquatic vertebrate species associated with mangrove swamp communities that were evaluated during the Florida Natural Areas Inventory (FNAI) within the NAF Key West study area (FNAI, 1994). However, the majority of the Poinciana Housing Parcel is essentially a residential area with no natural plant communities. Only ornamental plantings and a few remnant species of native vegetation are present. Several exceptionally large buttonwood trees are present near the playground. The lack of natural vegetation and the presence of humans may limit the occurrence of many of the species that can be found at Key West as described in the BRAC SI (B&RE, 1998). Wildlife associated with developed areas at Key West, such as Poinciana Housing, is primarily limited to birds associated with urbanized areas.

2.5.3 Summary of Risk Characterization

No estimated carcinogenic risks or noncarcinogenic risks above EPA's maximum target risk levels of 1.0E-04 and 1.0, respectively, were present under the exposure scenarios evaluated for COPCs remaining in soil at five NAF Key West BRAC Sites (Building 136, DRMO, Buildings 102, 103, and 104, Building 223, and Sewage Lift Station). The only potential receptor who had an estimated cancer risk

above a level of 1.0E-05 was the occupational worker at Building 223. Arsenic was the only carcinogenic COPC at Building 223.

The receptors who had an estimated cancer risk above the FDEP's ICR threshold of 1.0E-06 were the occupational worker at Buildings 136 and 223 and the Sewage Lift Station, and the adolescent, adult and lifetime trespasser at the Sewage Lift Station. The risks were calculated without consideration of the institutional controls and as applicable engineering controls currently in place at the sites.

2.6 THE SELECTED REMEDIES

The remedies selected in this Decision Document address the 10 BRAC properties. Based on available information and the current understanding of site conditions by the NAF Key West Partnering Team, each of the remedies was selected to provide the best balance of the nine NCP evaluation criteria. In addition, the selected remedies are expected to meet the following statutory requirements:

- Protection of human health and the environment
- Compliance with applicable or relevant and appropriate requirements (ARARs)
- Cost-effectiveness

The NAF Key West Partnering Team has determined that "emissions from the engine exhaust of a motor vehicle" are excluded from the definition of a release under CERCLA [42 USC 9601(22)]. Therefore, PAHs under roads and driveways do not fall under CERCLA regulation and are not addressed in the selected remedies.

For several BRAC sites, LUCs were selected as the final remedy. If future owners wish to change any of the controls established by the Navy, the Navy should be contacted to determine appropriate actions.

2.6.1 Hamaca Hawk Missile Site Sewage Lift Station

The selected remedy for Hamaca Hawk Missile Site Sewage Lift Station is to provide LUCs, including engineering and institutional controls that require anyone who disturbs structures identified as a permanent cover and/or containment material to comply with OSHA's Hazardous Waste Operations and Emergency Response, cited in 29 CFR 1910.120 and 1926.65. The selected institutional controls will include restrictions recorded in property transfer documents to ensure the integrity of the engineering control.

2.6.2 Areas Around Sediment Samples SD-05 and SD-08 at Hamaca Hawk Missile Site

The selected remedy for the areas around SD-05 and SD-08 is no further action, because the sites have been remediated.

2.6.3 Truman Annex DRMO Waste Storage Area

The selected remedy for Truman Annex DRMO Waste Storage Area is LUCs. Based on human health risk evaluations of remaining contaminants (Section 2.5), engineering controls are not required. The selected institutional controls at the site will include restrictions recorded in property transfer documents to ensure the integrity of the engineering controls.

2.6.4 Truman Annex DRMO Area Between Buildings 261 and 284

The selected remedy for Truman Annex DRMO Area Between Buildings 261 and 284 is no further action, because contamination at the site has been remediated.

2.6.5 Truman Annex Former Location of Building 136

The selected remedy at the Former Location of Building 136 is LUCs, including engineering controls and institutional controls. A portion of road at the site provides engineering controls to the remaining soil contaminant, preventing exposure to the soil. Institutional controls at the site will include deed restrictions that require anyone who disturbs the structure identified as a permanent cover and/or containment material comply with 29 CFR 1910.120 and 1926.65. The selected institutional controls will also include restrictions recorded in property transfer documents to ensure the integrity of the engineering control.

2.6.6 Truman Annex Building 103

The selected remedy for Truman Annex Building 103 has changed to no further action. Excavation of a 10-foot by 10-foot by 2 foot deep area around sample E09-SS02 (Figure 2-7) was performed to remove PCB-contaminated soils. Confirmation samples were collected and analyzed for PCBs following the excavation. Confirmation sample results have verified that PCBs do not exceed their action levels in the sidewalls of the excavation, and clean fill was placed in the excavation to return the site to grade. Therefore, no further action is recommended for Building 103. This change is discussed further in Section 2.8 of this document.

2.6.7 Truman Annex Buildings 102 and 104

The selected remedy for Truman Annex Buildings 102 and 104 is no further action, because contamination at the site has been sufficiently remediated.

2.6.8 Truman Annex Building 223 Former Hazardous Waste Storage Area

The selected remedy for Truman Annex Building 223 Former Hazardous Waste Storage Area has changed to LUCs, including institutional and engineering controls. Concrete foundations along with some remaining soil contaminants, were removed. Confirmation samples were collected and analyzed for arsenic following the excavation and clean fill was placed in the excavation to return the site to grade. Arsenic does remain above its action level in subsurface soil near the Hazardous Waste Storage Area. Therefore, institutional controls and engineering controls will apply. This change is discussed in Section 2.8 in this document.

2.6.9 Truman Annex Former Lube Area

The selected remedy for Truman Annex Former Lube is no further action, because contamination at the site has been sufficiently remediated.

2.6.10 Poinciana Housing

The selected remedy at Poinciana Housing is LUCs, including deed restrictions that require anyone who disturbs subsurface soils in the area of GMW-01 comply with 29 CFR 1910.120 and 1926.65. Access to site groundwater in the area of GMW-01 will also be restricted.

2.7 STATUTORY DETERMINATIONS

Remedial actions must meet the statutory requirements of Section 121 of CERCLA (42 U.S.C. 9621) as discussed below, although NAF Key West is not a National Priorities List (NPL) site.

Remedial actions at NPL sites must achieve the requirements of nine evaluation criteria. In order to be eligible for selection in accordance with the National Contingency Plan, the two threshold criteria must be met by the remedial action. Those threshold criteria are: overall protection of human health and the environment, and compliance with ARARs in both federal and state laws and regulations. Once the threshold criteria are met, five primary balancing criteria are used to compare and evaluate the elements of alternative remedial actions. The five balancing criteria include: long-term effectiveness and

permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. Finally, following the receipt of public comments on the SSI and Proposed Plans for the sites, two modifying criteria are used by the Navy to perform a final evaluation of the remedial alternatives. These modifying criteria are state acceptance and community acceptance.

The following discussion summarizes the statutory requirements that are met by the selected remedies.

2.7.1 Protection of Human Health and the Environment

The selected remedies implement measures to control sources of contamination and exposure to humans or the environment to residual contamination, as necessary, to protect human health and the environment. LUCs include engineering controls to reduce the possibility of exposure and deed restrictions, requiring that anyone who disturbs structures identified as engineering controls complies with appropriate laws and regulations.

Land-Use Controls

LUCs protect human health and the environment by preventing direct exposure to contaminated soil and by minimizing the potential for contaminant migration to groundwater. LUCs ensure that the site will not be used in the future for any purpose that could damage the engineering controls and potentially expose human and ecological receptors to the remaining soil contamination. LUCs will be implemented at Hamaca Hawk Missile Site Sewage Lift Station, Truman Annex DRMO Waste Storage Area, Truman Annex Former Location of Building 136, Truman Annex Building 223 Former Hazardous Waste Storage Area, and Poinciana Housing.

No Further Action

No further action is recommended for the areas around sediment samples SD-05 and SD-08 at Hamaca Hawk Missile Site, Truman Annex DRMO Area Between Buildings 261 and 284, Truman Annex Buildings 102 and 104, Truman Annex Building 103, and Truman Annex Former Lube Area. Confirmation sampling at these sites detected no chemicals of concern at concentrations above their action levels.

2.7.2 Compliance with ARARs

ARARs will not be met at the Seminole Battery Site. Contamination remains in the soil at concentrations above action levels. However, the soil removal activities were performed in accordance with the FDEP Brownfields Cleanup Criteria Rule, No Further Action Criteria [62-785.680 F.A.C.] that provided a

regulatory driver to determine engineering controls for the site. The regulation addresses no further action remedies with institutional controls and engineering controls, such as alternate cleanup target levels for soil contaminants at least 2 feet bls.

At several BRAC sites, PAHs were detected above action levels along roads, at former parking lots, or around areas used to access buildings. These PAHs are considered to be emissions from vehicular traffic. CERCLA excludes from the definition of "release" "...emissions from the engine exhaust of a motor vehicle..." [42 USC 9601(22)]. The PAHs are considered excluded under CERCLA, and therefore are not required to comply with ARARs. However, the presence of PAHs was taken into consideration during the human health risk evaluations described in Section 2.5.

2.7.3 Long-Term Effectiveness and Permanence

The selected remedy of LUCs will support contaminant or remaining contaminants using engineering controls. Deed restrictions will ensure that engineering controls remain in place or that appropriate regulations are followed if these areas are disturbed, as well as ensuring appropriate future use of the property.

2.7.4 Reduction of Toxicity, Mobility, or Volume through Treatment

The selected remedial actions for the 10 BRAC sites are no further action or LUCs. The LUCs do not require the use of any treatment technologies.

2.7.5 Short-Term Effectiveness

The LUCs and no further action remedies being implemented at the BRAC sites do not pose any new risk during implementation.

2.7.6 Implementability

LUCs are an implementable remedy. Engineering controls are already in place at the applicable sites, and institutional controls (deed restrictions) are readily implementable. No further action is a readily implementable remedy, because no action would occur.

2.7.7 Cost-Effectiveness

The Land-Use Control remedies are cost effective because engineering controls are already in place. Minimal costs are associated with institutional controls such as implementing and administering deed restrictions. No costs are associated with implementing and administering the no further action remedy. Excavation of soil is a proven and cost-effective technology.

2.7.8 State Acceptance

FDEP has accepted in full the remedial actions determined by this Decision Document. This acceptance has been demonstrated by the work performed by FDEP, EPA, and the Navy as part of the NAF Key West Partnering Team to implement the environmental investigation, public awareness (NAF Key West RAB), and final decision for closure of these sites. In addition, a concurrence letter from FDEP is included in Appendix C.

2.7.9 Community Acceptance

Over 100 key members of the Key West community were provided copies of the Proposed Plans, and the general Key West community was notified by local newspaper of the 30-day comment period and public meeting. Several of the selected remedies have changed from those identified in the Proposed Plans (September 14, 1999) as described in Section 2.6. One member of the RAB provided comments to the Navy during the public comment period. The Director of the Local Redevelopment Authority (LRA) also provided comments during the comment period. The Responsiveness Summary (Appendix A) provides responses to these comments. Two significant changes were made to the recommended remedial actions in the Proposed Plans. These changes include the recommendation made for Truman Annex Building 103 and Truman Annex Building 223 Hazardous Waste Storage Area.

2.8 EXPLANATION OF SIGNIFICANT DIFFERENCES

The purpose of this section is to fulfill the requirements of CERCLA section 117(b), which requires a discussion of the reasons for any significant changes made to the selected remedy. Only those sites where changes were made between the time the Proposed Plan was released for public comment and the final selection of the remedy in the Decision Document are listed in the following subsections. The discussion of each change includes a detailed description of the change, and the reason for choosing an alternative remedies.

2.8.1 Truman Annex DRMO Waste Storage Area

No changes have been made to the selected remedy for this site. The selected institutional controls for this site are consistent with the planned future use of the property.

However, the discussions of remaining site contaminants in the Proposed Plan (September 19, 1999) included two PAHs (dibenzo(a,h)anthracene and benzo(a)pyrene) that are included only in the risk evaluation section of this decision document. PAHs that result from vehicle emissions are excluded from the definition of release under CERCLA. Therefore, PAHs found along roadways or in soils adjacent to roadways or parking areas do not fall under CERCLA regulation. However, to ensure the safe future use of this property, all remaining PAHS were taken into consideration in the risk evaluation performed for this site (Section 2.5.1.2).

2.8.2 Truman Annex Former Location of Building 136

No changes have been made to the selected remedy for this site. The selected engineering and institutional controls for the site are consistent with the planned future use of the property.

However, the discussions of remaining site contaminants in the Proposed Plan (September 19, 1999) included the PAH benzo(a)pyrene, which is included only in the risk evaluation section of this decision document. PAHs that result from vehicle emissions are excluded from the definition of release under CERCLA. Therefore, PAHs found in soils adjacent to roadways or parking areas do not fall under CERCLA regulation. However, to ensure the safe future use of this property, all remaining PAHS were taken into consideration in the residual risk evaluation performed for this site (Section 2.5.1.3).

2.8.3 Truman Annex Building 103

The selected remedy for this site has been changed from the proposed LUCs remedy to no further action following the recent excavation to remove contaminated soil. The 2000 IRA removed the remaining PCB-contaminated soils at Building 103. Confirmation sampling verified the success of this remedial action. No CERCLA chemicals remain above action levels at the site. Therefore, no further action is required.

The discussions of remaining site contaminants in the Proposed Plan (September 19, 1999) included four PAHs (benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, and dibenzo(a,h)anthracene), which are included only in the residual risk assessment section of this decision document. Contaminants (including PAHs) that result from vehicle emissions are excluded from the definition of release under CERCLA. Therefore, PAHs found in soils adjacent to roadways or parking areas do not fall under

CERCLA regulation. However, to ensure the safe future use of this property, all remaining PAHs were taken into consideration in the residual risk assessment performed for this site (Section 2.5.1.4).

2.8.4 Truman Annex Building 223 Former Hazardous Waste Storage Area

The selected remedy for this site has been changed to LUCs, as recommended in the Proposed Plan, since the performance of an excavation to remove contaminated soil. Two soil excavations took place, removing two of three areas where arsenic has been detected above its action level. An area approximately 15-foot by 15-foot by 2-foot deep around sample F3-CONF07 was removed and included removal of two concrete foundations. Another excavation was performed where SI sample FO3-SS-03 was taken. Figure 2-9 presents details of the areas excavated for removal of arsenic-contaminated soils. Confirmation sampling was performed to verify the successful remediation of arsenic contamination.

However, at the former Hazardous Waste Storage Area south of Building 223, arsenic was detected at 4.5 mg/kg in one floor confirmation sample (B223-01) below 2 feet bls and remains (Figure 2-9).

LUCs, to include institutional controls, will be required surrounding one sample location (B223-01) where arsenic was detected in subsurface soil above its action level near the former Hazardous Waste Storage Area. The subsurface soil was covered by two feet of clean fill to prevent receptor exposure. However, LUCs will be required to prevent future owners from disturbing the area.

TABLE 2-1

**MAXIMUM DETECTED VALUES FOR REMAINING CONTAMINATION BY SITE
NAVAL AIR FACILITY
KEY WEST, FLORIDA**

Sample	Chemical of Concern	Maximum Detected Value	Action Level
Hamaca Hawk Missile Site Sewage Lift Station			
Inorganics (mg/kg)			
A4-CONF-08	Arsenic	21.4	2.7
Truman Annex DRMO Waste Storage Area			
Organics (µg/kg)			
C3-CONF-04	Benzo(a)pyrene	771	100
C3-CONF-14	Dibenzo(a,h)anthracene	159	100
Inorganics (mg/kg)			
C3-CONF-14	Antimony	30.6	26
C4-CONF-16	Arsenic	4	2.7
C3-CONF-14	Lead	2890	500
C3-CONF-50	Manganese	656	370
Truman Annex Seminole Battery			
Organics (µg/kg)			
D1-CONF-03	Benzo(a)pyrene	454	100
Truman Annex Former Location of Building 136			
Organics (µg/kg)			
E2-CONF-25	Benzo(a)pyrene	1410	100
E2-CONF-25	Dibenzo(a,h)anthracene	323	100
Inorganics (mg/kg)			
E2-CONF-07	Arsenic	2.9	2.7
Truman Annex Building 103			
Organics (µg/kg)			
E9-CONF-12	Benzo(a)anthracene	2180	1400
E9-CONF-12	Benzo(a)pyrene	1960	100
E9-CONF-02	Benzo(b)fluoranthene	2600	1400
E9-CONF-12	Dibenzo(a,h)anthracene	364	100
E9-CONF-12	Indeno(1,2,3-cd)pyrene	1750	1400
PCBs (µg/kg)			
E9-SS-02	Aroclor-1254	2160	900
Truman Annex Buildings 102 and 104			
Organics (µg/kg)			
E3-CONF-07	Benzo(a)pyrene	225	100
Truman Annex Building 223 Hazardous Waste Storage Area			
Inorganics (mg/kg)			
F3-CONF-07	Arsenic	4.7	2.7
Poinciana Housing Soil			
Inorganics (mg/kg)			
ZNG-SS-01	Arsenic	7	2.7
Poinciana Housing Groundwater			
Inorganics (µg/L)			
MW-01	Arsenic	624	50

All maximum values are post-IRA.

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CTO 0032

AIK-02-0068

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CTO 0032

AIK-00-0083

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CTO 0032

AIK-00-0083

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AIK-00-0083

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CTO 0032

AIK-02-0068

2-51

CTO 0032

AIK-02-0068

2-52

CTO 0032

REFERENCES

B&RE (Brown and Root Environmental), 1998, Site Inspection Report for Poinciana Housing BRAC Parcel; Naval Air Station, Key West, Florida, Revision 1, June.

BAP (Bermeilo, Ajamil, and Partners, Inc.), 1997, Key West Base Reuse Plan prepared for the city of Key West Local Reuse Authority, Florida, October 3.

BB&L (Blasland, Bouck, & Leed, Inc.), 1997, Contamination Assessment Report (CAR) for Hamaca Hawk Missile Site DEP Facility No.449402036.

BB&L (Blasland, Bouck, & Leed, Inc.), 1998, Supplemental Assessment Report for Hamaca Hawk Missile Site DEP Facility No.449402036, April 20.

BEI (Bechtel Environmental, Inc.), 1998, Remedial Work Plan Delivery Order No. 101, BRAC Parcels Fast Track Removals at Naval Air Station, Key West, Florida, prepared for Department of the Navy, Southern Division, Naval Facilities Engineering Command. Oak Ridge, Tennessee, November.

BEI (Bechtel Environmental, Inc.), 1999. Project Completion Report for BRAC Fast Track Soil Removals, NAF Key West Florida, June.

CAPE (CAPE Environmental Management), 1997. Lead-Based Paint Survey of the Naval Family Housing located at Poinciana Plaza, Key West, Florida, March.

Cowherd, C., G.E. Muleski, P.J. Englehart, and D.A. Gillette, 1984. Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites, Midwest Research Institute, Kansas City, MO.

Doull, J., C.D. Klaassen, and M.O. Amdur, 1986. Casarett and Doull's Toxicology: The Basic Science of Poisons, Third Edition, MacMillian Publishing Company, New York, NY.

EPA (United States Environmental Protection Agency), 1985. Development of Statistical Distributions or Ranges of Standard Factors Used in Exposure Assessment, EPA 600/8-85/010, Exposure Assessment Group, Office of Health and Environmental Assessment, Washington, DC.

EPA (United States Environmental Protection Agency), 1986b. Guidelines for the Health Risk Assessment of Chemical Mixtures, Federal Register, Vol. 51, No. 185, p. 34014 et seq., September 24.

EPA (United States Environmental Protection Agency), 1989a. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A), EPA 540/1-89/002, Office of Emergency and Remedial Response, Washington, DC.

EPA (United States Environmental Protection Agency), 1989b. Guidance Document on the Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Interim Final Guidance, EPA 530/SW-89-026, Office of Solid Waste, Washington, DC.

EPA (United States Environmental Protection Agency), 1991a. Chemical Concentration Data Near the Detection Limit, Region III Technical Guidance Manual, EPA-3/HWMD/8-91/002.

EPA (United States Environmental Protection Agency), 1991b. Exposure Point Concentrations in Groundwater, EPA Region III Technical Guidance Manual, EPA/903/8-91/002.

EPA (United States Environmental Protection Agency), 1991c. Exposure Factors Handbook, EPA 600/8-89/043, Office of Health and Environmental Assessment, Washington, DC.

EPA (United States Environmental Protection Agency), 1992a. Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities; Addendum to Interim Final Guidance, Office of Solid Waste Permits and State Programs Division, Washington, DC, July.

EPA (United States Environmental Protection Agency), 1992c. Guidelines for Exposure Assessment. Exposure Assessment Group, Office of Health and Environmental Assessment, Federal Register, Vol. 57, No. 104, p. 22888, Friday, May 29.

EPA (United States Environmental Protection Agency), 1992d. Guidance on Risk Characterization for Risk Managers and Risk Assessors, Memorandum from F. Henry Habicht on February 28, 1992, Office of the Administrator, Washington, DC.

EPA (United States Environmental Protection Agency), 1995. Assessing Dermal Exposure from Soil, EPA Region III Technical Guidance Manual, EPA/903-K-95-003, December.

EPA (United States Environmental Protection Agency), 1996a. Guidance for Data Quality Assessment, Pre-Publication Copy, Final, EPA QA/G-9, Quality Assurance Division, Washington, DC, February.

EPA (United States Environmental Protection Agency), 1996b. Exposure Factors Handbook, EPA 600/P-95/002, Office of Research and Development, National Center for Environmental Assessment, Washington, DC.

EPA (United States Environmental Protection Agency), 1996c. Soil Screening Guidance, EPA/540/R-96/018, Office of Emergency and Remedial Response, Washington, DC, April 1996.

EPA (United States Environmental Protection Agency), 1997a. Health Effects Assessment Summary Tables (HEAST), EPA/540/R-95-036, Office of Solid Waste and Emergency Response, May.

EPA (United States Environmental Protection Agency), 1997b. Exposure Factors Handbook, Update to Exposure Factors Handbook, EPA/600/8-89/043 - May 1989, Office of Research and Development.

EPA (United States Environmental Protection Agency), 1998. Risk Assessment Guidance for Superfund: Volume 1, Human Health Evaluation Manual (Part D, Standardized Planning, Reporting, and Review of Superfund Risk Assessments), Office of Emergency and Remedial Response, January 1998.

EPA (United States Environmental Protection Agency), 2001a. EPA Region III Risk-Based Concentration (RBC) Tables, October, 2001.

EPA (United States Environmental Protection Agency), 2001b. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim, EPA 540/R/99/005, Office of Emergency and Remedial Response, Washington, DC.

EPA (United States Environmental Protection Agency), 2001c. Integrated Risk Information System (IRIS), Database.FNAI (Florida Natural Areas Inventory/The Nature Conservancy), 1994, Ecological Survey of U.S. Navy Property in the Lower Florida Keys, Monroe county, Florida, Florida Natural Areas Inventory, Tallahassee, Florida.

Gehan, E.A., 1965. A Generalized Wilcoxon Test for Comparing Arbitrarily Singly-Censored Samples, Biometrika, Volume 52, pp. 203-223.

Gilbert, R.O., 1987. Statistical Methods for Environmental Pollution Monitoring, Van Nostrand and Reinhold, New York, NY.

TtNUS (Tetra Tech NUS, Inc.), 1998a, Engineer's Evaluation/Cost Analysis for BRAC Fast Track Soil Removal Parcels, Naval Air Station, Key West, Florida, December.

TtNUS (Tetra Tech NUS, Inc.), 1998b, Action Memorandum for BRAC Fast Track Soil Removal Parcels, Naval Air Station, Key West, Florida, December.

TtNUS (Tetra Tech NUS, Inc.), 1998c, Poinciana Housing Groundwater Monitoring Report No. 3; Naval Air Station, Key West, Florida, December.

TtNUS (Tetra Tech NUS, Inc.), 1999a, Supplemental Site Inspection Report for BRAC Parcels; Naval Air Station, Key West, Florida, Revision 2, September.

TtNUS (Tetra Tech NUS, Inc.), 1999b, Site Inspection Report for Nine BRAC Parcels; Naval Air Station, Key West, Florida, Revision 1, February.

TtNUS (Tetra Tech NUS, Inc.), 1999c, Supplemental Site Inspection Report for Poinciana Housing; Naval Air Station, Key West, Florida, Revision 1, June.

USN-NFEC (United States Navy – Naval Facilities Engineering Command), 1992, Contamination Assessment Report (CAR) for Electric Power Plant Building 103, September.

USN-NFEC (United States Navy – Naval Facilities Engineering Command), 1993, Contamination Assessment Report (CAR) Addendum for Electric Power Plant Building 103, September.

USN-NFEC (United States Navy – Naval Facilities Engineering Command), 1994, Remedial Action Plan (RAP) for Electric Power Plant Building 103.

USN-NFEC (United States Navy – Naval Facilities Engineering Command), 1995, USN-NAF Key West Closure Report on Building 1276.

USN-NFEC (United States Navy – Naval Facilities Engineering Command), 1996a, USN-NAF Key West Predraft Environmental Baseline Study (EBS) Truman Annex; Excess Property.

USN-NFEC (United States Navy – Naval Facilities Engineering Command), 1996b, USN-NAF Key West Closure Report on Building 1287.

USN-NFEC (United States Navy – Naval Facilities Engineering Command), 1997, NAF Key West Draft EBS Truman Annex Outer Mole Pier 8/Buildings 149, 1374, 4080.

USN-NPWC (United States Navy – Naval Publics Works Center), 1995a, Lead and Asbestos Survey of Hamaca Hawk Missile Site.

USN-NPWC (United States Navy – Naval Publics Works Center), 1995b, Lead and Asbestos Survey of Poinciana Housing, NVSTA Key West, Florida, May 1995.

USN-NPWC (United States Navy – Naval Publics Works Center), 1996, Lead and Asbestos Survey of Truman Pier.

USN-SUPSHIP (United States Navy – Supervisor of Shipbuilding, Conversion, and Repair, Environmental Detachment), 1996, Predraft EBS Realignment Parcels, October.

APPENDIX A
RESPONSIVENESS SUMMARY

APPENDIX A. RESPONSIVENESS SUMMARY

Public Comments 1-3 were provided by Robin Orlandi, Restoration Advisory Board member, September 18, 1999

Public Comment 1:

While the 2 foot below surface excavation criteria generally utilized at these sites may meet the 95 percent confidence level set by the NAF Key West Partnering Team, I find it problematic that no post excavation floor samples were taken at affected BRAC sites to delineate potential remaining levels of contaminants. And that, as a result, remaining contaminants may have been overlooked and left in soils below two feet.

The open excavations presented a singular opportunity to obtain this data, and to define the exact condition of subsurface soils. Such information could have provided guidance to the city of Key West for evaluating future land use options and potential risk and liabilities associated with changes in usage. The proposed re-use of the lands for parks and recreation virtually assures that site improvement activities will involve digging below the two-foot barrier.

This oversight seems particularly egregious at sites such as the Truman Annex DRMO Waste Storage Area where post excavation sidewall samples indicated that contaminants remain in excess of Fla. Brownfields Industrial Exposure Target Levels. While it is understood that land use controls (LUCs) (see additional comments below) have been designated to protect the public from direct exposure to contaminants, the lack of data concerning what levels of contaminants may remain buried beneath excavated sites presents an unacceptable and, considering the thoroughness of testing in other areas, inexplicable data gap.

Response to Public Comment 1:

The commentor makes a valid point. Generally, confirmation sampling is performed at the base of an excavation to ensure adequate removal of contaminated soils. However, at the BRAC sites delineation sampling was performed during the Supplemental Site Inspection (SSI) at the two largest remediation sites (DRMO Waste Storage Area and Former Location of Building 136), which delineated subsurface soil conditions as well as surface soil conditions. Data delineating soils to a depth of 9 feet bls were collected for these areas and can be reviewed in Chapter 3 of the SSI Report. Surface (0 to 2 feet bls) soil and subsurface (3 to 8 feet bls) soil were sampled to characterize soil conditions beneath and around Buildings 102, 103, and 104 near the East Quay Wall. These data can be reviewed in Chapter 2 of the

SSI Report. In addition, groundwater data collected during the SI and the SSI were used to assist in the characterization of subsurface soils. Based on delineation results from the SSI, the Navy conducted some excavations below 2 feet where chemicals were detected above or near the leachate criteria levels. The previous sampling events and the published results of the data collected from those events led the NAF Key West Partnering Team to determine that sampling the floor of these excavations was not necessary since subsurface soils were previously characterized and delineated.

Human Health risk scenarios were calculated for the potential future recreational child and landscape and utility workers, using all data for samples that were collected from soils that remain on site (surface and subsurface). The results of these risk evaluation can be reviewed in Section 2.5 of this Decision Document.

Public Comment 2:

Exposure Criteria: RAB community members and city representatives have been repeatedly assured that cleanups at the BRAC sites, specifically at the Truman Annex sites, met residential exposure criteria. Yet chemicals of concern are still present at excavated sites at concentrations that exceed the industrial/commercial direct exposure limits as defined by Fla. Brownfields Soil Cleanup standards. In several instances, such as the levels of the carcinogens arsenic (4 mg/kg) and benzo(a)pyrene (702 µg/kg) at the Truman Annex DRMO Waste Storage Area, the remaining contaminants exceed the Brownfields residential exposure levels (0.8 mg/kg for arsenic and 0.1 mg/kg - or 100 µg/kg- for benzo(a)pyrene) by multiple factor. For that matter, the remaining levels of these two chemicals also exceed the industrial exposure levels. While it is understood that LUCs and exposure probabilities are factored into determining site by site cleanup levels, it remains unclear in the Proposed Plans exactly how clean these sites are and what risk levels have been determined to be acceptable. More information is needed, as follows:

Summaries containing the following information, written in plain language, need to be provided for each individual site so that city officials and citizens unfamiliar with the engineering and chemical details of site remediation can be adequately and accurately informed about preexisting site conditions and possible future liabilities.

(a) A list of all remaining chemicals of concern on site that have been measured in excess of FDEP baseline residential exposure criteria. Chemicals that exceed the baseline industrial exposure criteria or environmental risk criteria should also be denoted.

(b) A statement clearly defining the cleanup standard with which the site complies: residential, commercial, industrial or other and how those standards were determined. This should include descriptions of any mitigating criteria members of the Partnering Team used to arrive at a finding of re-use suitability for sites that contain residual contaminants in excess of residential or industrial exposure levels as set by FDEP. What factors were used to calibrate risk to an acceptable level? How did the city's proposed reuse of the site factor into calculations of acceptable exposure levels'?

A description of the risk factors determined to be acceptable to potential future residents or transient occupants: were risk factors of one in a million, one in 100,000, or other ratios used? Were risks calculated only for carcinogenic effects or were other potential health impacts incorporated into determining acceptable risk? What ecological risk assessments were utilized?

Response to Public Comment 2:

The NAF Key West Partnering Team used the Base Reuse Plan (BRP) to direct remediation at the BRAC sites according to the type of reuse projected in the Plan. This methodology is prescribed in the regulation 40 CFR 300 (otherwise known as the NCP) and EPA and Navy guidance, "A Guidance to Cleanup." Based on the remedial activities performed at the BRAC sites, the reuse can be carried out safely.

Since the issuance of Revision 0 of the Decision Document for 10 BRAC Sites, the NAF Key West Partnering Team has determined that "emissions from the engine exhaust of a motor vehicle" are excluded from the definition of a release under CERCLA. Therefore polynuclear aromatic hydrocarbons (PAHs) that are present alongside or under roads and driveways do not fall under CERCLA regulation and are not addressed in this Decision Document.

Residential action levels were used as cleanup criteria at all IRA sites and Poinciana Housing. Most locations where contaminants were left in place at concentrations that exceed these levels are capped. However, at one DRMO location excavation was stopped adjacent to underground utilities (no permanent cap) and a contaminant was left in place in excess of its residential action level. Based on the detected level of this contaminant that remains in an uncapped location at DRMO, an upper confidence level was calculated to provide a scientifically based, statistical approach to assist in decision making. In addition, human health risks were estimated during the development of the Decision Document. These calculated human health risk values and conclusions can be reviewed in Section 2.5 of the Decision Document for Ten BRAC Sites. Ecological risks are addressed in Section 2.5.2 of the Decision Document. The Truman Annex BRAC sites are considered fill areas with no natural communities. As identified in the Florida Natural Areas Inventory (FNAI), Hamaca Hawk Missile Site and Poinciana Housing do support

natural communities. However, no chemicals remain at these areas that did not attain the 95 percent upper confidence limit requirement set by the NAF Key West Partnering Team.

Information about all excavations, sample results, human health risk evaluation and locations will be made available to City of Key West.

In Response to Subcomment (a) - Chapter 4 of the SSI lists all contaminants left in place during the IRAs. SSI maps show the locations of all contaminants and SSI tables show the concentrations at which all the contaminants were detected. The results are grouped by individual sites, as requested in the public comment. The Partnering Team has adopted a set of action levels (including residential and industrial levels) consisting of ARARs and Screening Action Levels (SALs), which can be found in Appendix B of the SI Workplan as well as Appendix B of this Decision Document. This information is also available at Information Repository, NAF Key West, and before and after RAB meetings. To further respond to this public comment, the Navy will provide a list by parcel of any chemicals that exceed exposure point concentration for the appropriate reuse scenario.

In response to Subcomment (b) - The Navy used the recreational child scenario instead of the adult scenario to conservatively calculate the human health risks as well as calculating risk for the potential future landscape and utility workers. Risks were calculated for each site with contaminants remaining following the IRAs, which applies only to Hamaca Hawk Missile Site Sewage Lift Station Truman Annex DRMO Waste Storage Area, the Former Location of Building 136, Building 223 Hazardous Waste Storage Area, and the area where Buildings 102, 103, and 104 are located. For chemicals left in place below 2 feet or under engineering controls, human health risks for the appropriate reuse scenarios were calculated for all sites with any remaining contamination to estimate risks for future workers during redevelopment of the sites. This information is presented in the Decision Document to assist the City of Key West in planning and executing any improvements to this property.

Chemicals not passing the 95 percent confidence level set by the NAF Key West Partnering Team were evaluated, and their maximum exposure-point concentrations are presented in Tables 2-2 and 2-3 of the Decision Document for Ten BRAC Sites. The exposure-point concentrations are used to estimate human health risks. For those sites that do not have enough data to calculate a 95 percent confidence level (Sewage Lift station and Hazardous Waste Storage Area) the maximum contaminant concentration was used to calculate risk.

The cumulative cancer risk under a “reasonable maximum exposure” scenario at the sites in question (DRMO Waste Storage Area and Buildings 102, 103, and 104) were estimated to be below the FDEP target risk of 1.0E-06. Noncarcinogenic HIs were calculated for these sites as well and they were also

below the FDEP target level of 1.0. In summary, carcinogenic risks posed to the recreational child at DRMO and Buildings 102, 103, and 104 are considered “acceptable” because all risks fall below FDEP’s target risk level of 1.0E-06.

Public Comment 3:

There are questionable decisions in the Proposed Plans, obfuscated for the layperson by complex mathematical, statistical and regulatory equations and by a lack of information concerning the decision making process and authority of the Partnering Team. There are several instances where proposed remedies are justified by the various options CERCLA and FDEP allow based on site specific conditions, but which do not ultimately seem to be the alternative most protective of human and ecological health or most realistic in terms of the proposed reuse:

(a) The intensive reliance on LUCs at Truman Annex, particularly on engineering controls that derive from existing structures such as foundations and roadways is unrealistic given the high probability that reuse improvements will eventually involve their removal, restructuring or renovation, hence disturbance of residual contaminants. Re-defining obstacles that impeded a more thorough cleanup as “engineering controls” conveniently avoids the real issue: contaminants in excess of guidelines will be left on site as potential liabilities for future owners and, in the event of their migration, as potential public health hazards. These engineering controls are an unacceptable remedy for contaminants that exceed baseline FDEP industrial/commercial direct exposure limits. The Navy should make every effort to conduct remedial actions to remove these remaining hotspots and should retain liability for remediation of any contaminants left on site.

(b) Given the porous nature of Key West’s soils, the waterfront location of Truman Annex and the documented tidal and storm surge flushing that occurs both at the soil surface and underground, annual monitoring of both soil and groundwater for potential migration of contaminants left on site should be conducted by the Navy until such time as a pattern of non-migration can be clearly established.

(c) Information concerning the RCRA UST Program cleanup, remedial activities, extent of contamination, proposed remedies, chain of liability and potential liabilities to future owners needs to be provided in conjunction with the Proposed Plans.

(d) The external structure next to Bldg. 103 where a PCBs have been detected in excess of action levels should be removed and the underlying soil excavated to direct exposure residential standards. No amount of statistical or regulatory manipulation can justify leaving this hazard for future owners to deal with. Considering the extremely high levels of other contaminants found at this building, the presence of

underground petroleum contamination, and its past use as a power plant, indicating the probable presence of PCB contaminated insulation fluids, cleanup of this location needs to be as thorough as possible. Also, the use of leachate criteria as an alternative cleanup criteria for soil contaminants 2 feet below surface at this site seems questionable, given that oil and water don't mix. Are leachate testing methods and criteria suitable and accurate to measure petroleum or petroleum based contaminants? Please reference this.

(e) The Proposed Plan for Poinciana Housing fails to include the actual figures for the levels of arsenic that have been measured in monitoring wells located there. It is difficult to evaluate what appears to be a workable proposed remedy without knowing the extent of contamination. Continued monitoring of the hotspot for migration should be implemented as part of the remedy, given the magnitude of storm related surface flooding and groundwater flushing that occurs in Key West.

Response to Public Comment 3: The Navy's response to the subcomments (a) though (e) appears below.

(a) The BRP indicates no plan to remove the structures identified as permanent caps in the SSI Report. For example, the base road that leads from Southard to the Outer Mole Pier and the State Park Road to Fort Zachary Taylor are projected to remain in place. Furthermore, all discussions to date that involve the areas of Buildings 102, 103, and 104 have indicated that the buildings would be flattened and the foundations would be covered in place. In addition, the CERCLA chemicals of concern left in place do not (according to risk assessment guidance) pose a risk unacceptable by law.

The Navy understands and accepts its obligation to remediate "previously undiscovered" contamination at the BRAC sites. Any contamination found by future owners that has not been located and identified by the Navy will be the responsibility of the Navy. The Navy has addressed the low levels of contamination that persist below 2 feet or under engineering controls and determined that engineering controls should remain in place. If future owners wish to remove the structures identified as engineering controls, which would violate deed restrictions, the Navy should be contacted to determine appropriate actions. Future owners, not the Navy, will be liable for any additional cleanup if the future owner decides to deviate from the BRP or violate deed restrictions.

The NAF Key West Partnering Team used the BRP to direct remediation at the BRAC sites according to the type of reuse projected in the Plan and in accordance with the NCP and EPA and Department of Defense (DoD) guidance. Furthermore, it is the Navy's intention to protect the public from any unacceptable risk through the use of engineering controls such as those defined in this document and

which have already been successfully implemented at such similar BRAC locations as NAF Cecil Field in Jacksonville, Florida and Homestead AFB in Homestead, Florida.

(b) The design and construction of the Inner Mole Pier/Sea Wall provide an adequate barrier to protect against tidal flushing and migration of contaminants into nearby surface water. Furthermore, known contaminants that were left in place following the IRA are contained in surface soils that are capped by a permanent structure that provides runoff and infiltration protection. In addition, the UST program at NAF Key West has established that contaminant migration in groundwater in the East Quay Wall area is minimal and has not reached the Quay Wall. The UST program has found silty dredge fill material in the subsurface soil in this area.

(c) The Navy concurs with the comment. Information on the UST program will be provided as the program proceeds. Due to the nature of the contamination in groundwater at the East Quay Wall, this issue is addressed as part of the UST Program. UST-related petroleum contamination by law must be addressed by the UST program and is excluded (by law) from work conducted under CERCLA.

(d) The Navy will excavate a 10-foot by 10-foot by 2-foot area of soil and obtain confirmation samples to ensure removal of Aroclor-1254 to below action levels

(e) Arsenic has only been detected in one monitoring well (GMW-01) at Poinciana Housing at levels exceeding the FDEP action level. This well was sampled on six different occasions from February 1998 through April 1999 with arsenic detected at concentrations ranging from 102 µg/l to 624 µg/l. In April 1999, three monitoring wells (GMW-03, GMW-04, and GMW-05) were installed up-gradient and across-gradient and sampled for arsenic. Arsenic was not detected in these wells. A fourth monitoring well (GMW-02) was installed near GMW-01 and screened deeper (20 to 25 feet) to determine the vertical extent of arsenic in the groundwater. Arsenic was detected in MW-02, but the level was low (approximately 20 percent of the action level). The groundwater and soil sample data can be reviewed in the SSI Report for Poinciana Housing (TtNUS, 1999) and the Third Groundwater Monitoring Report for Poinciana Housing BRAC Property (TtNUS, 1998). The Navy will continue to monitor GMW-01 for arsenic to determine any future actions that may be required.

Public Comments 4-14 were provided by William Harrison, Local Redevelopment Authority Director, September 28, 1999

Public Comment 4:

Hamaca Hawk Missile Site (City of Key West) - The soil and sediment removal activities performed in compliance with FDEP Brownfields Cleanup Criteria appear to be sufficient for the proposed future conservation and open space uses contemplated by the BRP.

Response to Public Comment 4:

The Navy accepts the comment.

Public Comment 5:

Truman Annex DRMO Area (Ft. Zachary Taylor Site) - The proposed remedy of no further action should be determined by the Department of Environmental Protection of the State of Florida in that the transfer is being made between the State of Florida and the United States Navy.

Response to Public Comment 5:

The Florida Department of Environmental Protection (FDEP) has been actively involved in the decision making process of the BRAC properties at NAF Key West throughout the entire BRAC process. FDEP concurs with the no further action remedy for the DRMO waste storage area between Buildings 261 and 284.

Public Comment 6:

Truman Annex DRMO Waste Storage Area (City of Key West) - The Navy's position that contamination at the site has been sufficiently remediated is questionable. The site is proposed to be used for open space and parklands. In the development of the parklands, landscaping and trees will be planted that will go below the two feet of soil that has been removed in most of the site. How can trees be planted in two feet of soil cover without disturbing potential contaminants?

The adjacent active duty facility is fed with under ground utilities that will be crossing this site through easements retained by the Navy. In the future excavation of the site will occur below the two-foot level for repairing or servicing of these utilities. In addition new underground utilities may be required as the

parklands are programmed thereby making land use controls extremely problematic in the future. Soil excavations on the site have often stopped at existing asphalt or concrete coverings, which may or may not remain in the future.

Response to Public Comment 6:

The Navy used the recreational child scenario instead of the adult scenario to conservatively calculate the human health risks as well as calculating risks for the potential future landscape and utility workers. Risks were calculated for each site with contaminants remaining following the IRAs, which applies only to the Sewage Lift Station, Truman Annex DRMO Waste Storage Area, the area where Buildings 102, 103, and 104 are located, the Former Location of Building 136, and Building 223 Hazardous Waste Storage Area. For chemicals left in place below 2 feet or under engineering controls, human health risks for the appropriate reuse scenarios will be calculated for all sites with any remaining contamination to estimate risks for future workers during redevelopment of the sites. This information is included in Revision 1 of the Decision Document to assist the City of Key West in planning and executing any improvements to this property. Maps and tables in Chapter 4 of the SSI Report show the known locations of contaminants below two feet.

Chemicals not passing the 95 percent confidence level set by the NAF Key West Partnering Team were evaluated and their maximum exposure-point concentrations are presented in Tables 2-2 and 2-3 of the Decision Document for Ten BRAC Sites. The exposure-point concentrations are used to estimate human health risks. For those sites that do not have enough data to calculate a 95 percent confidence level (Sewage Lift station and Hazardous Waste Storage Area) the maximum contaminant concentration was used to calculate risk.

The cumulative cancer risk under a “reasonable maximum exposure” scenario at the site in question (DRMO Waste Storage) was estimated to be below the FDEP target risk of 1.0E-06. Noncarcinogenic risks were calculated for these sites and were found to be below FDEP target level of 1.0. In summary, carcinogenic risks posed to the recreational child at DRMO are considered “acceptable” because all risks fall below FDEP’s target risk level of 1.0E-06.

In addition, estimates of risk to the potential future utility and landscape workers were calculated and are presented in the Decision Document to assist the City of Key West in planning and executing any improvements to this property that are consistent with the BRP.

The NAF Key West Partnering Team used the BRP to direct remediation at the BRAC sites according to the type of reuse projected in the Plan.

Public Comment 7:

Truman Annex Seminole Battery (Navy Retained Site) - The proposed remedy of land use controls is still questionable even though the cleanup site in question is being retained by the Navy.

Response to Public Comment 7:

As noted in the comment, the Navy will manage future LUCs at this site with the concurrence of EPA and FDEP.

Public Comment 8:

Truman Annex Former Location of Building 136 - The impervious surfaces of asphalt and concrete may not exist in the future in this area as the Harborwalk Parklands are programmed and developed.

Response to Public Comment 8:

All exposed soil was removed to 2 feet bls with all CERCLA contaminants removed except at one location. As defined in deed restrictions, the concrete/asphalt cap will need to be kept in place as an engineering control. The Navy will retain an easement for the Southard St extension road through the property and will maintain this engineering control.

Public Comment 9:

Truman Annex Location for Building 102 and Building 104 - Even though excavations of soils to two feet in depth have occurred in separate areas concentrations of benzo(a)pyrene do remain on the site in excess of its FDEP residential action levels. Further remedial action is required for this site. Foundations may need to be removed at this site in the future thereby potentially uncovering additional contaminants. The liability for any existing contaminants should remain with the Navy, not a new owner.

Response to Public Comment 9:

Since the issuance of Revision 0 of the Decision Document for 10 BRAC Sites, the NAF Key West Partnering team has determined that polynuclear aromatic hydrocarbons (PAHs) produced by “emissions from the engine exhaust of a motor vehicle” are excluded from the definition of a release under CERCLA. Therefore PAHs that are present alongside or under roads and are not addressed in this Decision Document. The Navy has remediated this site using residential action levels, which is more than required

since the proposed reuse for the area where Building 102, 103, and 104 are located is not a residential area but a park area. The Navy understands and accepts its obligation to remediate “previously undiscovered” contamination at the BRAC sites. If future owners wish to remove the structures identified as engineering controls or otherwise deviate from the selected remedy, the Navy and FDEP must be contacted to determine appropriate actions. Maps and tables in Chapter 4 of the SSI Report show the known locations of contaminants below two feet. Furthermore, this information will be provided to the City of Key West to assist them in making decisions concerning improvements made to this property.

Public Comment 10:

Truman Annex Building 103 - This building was formerly a central power plant wherein petroleum contamination was identified in the ground water. As part of the Resource Conservation and Recovery Act a Contamination Assessment Report and Remedial Action Plan has been developed and implementation is pending. Essentially, land use controls, which include deed restrictions that will require anyone who disturbs the structures identified, may become problematic in future redevelopment.

Response to Comment 10:

As described in the Proposed Plan for Building 103, the use of land use controls is to provide protection from potential soil contamination. As stated in the comment, the CAR and the RAP were developed to address groundwater contamination associated with the UST program. As a practical matter, the concrete floor of Building 103 provides a substantial barrier to contact with any chemicals and it would not be cost-effective to remove the 6-10 foot thick slab. Thus, the remedy will retain the floor of Building 103 as an engineering control.

Public Comment 11:

Truman Annex Former Lube Area - The Navy has represented that this area has been cleaned up to residential standards and it currently poses no threat to human health and environment.

Response to Public Comment 11:

The Navy concurs with the comment.

Public Comment 12:

Truman Annex Building 223 Former Hazardous Waste Storage Area - The land use controls, which include engineering controls to insure the remaining soil contaminants remain in place, are risky. This is a de-facto transfer of contamination liability to the new owner that may be onerous in the future.

Response to Public Comment 12:

The NAF Key West Partnering Team also discussed the concern raised in this comment during several of its meetings. The Navy will respond to any arsenic contamination remaining in place. The soil removal activities were performed in accordance with the Florida Department of Environmental Protection (FDEP) Brownfields Cleanup Criteria Rule, No Further Action Criteria [62-785.680 F.A.C.] that provided a regulatory driver to the site action levels. The regulation addresses no-further-action remedies with institutional controls and engineering controls. These cleanup criteria were implemented during the soil removal activities at the site. The no-further-action regulation also addresses the use of permanent cover and containment material to prevent human exposure and limit water infiltration. The asphalt- and concrete-covered areas found during excavation activities at these sites meet the definition of permanent cover material, as required by the FDEP Brownfields rule.

Public Comment 13:

Poinciana Housing - Surface soil at Poinciana Housing does not appear to contain elevated levels of arsenic. However, sub-soils below two feet should not be disturbed in this area. Institutional controls through deed restrictions would restrict any use of groundwater or exposure of groundwater to the public in a portion of the site. Regular groundwater monitoring will be required to subsequent owners. The aforementioned land use controls appear to be reasonable for this site.

Response to Public Comment 13:

The Navy accepts the comment. In addition, the subsurface soils between Buildings P1618 and P1619 should not be disturbed within a 20-foot radius around GMW-01. This restriction will be stated as an Institutional Control in a deed restriction upon property transfer.

Public Comment 14:

Summary - The proposed remedy of using land use controls to ensure that engineering controls stay in place should not relieve the Navy of the liability of existing contaminants remaining in place. These

contaminants would have otherwise been removed when discovered by the Navy. If in the future, these known contaminants are disturbed because of redevelopment, the Navy should still remain responsible in equity because they were the causative party.

Response to Public Comment 14:

The Partnering Team used the BRP to direct remediation at the BRAC sites according to the type of reuse projected in the Plan. The Navy has addressed the low levels of contamination that persist below 2 feet or under engineering controls and determined that engineering controls should remain in place. If future owners wish to remove the structures identified as engineering controls, which would violate deed restrictions, the Navy should be contacted to determine appropriate actions. Future owners, not the Navy, will be liable for any additional cleanup if the future owner decides to deviate from the approved reuse or violate deed restrictions. Data detailing the known locations of contaminants left in place can be found on maps and tables in Chapter 4 of the SSI Report. Since the issuance of Revision 0 of the Decision Document for 10 BRAC Sites, the NAF Key West Partnering team has determined that PAHs produced by “emissions from the engine exhaust of a motor vehicle” are excluded from the definition of a release under CERCLA. Therefore PAHs that are present alongside or under roads and driveways are not addressed in this Decision Document. The Navy has remediated this site using residential action levels, which is more than required since the proposed reuse for the area where Buildings 102, 103, and 104 are located is not a residential area but a park area. The Navy understands and accepts its obligation to remediate “previously undiscovered” contamination at the BRAC sites. Any contamination found by future owners that has not been located and identified by the Navy will be the responsibility of the Navy. Data detailing the known locations of contaminants below 2 feet can be found on maps and tables in Chapter 4 of the SSI Report. Furthermore, this information will be provided to the City of Key West to assist them in making decisions concerning improvements made to this property.

APPENDIX B

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

TABLE B-1

**SELECTION OF SOIL ACTION LEVELS FOR POTENTIAL FUTURE RESIDENTIAL SITES
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 1 OF 4**

Parameter	FDEP Residential Goals ¹	Residential Soil RBCs ²	2x Average BG ³	Selected Action Level	Source of Action Level	Units
INORGANICS						
Aluminum	75,000	78,000	3774.57	75,000	FDEP Residential Goals	mg/kg
Antimony	26	31	0.58	26	FDEP Residential Goals	mg/kg
Arsenic	0.8	0.43	2.66	2.66	2x Avg Background	mg/kg
Barium	5,200	5,500	21.9	5,200	FDEP Residential Goals	mg/kg
Beryllium	0.2	0.15	0.08	0.2	FDEP Residential Goals	mg/kg
Cadmium	37	39	0.28	37	FDEP Residential Goals	mg/kg
Calcium	NA	NA	NA	NA	NA	mg/kg
Chromium	290	390	12.34	290	FDEP Residential Goals	mg/kg
Cobalt	4,700	4,700	0.46	4,700	FDEP Residential Goals	mg/kg
Copper	NA	3,100	11.54	3,100	Residential Soil RBCs	mg/kg
Iron	NA	23,000	2334.88	23,000	Residential Soil RBCs	mg/kg
Lead	500	NA	33.32	500	FDEP Residential Goals	mg/kg
Magnesium	NA	NA	NA	NA	NA	mg/kg
Manganese	370	1,800	35.3	370	FDEP Residential Goals	mg/kg
Mercury	23	23	0.06	23	FDEP Residential Goals	mg/kg
Nickel	1,500	1,600	3.4	1,500	FDEP Residential Goals	mg/kg
Potassium	NA	NA	NA	NA	NA	mg/kg
Selenium	390	390	1.3	390	FDEP Residential Goals	mg/kg
Silver	390	390	NA	390	FDEP Residential Goals	mg/kg
Sodium	NA	NA	NA	NA	NA	mg/kg
Thallium	NA	NA	NA	NA	NA	mg/kg
Tin	44,000	47,000	3.92	44,000	FDEP Residential Goals	mg/kg
Vanadium	490	550	8.32	490	FDEP Residential Goals	mg/kg
Zinc	23,000	23,000	32.18	23,000	FDEP Residential Goals	mg/kg
PESTICIDES						
4,4'-DDD	4,500	2,700	27.2	4,500	FDEP Residential Goals	µg/kg
4,4'-DDE	3,000	1,900	83.3	3,000	FDEP Residential Goals	µg/kg
4,4'-DDT	3,100	1,900	61.24	3,100	FDEP Residential Goals	µg/kg
Aldrin	60	38	NA	60	FDEP Residential Goals	µg/kg
alpha-BHC	200	100	NA	200	FDEP Residential Goals	µg/kg
alpha-chlordane	NA	490	NA	490	Residential Soil RBCs	µg/kg
beta-BHC	600	350	NA	600	FDEP Residential Goals	µg/kg
delta-BHC	23,000	NA	NA	23,000	FDEP Residential Goals	µg/kg
Dieldrin	70	40	NA	70	FDEP Residential Goals	µg/kg
Endosulfan I	390,000	470,000	6.26	390,000	FDEP Residential Goals	µg/kg
Endosulfan II	390,000	470,000	NA	390,000	FDEP Residential Goals	µg/kg
Endosulfan sulfate	NA	NA	NA	NA	NA	µg/kg
Endrin	23,000	23,000	11.8	23,000	FDEP Residential Goals	µg/kg
Endrin aldehyde	23,000	NA	NA	23,000	FDEP Residential Goals	µg/kg

TABLE B-1

**SELECTION OF SOIL ACTION LEVELS FOR POTENTIAL FUTURE RESIDENTIAL SITES
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 2 OF 4**

Endrin ketone	NA	NA	NA	NA	NA	µg/kg
gamma-BHC (lindane)	800	490	NA	800	FDEP Residential Goals	µg/kg
gamma-chlordane	NA	490	NA	490	Residential Soil RBCs	µg/kg
Heptachlor	200	140	NA	200	FDEP Residential Goals	µg/kg
Heptachlor epoxide	100	70	NA	100	FDEP Residential Goals	µg/kg
Methoxychlor	380,000	390,000	59.86	380,000	FDEP Residential Goals	µg/kg
Toxaphene	900	580	NA	900	FDEP Residential Goals	µg/kg

POLYCHLORINATED BIPHENYLS

Aroclor-1016	900	320	NA	900	FDEP Residential Goals	µg/kg
Aroclor-1221	900	320	NA	900	FDEP Residential Goals	µg/kg
Aroclor-1232	900	320	NA	900	FDEP Residential Goals	µg/kg
Aroclor-1242	900	320	NA	900	FDEP Residential Goals	µg/kg
Aroclor-1248	900	320	NA	900	FDEP Residential Goals	µg/kg
Aroclor-1254	900	320	NA	900	FDEP Residential Goals	µg/kg
Aroclor-1260	900	320	NA	900	FDEP Residential Goals	µg/kg

SEMIVOLATILE ORGANIC COMPOUNDS

1,2,4-trichlorobenzene	NA	780,000	NA	780,000	Residential Soil RBCs	µg/kg
1,2-dichlorobenzene	820,000	7,000,000	NA	820,000	FDEP Residential Goals	µg/kg
1,3-dichlorobenzene	1,700,000	7,000,000	NA	1,700,000	FDEP Residential Goals	µg/kg
1,4-dichlorobenzene	7,500	27,000	NA	7,500	FDEP Residential Goals	µg/kg
2,4,5-trichlorophenol	7,100,000	7,800,000	NA	7,100,000	FDEP Residential Goals	µg/kg
2,4,6-trichlorophenol	87,000	58,000	NA	87,000	FDEP Residential Goals	µg/kg
2,4-dichlorophenol	220,000	230,000	NA	220,000	FDEP Residential Goals	µg/kg
2,4-dimethylphenol	1,200,000	1,600,000	NA	1,200,000	FDEP Residential Goals	µg/kg
2,4-dinitrophenol	NA	160,000	NA	160,000	Residential Soil RBCs	µg/kg
2,4-dinitrotoluene	130,000	160,000	NA	130,000	FDEP Residential Goals	µg/kg
2,6-dinitrotoluene	71,000	78,000	NA	71,000	FDEP Residential Goals	µg/kg
2-chloronaphthalene	560,000	NA	NA	560,000	FDEP Residential Goals	µg/kg
2-chlorophenol	280,000	390,000	NA	280,000	FDEP Residential Goals	µg/kg
2-methyl-4,6-dinitrophenol	NA	NA	NA	NA	NA	µg/kg
2-methylnaphthalene	960,000	NA	NA	960,000	FDEP Residential Goals	µg/kg
2-methylphenol	2,600,000	3,900,000	NA	2,600,000	FDEP Residential Goals	µg/kg
2-nitroaniline	4,000	4,700	NA	4,000	FDEP Residential Goals	µg/kg
2-nitrophenol	NA	NA	NA	NA	NA	µg/kg
3 & 4-methylphenol	340,000	3,900,000	NA	340,000	FDEP Residential Goals	µg/kg
3,3'-dichlorobenzidine	NA	1,400	NA	1,400	Residential Soil RBCs	µg/kg
3-nitroaniline	NA	230,000	NA	230,000	Residential Soil RBCs	µg/kg
4-bromophenyl phenyl ether	NA	4,500,000	NA	4,500,000	Residential Soil RBCs	µg/kg
4-chloro-3-methylphenol	1.40E+08	NA	NA	1.4E+08	FDEP Residential Goals	µg/kg
4-chloroaniline	240,000	310,000	NA	240,000	FDEP Residential Goals	µg/kg
4-chlorophenyl phenyl ether	NA	NA	NA	NA	NA	µg/kg
4-nitroaniline	230,000	230,000	NA	230,000	FDEP Residential Goals	µg/kg

TABLE B-1

**SELECTION OF SOIL ACTION LEVELS FOR POTENTIAL FUTURE RESIDENTIAL SITES
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 3 OF 4**

4-nitrophenol	NA	4,800,000	NA	4,800,000	Residential Soil RBCs	µg/kg
Acenaphthene	2,800,000	4,700,000	NA	2,800,000	FDEP Residential Goals	µg/kg
Acenaphthylene	670,000	NA	NA	670,000	FDEP Residential Goals	µg/kg
Anthracene	20,000,000	23,000,000	NA	20,000,000	FDEP Residential Goals	µg/kg
Benzo(a)anthracene	1,400	880	NA	1,400	FDEP Residential Goals	µg/kg
Benzo(a)pyrene	100	88	NA	100	FDEP Residential Goals	µg/kg
Benzo(b)fluoranthene	1,400	880	NA	1,400	FDEP Residential Goals	µg/kg
Benzo(g,h,i)perylene	14,000	NA	NA	14,000	FDEP Residential Goals	µg/kg
Benzo(k)fluoranthene	14,000	8,800	NA	14,000	FDEP Residential Goals	µg/kg
Bis(2-chloroethoxy)methane	170,000	NA	NA	170,000	FDEP Residential Goals	µg/kg
Bis(2-chloroethyl)ether	500	580	NA	500	FDEP Residential Goals	µg/kg
Bis(2-ethylhexyl)phthalate	48,000	46,000	NA	48,000	FDEP Residential Goals	µg/kg
Butyl benzyl phthalate	15,000,000	16,000,000	NA	15,000,000	FDEP Residential Goals	µg/kg
Carbazole	42,000	32,000	NA	42,000	FDEP Residential Goals	µg/kg
Chrysene	140,000	88,000	NA	140,000	FDEP Residential Goals	µg/kg
Di-n-butyl phthalate	7,300,000	7,800,000	NA	7,300,000	FDEP Residential Goals	µg/kg
Di-n-octyl phthalate	1,500,000	1,600,000	NA	1,500,000	FDEP Residential Goals	µg/kg
Dibenzo(a,h)anthracene	100	88	NA	100	FDEP Residential Goals	µg/kg
Dibenzofuran	240,000	310,000	NA	240,000	FDEP Residential Goals	µg/kg
Diethyl phthalate	56,000,000	63,000,000	NA	56,000,000	FDEP Residential Goals	µg/kg
Dimethyl phthalate	630,000,000	780,000,000	NA	6.3E+08	FDEP Residential Goals	µg/kg
Fluoranthene	2,900,000	3,100,000	NA	2,900,000	FDEP Residential Goals	µg/kg
Fluorene	2,400,000	3,100,000	NA	2,400,000	FDEP Residential Goals	µg/kg
Hexachlorobenzene	600	400	NA	600	FDEP Residential Goals	µg/kg
Hexachlorobutadiene	3,100	8,200	NA	3,100	FDEP Residential Goals	µg/kg
Hexachlorocyclopentadiene	NA	550,000	NA	550,000	Residential Soil RBCs	µg/kg
Hexachloroethane	27,000	46,000	NA	27,000	FDEP Residential Goals	µg/kg
Indeno(1,2,3-cd)pyrene	1,400	880	NA	1,400	FDEP Residential Goals	µg/kg
Isophorone	NA	670,000	NA	670,000	Residential Soil RBCs	µg/kg
n-nitrosodiphenylamine	73,000	130,000	NA	73,000	FDEP Residential Goals	µg/kg
Naphthalene	1,300,000	3,100,000	NA	1,300,000	FDEP Residential Goals	µg/kg
Nitrobenzene	22,000	39,000	NA	22,000	FDEP Residential Goals	µg/kg
Pentachlorophenol	5,400	5300	NA	5,400	FDEP Residential Goals	µg/kg
Phenanthrene	1,700,000	NA	NA	1,700,000	FDEP Residential Goals	µg/kg
Phenol	34,000,000	47,000,000	NA	34,000,000	FDEP Residential Goals	µg/kg
Pyrene	2,200,000	2,300,000	NA	2,200,000	FDEP Residential Goals	µg/kg

VOLATILE ORGANIC COMPOUNDS

1,1,1-trichloroethane	610,000	2,700,000	NA	610,000	FDEP Residential Goals	µg/kg
1,1,2,2-tetrachloroethane	900	3,200	NA	900	FDEP Residential Goals	µg/kg
1,1,2-trichloroethane	2,000	11,000	NA	2,000	FDEP Residential Goals	µg/kg
1,1-dichloroethane	310,000	7,800,000	NA	310,000	FDEP Residential Goals	µg/kg
1,1-dichloroethene	100	1,100	NA	100	FDEP Residential Goals	µg/kg

TABLE B-1

**SELECTION OF SOIL ACTION LEVELS FOR POTENTIAL FUTURE RESIDENTIAL SITES
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 4 OF 4**

1,2-dichloroethane	700	7,000	NA	700	FDEP Residential Goals	µg/kg
1,2-dichloropropane	800	9,400	NA	800	FDEP Residential Goals	µg/kg
2-butanone	2,200,000	47,000,000	NA	2,200,000	FDEP Residential Goals	µg/kg
2-hexanone	NA	NA	NA	NA	NA	µg/kg
4-methyl-2-pentanone	520,000	6,300,000	NA	520,000	FDEP Residential Goals	µg/kg
Acetone	260,000	7,800,000	NA	260,000	FDEP Residential Goals	µg/kg
Benzene	1,400	22,000	NA	1,400	FDEP Residential Goals	µg/kg
Bis(2-chloroisopropyl)ether	NA	9,100	NA	9,100	Residential Soil RBCs	µg/kg
Bromodichloromethane	700	10,000	NA	700	FDEP Residential Goals	µg/kg
Bromoform	65,000	81,000	NA	65,000	FDEP Residential Goals	µg/kg
Bromomethane	NA	110,000	NA	110,000	Residential Soil RBCs	µg/kg
Carbon disulfide	5,200	7,800,000	NA	5,200	FDEP Residential Goals	µg/kg
Carbon tetrachloride	600	4,900	NA	600	FDEP Residential Goals	µg/kg
Chlorobenzene	44,000	1,600,000	NA	44,000	FDEP Residential Goals	µg/kg
Chloroethane	NA	31,000,000	NA	31,000,000	Residential Soil RBCs	µg/kg
Chloroform	600	100,000	NA	600	FDEP Residential Goals	µg/kg
Chloromethane	200	49,000	NA	200	FDEP Residential Goals	µg/kg
cis-1,2-dichloroethene	26,000	780,000	NA	26,000	FDEP Residential Goals	µg/kg
cis-1,3-dichloropropene	300	3,700	NA	300	FDEP Residential Goals	µg/kg
Dibromochloromethane	1,200	7,600	NA	1200	FDEP Residential Goals	µg/kg
Ethylbenzene	1,400,000	7,800,000	NA	1,400,000	FDEP Residential Goals	µg/kg
Methylene chloride	16,000	85,000	5.6	16,000	FDEP Residential Goals	µg/kg
Styrene	4,100,000	16,000,000	NA	4,100,000	FDEP Residential Goals	µg/kg
Tetrachloroethene	12,000	12,000	NA	12,000	FDEP Residential Goals	µg/kg
Toluene	520,000	16,000,000	NA	520,000	FDEP Residential Goals	µg/kg
trans-1,2-dichloroethene	62,000	1,600,000	NA	62,000	FDEP Residential Goals	µg/kg
trans-1,3-dichloropropene	300	3,700	NA	300	FDEP Residential Goals	µg/kg
Trichloroethene	6,500	58,000	NA	6,500	FDEP Residential Goals	µg/kg
Vinyl chloride	5	340	NA	5	FDEP Residential Goals	µg/kg
Xylenes, total	13,000,000	160,000,000	NA	13,000,000	FDEP Residential Goals	µg/kg

- 1 Florida Residential Soil Cleanup Goals (FDEP 1995b and 1996a).
- 2 Residential Soil Risk-Based Concentrations (EPA, 1997).
- 3 As agreed by the NAF Key West Partnering Team, 2x average background values are presented here for inorganics, while average background values are presented here for pesticides. This data is based on a subset of data from Appendix F of the Supplemental RFI/RI for Eight Sites as NAF Key West.

TABLE B-2

**SELECTION OF SOIL ACTION LEVELS FOR POTENTIAL FUTURE INDUSTRIAL SITES
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 1 OF 4**

Parameter	FDEP Industrial Goals ²	Residential Soil RBCs ²	2x Average BG ³	Selected Action Level	Source of Action Level	Units
INORGANICS						
Aluminum	1,000,000	78,000	3774.57	1,000,000	FDEP Industrial Goals	mg/kg
Antimony	220	31	0.58	220	FDEP Industrial Goals	mg/kg
Arsenic	3.7	0.43	2.66	3.7	FDEP Industrial Goals	mg/kg
Barium	84,000	5,500	21.9	84,000	FDEP Industrial Goals	mg/kg
Beryllium	1	0.15	0.08	1	FDEP Industrial Goals	mg/kg
Cadmium	600	39	0.28	600	FDEP Industrial Goals	mg/kg
Calcium	NA	NA	NA	NA	NA	mg/kg
Chromium	430	390	12.34	430	FDEP Industrial Goals	mg/kg
Cobalt	110,000	4,700	0.46	110,000	FDEP Industrial Goals	mg/kg
Copper	NA	3,100	11.54	3,100	Residential Soil RBCs	mg/kg
Iron	NA	23,000	2334.88	23,000	Residential Soil RBCs	mg/kg
Lead	1,000	NA	33.32	1,000	FDEP Industrial Goals	mg/kg
Magnesium	NA	NA	NA	NA	NA	mg/kg
Manganese	5,500	1,800	35.3	5,500	FDEP Industrial Goals	mg/kg
Mercury	480	23	0.06	480	FDEP Industrial Goals	mg/kg
Nickel	26,000	1,600	3.4	26,000	FDEP Industrial Goals	mg/kg
Potassium	NA	NA	NA	NA	NA	mg/kg
Selenium	9,900	390	1.3	9,900	FDEP Industrial Goals	mg/kg
Silver	9,000	390	NA	9,000	FDEP Industrial Goals	mg/kg
Sodium	NA	NA	NA	NA	NA	mg/kg
Thallium	NA	NA	NA	NA	NA	mg/kg
Tin	670,000	47,000	3.92	670,000	FDEP Industrial Goals	mg/kg
Vanadium	4,800	550	8.32	4,800	FDEP Industrial Goals	mg/kg
Zinc	560,000	23,000	32.18	560,000	FDEP Industrial Goals	mg/kg
PESTICIDES						
4,4'-DDD	17,000	2,700	27.2	17,000	FDEP Industrial Goals	µg/kg
4,4'-DDE	11,000	1,900	83.3	11,000	FDEP Industrial Goals	µg/kg
4,4'-DDT	12,000	1,900	61.24	12,000	FDEP Industrial Goals	µg/kg
Aldrin	200	38	NA	200	FDEP Industrial Goals	µg/kg
alpha-BHC	600	100	NA	600	FDEP Industrial Goals	µg/kg
alpha-chlordane	NA	490	NA	490	Residential Soil RBCs	µg/kg
beta-BHC	2,300	350	NA	2,300	FDEP Industrial Goals	µg/kg
delta-BHC	470,000	NA	NA	470,000	FDEP Industrial Goals	µg/kg
Dieldrin	300	40	NA	300	FDEP Industrial Goals	µg/kg
Endosulfan I	5,900,000	470,000	6.26	5,900,000	FDEP Industrial Goals	µg/kg
Endosulfan II	5,900,000	470,000	NA	5,900,000	FDEP Industrial Goals	µg/kg
Endosulfan sulfate	NA	NA	NA	NA	NA	µg/kg
Endrin	470,000	23,000	11.8	470,000	FDEP Industrial Goals	µg/kg
Endrin aldehyde	480,000	NA	NA	480,000	FDEP Industrial Goals	µg/kg

TABLE B-2

**SELECTION OF SOIL ACTION LEVELS FOR POTENTIAL FUTURE INDUSTRIAL SITES
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 2 OF 4**

Parameter	FDEP Industrial Goals ²	Residential Soil RBCs ²	2x Average BG ³	Selected Action Level	Source of Action Level	Units
Endrin ketone	NA	NA	NA	NA	NA	µg/kg
gamma-BHC (lindane)	3,000	490	NA	3,000	FDEP Industrial Goals	µg/kg
gamma-chlordane	NA	490	NA	490	Residential Soil RBCs	µg/kg
Heptachlor	500	140	NA	500	FDEP Industrial Goals	µg/kg
Heptachlor epoxide	300	70	NA	300	FDEP Industrial Goals	µg/kg
Methoxychlor	7,800,000	390,000	59.86	7,800,000	FDEP Industrial Goals	µg/kg
Toxaphene	3,000	580	NA	3,000	FDEP Industrial Goals	µg/kg

POLYCHLORINATED BIPHENYLS

Aroclor-1016	3,500	320	NA	3,500	FDEP Industrial Goals	µg/kg
Aroclor-1221	3,500	320	NA	3,500	FDEP Industrial Goals	µg/kg
Aroclor-1232	3,500	320	NA	3,500	FDEP Industrial Goals	µg/kg
Aroclor-1242	3,500	320	NA	3,500	FDEP Industrial Goals	µg/kg
Aroclor-1248	3,500	320	NA	3,500	FDEP Industrial Goals	µg/kg
Aroclor-1254	3,500	320	NA	3,500	FDEP Industrial Goals	µg/kg
Aroclor-1260	3,500	320	NA	3,500	FDEP Industrial Goals	µg/kg

SEMIVOLATILE ORGANIC COMPOUNDS

1,2,4-trichlorobenzene	NA	780,000	NA	780,000	Residential Soil RBCs	µg/kg
1,2-dichlorobenzene	6,000,000	7,000,000	NA	6,000,000	FDEP Industrial Goals	µg/kg
1,3-dichlorobenzene	13,000,000	7,000,000	NA	13,000,000	FDEP Industrial Goals	µg/kg
1,4-dichlorobenzene	1,100	27,000	NA	1,100	FDEP Industrial Goals	µg/kg
2,4,5-trichlorophenol	130,000,000	7,800,000	NA	130,000,000	FDEP Industrial Goals	µg/kg
2,4,6-trichlorophenol	280,000	58,000	NA	280,000	FDEP Industrial Goals	µg/kg
2,4-dichlorophenol	4,000,000	230,000	NA	4,000,000	FDEP Industrial Goals	µg/kg
2,4-dimethylphenol	16,000,000	1,600,000	NA	16,000,000	FDEP Industrial Goals	µg/kg
2,4-dinitrophenol	NA	160,000	NA	160,000	Residential Soil RBCs	µg/kg
2,4-dinitrotoluene	2,000,000	160,000	NA	2,000,000	FDEP Industrial Goals	µg/kg
2,6-dinitrotoluene	1,300,000	78,000	NA	1,300,000	FDEP Industrial Goals	µg/kg
2-chloronaphthalene	4,000,000	NA	NA	4,000,000	FDEP Industrial Goals	µg/kg
2-chlorophenol	3,700,000	390,000	NA	3,700,000	FDEP Industrial Goals	µg/kg
2-methyl-4,6-dinitrophenol	NA	NA	NA	NA	NA	µg/kg
2-methylnaphthalene	8,800,000	NA	NA	8,800,000	FDEP Industrial Goals	µg/kg
2-methylphenol	32,000,000	3,900,000	NA	32,000,000	FDEP Industrial Goals	µg/kg
2-nitroaniline	73,000	4,700	NA	73,000	FDEP Industrial Goals	µg/kg
2-nitrophenol	NA	NA	NA	NA	NA	µg/kg
3 & 4-methylphenol	5,500,000	3,900,000	NA	5,500,000	FDEP Industrial Goals	µg/kg
3,3'-dichlorobenzidine	NA	1,400	NA	1,400	Residential Soil RBCs	µg/kg
3-nitroaniline	NA	230,000	NA	230,000	Residential Soil RBCs	µg/kg
4-bromophenyl phenyl ether	NA	4,500,000	NA	4,500,000	Residential Soil RBCs	µg/kg
4-chloro-3-methylphenol	1,000,000,000	NA	NA	1,000,000,000	FDEP Industrial Goals	µg/kg
4-chloroaniline	3,300,000	310,000	NA	3,300,000	FDEP Industrial Goals	µg/kg

TABLE B-2

**SELECTION OF SOIL ACTION LEVELS FOR POTENTIAL FUTURE INDUSTRIAL SITES
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 3 OF 4**

Parameter	FDEP Industrial Goals ²	Residential Soil RBCs ²	2x Average BG ³	Selected Action Level	Source of Action Level	Units
4-chlorophenyl phenyl ether	NA	NA	NA	NA	NA	µg/kg
4-nitroaniline	4,700,000	230,000	NA	4,700,000	FDEP Industrial Goals	µg/kg
4-nitrophenol	NA	4,800,000	NA	4,800,000	Residential Soil RBCs	µg/kg
Acenaphthene	30,000,000	4,700,000	NA	30,000,000	FDEP Industrial Goals	µg/kg
Acenaphthylene	5,600,000	NA	NA	5,600,000	FDEP Industrial Goals	µg/kg
Anthracene	300,000,000	23,000,000	NA	300,000,000	FDEP Industrial Goals	µg/kg
Benzo(a)anthracene	4,900	880	NA	4,900	FDEP Industrial Goals	µg/kg
Benzo(a)pyrene	500	88	NA	500	FDEP Industrial Goals	µg/kg
Benzo(b)fluoranthene	5,000	880	NA	5,000	FDEP Industrial Goals	µg/kg
Benzo(g,h,i)perylene	50,000	NA	NA	50,000	FDEP Industrial Goals	µg/kg
Benzo(k)fluoranthene	48,000	8,800	NA	48,000	FDEP Industrial Goals	µg/kg
Bis(2-chloroethoxy)methane	3,000,000	NA	NA	3,000,000	FDEP Industrial Goals	µg/kg
Bis(2-chloroethyl)ether	900	580	NA	900	FDEP Industrial Goals	µg/kg
Bis(2-ethylhexyl)phthalate	110,000	46,000	NA	110,000	FDEP Industrial Goals	µg/kg
Butyl benzyl phthalate	310,000,000	16,000,000	NA	310,000,000	FDEP Industrial Goals	µg/kg
Carbazole	120,000	32,000	NA	120,000	FDEP Industrial Goals	µg/kg
Chrysene	500,000	88,000	NA	500,000	FDEP Industrial Goals	µg/kg
Di-n-butyl phthalate	140,000,000	7,800,000	NA	140,000,000	FDEP Industrial Goals	µg/kg
Di-n-octyl phthalate	32,000,000	1,600,000	NA	32,000,000	FDEP Industrial Goals	µg/kg
Dibenzo(a,h)anthracene	500	88	NA	500	FDEP Industrial Goals	µg/kg
Dibenzofuran	3,500,000	310,000	NA	3,500,000	FDEP Industrial Goals	µg/kg
Diethyl phthalate	970,000,000	63,000,000	NA	970,000,000	FDEP Industrial Goals	µg/kg
Dimethyl phthalate	1,000,000,000	780,000,000	NA	1E9	FDEP Industrial Goals	µg/kg
Fluoranthene	48,000,000	3,100,000	NA	48,000,000	FDEP Industrial Goals	µg/kg
Fluorene	30,000,000	3,100,000	NA	30,000,000	FDEP Industrial Goals	µg/kg
Hexachlorobenzene	1,600	400	NA	1,600	FDEP Industrial Goals	µg/kg
Hexachlorobutadiene	4,900	8,200	NA	4,900	FDEP Industrial Goals	µg/kg
Hexachlorocyclopentadiene	NA	550,000	NA	550,000	Residential Soil RBCs	µg/kg
Hexachloroethane	120,000	46,000	NA	120,000	FDEP Industrial Goals	µg/kg
Indeno(1,2,3-cd)pyrene	5,000	880	NA	5,000	FDEP Industrial Goals	µg/kg
Isophorone	NA	670,000	NA	670,000	Residential Soil RBCs	µg/kg
n-nitrosodiphenylamine	130,000	130,000	NA	130,000	FDEP Industrial Goals	µg/kg
Naphthalene	12,000,000	3,100,000	NA	12,000,000	FDEP Industrial Goals	µg/kg
Nitrobenzene	250,000	39,000	NA	250,000	FDEP Industrial Goals	µg/kg
Pentachlorophenol	12,000	5300	NA	12,000	FDEP Industrial Goals	µg/kg
Phenanthrene	21,000,000	NA	NA	21,000,000	FDEP Industrial Goals	µg/kg
Phenol	440,000,000	47,000,000	NA	440,000,000	FDEP Industrial Goals	µg/kg
Pyrene	41,000,000	2,300,000	NA	41,000,000	FDEP Industrial Goals	µg/kg
VOLATILE ORGANIC COMPOUNDS						
1,1,1-trichloroethane	4,300,000	2,700,000	NA	4,300,000	FDEP Industrial Goals	µg/kg

TABLE B-2

**SELECTION OF SOIL ACTION LEVELS FOR POTENTIAL FUTURE INDUSTRIAL SITES
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 4 OF 4**

Parameter	FDEP Industrial Goals ²	Residential Soil RBCs ²	2x Average BG ³	Selected Action Level	Source of Action Level	Units
1,1,2,2-tetrachloroethane	1,400	3,200	NA	1,400	FDEP Industrial Goals	µg/kg
1,1,2-trichloroethane	3,000	11,000	NA	3,000	FDEP Industrial Goals	µg/kg
1,1-dichloroethane	2,100,000	7,800,000	NA	2,100,000	FDEP Industrial Goals	µg/kg
1,1-dichloroethene	100	1,100	NA	100	FDEP Industrial Goals	µg/kg
1,2-dichloroethane	1,000	7,000	NA	1,000	FDEP Industrial Goals	µg/kg
1,2-dichloropropane	1,200	9,400	NA	1,200	FDEP Industrial Goals	µg/kg
2-butanone	15,000,000	47,000,000	NA	15,000,000	FDEP Industrial Goals	µg/kg
2-hexanone	NA	NA	NA	NA	NA	µg/kg
4-methyl-2-pentanone	3,700,000	6,300,000	NA	3,700,000	FDEP Industrial Goals	µg/kg
Acetone	1,800,000	7,800,000	NA	1,800,000	FDEP Industrial Goals	µg/kg
Benzene	2,000	22,000	NA	2,000	FDEP Industrial Goals	µg/kg
Bis(2-chloroisopropyl)ether	NA	9,100	NA	9,100	Residential Soil RBCs	µg/kg
Bromodichloromethane	1,000	10,000	NA	1,000	FDEP Industrial Goals	µg/kg
Bromoform	130,000	81,000	NA	130,000	FDEP Industrial Goals	µg/kg
Bromomethane	NA	110,000	NA	110,000	Residential Soil RBCs	µg/kg
Carbon disulfide	34,000	7,800,000	NA	34,000	FDEP Industrial Goals	µg/kg
Carbon tetrachloride	800	4,900	NA	800	FDEP Industrial Goals	µg/kg
Chlorobenzene	300,000	1,600,000	NA	300,000	FDEP Industrial Goals	µg/kg
Chloroethane	NA	31,000,000	NA	31,000,000	Residential Soil RBCs	µg/kg
Chloroform	800	100,000	NA	800	FDEP Industrial Goals	µg/kg
Chloromethane	300	49,000	NA	300	FDEP Industrial Goals	µg/kg
cis-1,2-dichloroethene	180,000	780,000	NA	180,000	FDEP Industrial Goals	µg/kg
cis-1,3-dichloropropene	400	3,700	NA	400	FDEP Industrial Goals	µg/kg
Dibromochloromethane	1,700	7,600	NA	1,700	FDEP Industrial Goals	µg/kg
Ethylbenzene	10,000,000	7,800,000	NA	10,000,000	FDEP Industrial Goals	µg/kg
Methylene chloride	23,000	85,000	5.6	23,000	FDEP Industrial Goals	µg/kg
Styrene	34,000,000	16,000,000	NA	34,000,000	FDEP Industrial Goals	µg/kg
Tetrachloroethene	28,000	12,000	NA	28,000	FDEP Industrial Goals	µg/kg
Toluene	3,500,000	16,000,000	NA	3,500,000	FDEP Industrial Goals	µg/kg
trans-1,2-dichloroethene	430,000	1,600,000	NA	430,000	FDEP Industrial Goals	µg/kg
trans-1,3-dichloropropene	400	3,700	NA	400	FDEP Industrial Goals	µg/kg
Trichloroethene	9,300	58,000	NA	9,300	FDEP Industrial Goals	µg/kg
Vinyl chloride	7	340	NA	7	FDEP Industrial Goals	µg/kg
Xylenes, total	92,000,000	160,000,000	NA	92,000,000	FDEP Industrial Goals	µg/kg

1 Florida Residential Soil Cleanup Goals (FDEP 1995b and 1996a).

2 Residential Soil Risk-Based Concentrations (EPA, 1997).

3 As agreed by the NAF Key West Partnering Team, 2x average background values are presented here for inorganics, while average background values are presented here for pesticides. This data is based on a subset of data from Appendix F of the Supplemental RFI/RI for Eight Sites as NAF Key West.

TABLE B-3
SELECTION OF GROUNDWATER ACTION LEVELS
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 1 OF 4

Parameter	MCL ¹	Florida MCL ²	Tap Water RBCs ³	2x Average BG ⁴	Selected Level Action	Source of Selected Action Level	Units
INORGANICS							
Aluminum	NA	NA	37,000	NA	37,000	Tap Water RBCs	µg/L
Antimony	6	6	15	NA	6	MCL	µg/L
Arsenic	50	50	0.045	9.9	50	MCL	µg/L
Barium	2,000	2,000	2,600	19.16	2,000	MCL	µg/L
Beryllium	4	4	0.016	NA	4	MCL	µg/L
Cadmium	5	5	18	NA	5	MCL	µg/L
Calcium	NA	NA	NA	NA	NA	NA	µg/L
Chromium	100	100	180	1.92	100	MCL	µg/L
Cobalt	NA	NA	2,200	NA	2,200	Tap Water RBCs	µg/L
Copper	NA	NA	1,500	3.36	1,500	Tap Water RBCs	µg/L
Cyanide	200	200	730	2.94	200	MCL	µg/L
Iron	NA	NA	11,000	83.44	11,000	Tap Water RBCs	µg/L
Lead	15	15	NA	NA	15	MCL	µg/L
Magnesium	NA	NA	NA	NA	NA	NA	µg/L
Manganese	NA	NA	840	7.56	840	Tap Water RBCs	µg/L
Mercury	2	2	11	0.2	2	MCL	µg/L
Nickel	100	100	730	NA	100	MCL	µg/L
Potassium	NA	NA	NA	NA	NA	NA	µg/L
Selenium	50	50	180	4.3	50	MCL	µg/L
Silver	NA	NA	180	2.06	180	Tap Water RBCs	µg/L
Sodium	NA	160,000	NA	NA	160,000	FI MCL	µg/L
Thallium	2	2	NA	4.62	4.62	2x Average BG	µg/L
Tin	NA	NA	22,000	NA	22,000	Tap Water RBCs	µg/L
Vanadium	NA	NA	260	3.8	260	Tap Water RBCs	µg/L
Zinc	NA	NA	11,000	2.34	11,000	Tap Water RBCs	µg/L
PESTICIDES							
4,4'-DDD	NA	NA	0.28	NA	0.28	Tap Water RBCs	µg/L
4,4'-DDE	NA	NA	0.2	NA	0.2	Tap Water RBCs	µg/L
4,4'-DDT	NA	NA	0.2	NA	0.2	Tap Water RBCs	µg/L
Aldrin	NA	NA	0.004	NA	0.004	Tap Water RBCs	µg/L
alpha-BHC	NA	NA	0.011	NA	0.011	Tap Water RBCs	µg/L
alpha-chlordane	NA	NA	0.052	NA	0.052	Tap Water RBCs	µg/L
beta-BHC	NA	NA	0.037	NA	0.037	Tap Water RBCs	µg/L
delta-BHC	NA	NA	NA	NA	NA	NA	µg/L
Dieldrin	NA	NA	0.0042	NA	0.0042	Tap Water RBCs	µg/L
Endosulfan I	NA	NA	220	NA	220	Tap Water RBCs	µg/L
Endosulfan II	NA	NA	220	NA	220	Tap Water RBCs	µg/L
Endosulfan sulfate	NA	NA	NA	NA	NA	NA	µg/L
Endrin	2	2	11	NA	2	MCL	µg/L

TABLE B-3
SELECTION OF GROUNDWATER ACTION LEVELS
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 2 OF 4

Parameter	MCL ¹	Florida MCL ²	Tap Water RBCs ³	2x Average BG ⁴	Selected Level Action	Source of Selected Action Level	Units
Endrin aldehyde	NA	NA	NA	NA	NA	NA	µg/L
Endrin ketone	NA	NA	NA	NA	NA	NA	µg/L
gamma-BHC (lindane)	0.2	0.2	0.052	NA	0.2	MCL	µg/L
gamma-chlordane	NA	NA	0.052	NA	0.052	Tap Water RBCs	µg/L
Heptachlor	0.4	0.4	0.0023	NA	0.4	MCL	µg/L
Heptachlor epoxide	0.2	0.2	0.0012	NA	0.2	MCL	µg/L
Methoxychlor	40	40	180	NA	40	MCL	µg/L
Toxaphene	3	3	0.061	NA	3	MCL	µg/L

POLYCHLORINATED BIPHENYLS

Aroclor-1016	0.5	0.5	0.0335	NA	0.5	MCL	µg/L
Aroclor-1221	0.5	0.5	0.0335	NA	0.5	MCL	µg/L
Aroclor-1232	0.5	0.5	0.0335	NA	0.5	MCL	µg/L
Aroclor-1242	0.5	0.5	0.0335	NA	0.5	MCL	µg/L
Aroclor-1248	0.5	0.5	0.0335	NA	0.5	MCL	µg/L
Aroclor-1254	0.5	0.5	0.0335	NA	0.5	MCL	µg/L
Aroclor-1260	0.5	0.5	0.0335	NA	0.5	MCL	µg/L

SEMIVOLATILE ORGANIC COMPOUNDS

1,2,4-trichlorobenzene	70	70	190	NA	70	MCL	µg/L
1,2-dichlorobenzene	600	600	270	NA	600	MCL	µg/L
1,3-dichlorobenzene	NA	NA	540	NA	540	Tap Water RBCs	µg/L
1,4-dichlorobenzene	75	75	0.44	NA	0.44	MCL	µg/L
2,4,5-trichlorophenol	NA	NA	3,700	NA	3,700	Tap Water RBCs	µg/L
2,4,6-trichlorophenol	NA	NA	6.1	NA	6.1	Tap Water RBCs	µg/L
2,4-dichlorophenol	NA	NA	110	NA	110	Tap Water RBCs	µg/L
2,4-dimethylphenol	NA	NA	730	NA	730	Tap Water RBCs	µg/L
2,4-dinitrophenol	NA	NA	73	NA	73	Tap Water RBCs	µg/L
2,4-dinitrotoluene	NA	NA	73	NA	73	Tap Water RBCs	µg/L
2,6-dinitrotoluene	NA	NA	37	NA	37	Tap Water RBCs	µg/L
2-chloronaphthalene	NA	NA	NA	NA	NA	NA	µg/L
2-chlorophenol	NA	NA	180	NA	180	Tap Water RBCs	µg/L
2-methyl-4,6-dinitrophenol	NA	NA	NA	NA	NA	NA	µg/L
2-methylnaphthalene	NA	NA	NA	NA	NA	NA	µg/L
2-methylphenol	NA	NA	1,800	NA	1,800	Tap Water RBCs	µg/L
2-nitroaniline	NA	NA	2.2	NA	2.2	Tap Water RBCs	µg/L
2-nitrophenol	NA	NA	NA	NA	NA	NA	µg/L
3 and 4-methylphenol	NA	NA	1,800	NA	1,800	Tap Water RBCs	µg/L
3,3'-dichlorobenzidine	NA	NA	0.15	NA	0.15	Tap Water RBCs	µg/L
3-nitroaniline	NA	NA	110	NA	110	Tap Water RBCs	µg/L
4-bromophenyl phenyl ether	NA	NA	2,100	NA	2,100	Tap Water RBCs	µg/L
4-chloro-3-methylphenol	NA	NA	NA	NA	NA	NA	µg/L

TABLE B-3
SELECTION OF GROUNDWATER ACTION LEVELS
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 3 OF 4

Parameter	MCL ¹	Florida MCL ²	Tap Water RBCs ³	2x Average BG ⁴	Selected Level Action	Source of Selected Action Level	Units
4-chloroaniline	NA	NA	150	NA	150	Tap Water RBCs	µg/L
4-chlorophenyl phenyl ether	NA	NA	NA	NA	NA	NA	µg/L
4-nitroaniline	NA	NA	110	NA	110	Tap Water RBCs	µg/L
4-nitrophenol	NA	NA	2,300	NA	2,300	Tap Water RBCs	µg/L
Acenaphthene	NA	NA	2,200	NA	2,200	Tap Water RBCs	µg/L
Acenaphthylene	NA	NA	NA	NA	NA	NA	µg/L
Anthracene	NA	NA	11,000	NA	11,000	Tap Water RBCs	µg/L
Benzo(a)anthracene	NA	NA	0.092	NA	0.092	Tap Water RBCs	µg/L
Benzo(a)pyrene	0.2	0.2	0.0092	NA	0.2	MCL	µg/L
Benzo(b)fluoranthene	NA	NA	0.092	NA	0.092	Tap Water RBCs	µg/L
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	µg/L
Benzo(k)fluoranthene	NA	NA	0.92	NA	0.92	Tap Water RBCs	µg/L
Bis(2-chloroethoxy)methane	NA	NA	NA	NA	NA	NA	µg/L
Bis(2-chloroethyl)ether	NA	NA	0.0092	NA	0.0092	Tap Water RBCs	µg/L
Bis(2-ethylhexyl)phthalate	6	6	4.8	NA	6	MCL	µg/L
Butyl benzyl phthalate	NA	NA	7,300	NA	7,300	Tap Water RBCs	µg/L
Carbazole	NA	NA	3.4	NA	3.4	Tap Water RBCs	µg/L
Chrysene	NA	NA	9.2	NA	9.2	Tap Water RBCs	µg/L
Di-n-butyl phthalate	NA	NA	3,700	NA	3,700	Tap Water RBCs	µg/L
Di-n-octyl phthalate	NA	NA	730	NA	730	Tap Water RBCs	µg/L
Dibenzo(a,h)anthracene	NA	NA	0.0092	NA	0.0092	Tap Water RBCs	µg/L
Dibenzofuran	NA	NA	150	NA	150	Tap Water RBCs	µg/L
Diethyl phthalate	NA	NA	29,000	NA	29,000	Tap Water RBCs	µg/L
Dimethyl phthalate	NA	NA	370,000	NA	370,000	Tap Water RBCs	µg/L
Fluoranthene	NA	NA	1,500	NA	1,500	Tap Water RBCs	µg/L
Fluorene	NA	NA	1,500	NA	1,500	Tap Water RBCs	µg/L
Hexachlorobenzene	1	1	0.0066	NA	1	MCL	µg/L
Hexachlorobutadiene	NA	NA	0.14	NA	0.14	Tap Water RBCs	µg/L
Hexachlorocyclopentadiene	50	50	0.15	NA	50	MCL	µg/L
Hexachloroethane	NA	NA	0.75	NA	0.75	Tap Water RBCs	µg/L
Indeno(1,2,3-cd)pyrene	NA	NA	0.092	NA	0.092	Tap Water RBCs	µg/L
Isophorone	NA	NA	71	NA	71	Tap Water RBCs	µg/L
n-nitrosodiphenylamine	NA	NA	14	NA	14	Tap Water RBCs	µg/L
Naphthalene	NA	NA	1,500	NA	1,500	Tap Water RBCs	µg/L
Nitrobenzene	NA	NA	3.4	NA	3.4	Tap Water RBCs	µg/L
Pentachlorophenol	1	1	0.56	NA	1	MCL	µg/L
Phenanthrene	NA	NA	NA	NA	NA	NA	µg/L
Phenol	NA	NA	22,000	NA	22,000	Tap Water RBCs	µg/L
Pyrene	NA	NA	1,100	NA	1,100	Tap Water RBCs	µg/L

TABLE B-3
SELECTION OF GROUNDWATER ACTION LEVELS
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 4 OF 4

Parameter	MCL ¹	Florida MCL ²	Tap Water RBCs ³	2x Average BG ⁴	Selected Level Action	Source of Selected Action Level	Units
VOLATILE ORGANIC COMPOUNDS							
1,1,1-trichloroethane	200	200	790	NA	200	MCL	µg/L
1,1,2,2-tetrachloroethane	NA	NA	0.052	NA	0.052	Tap Water RBCs	µg/L
1,1,2-trichloroethane	5	5	0.19	NA	5	MCL	µg/L
1,1-dichloroethane	NA	NA	810	NA	810	Tap Water RBCs	µg/L
1,1-dichloroethene	7	7	0.044	NA	7	MCL	µg/L
1,2-dichloroethane	5	3	0.12	NA	3	FI MCL	µg/L
1,2-dichloropropane	5	5	0.16	NA	5	MCL	µg/L
2-butanone	NA	NA	1,900	NA	1,900	Tap Water RBCs	µg/L
2-hexanone	NA	NA	NA	NA	NA	NA	µg/L
4-methyl-2-pentanone	NA	NA	2,900	NA	2,900	Tap Water RBCs	µg/L
Acetone	NA	NA	3,700	NA	3,700	Tap Water RBCs	µg/L
Benzene	5	1	0.36	NA	1	FI MCL	µg/L
Bis(2-chloroisopropyl)ether	NA	NA	0.26	NA	0.26	Tap Water RBCs	µg/L
Bromodichloromethane	100	NA	0.17	NA	100	MCL	µg/L
Bromoform	100	NA	2.4	NA	100	MCL	µg/L
Bromomethane	NA	NA	8.7	NA	8.7	Tap Water RBCs	µg/L
Carbon disulfide	NA	NA	1,000	NA	1,000	Tap Water RBCs	µg/L
Carbon tetrachloride	5	3	0.16	NA	3	FI MCL	µg/L
Chlorobenzene	100	100	39	NA	100	MCL	µg/L
Chloroethane	NA	NA	8,600	NA	8,600	Tap Water RBCs	µg/L
Chloroform	100	NA	0.15	NA	100	MCL	µg/L
Chloromethane	NA	NA	1.4	NA	1.4	Tap Water RBCs	µg/L
cis-1,2-dichloroethene	70	70	61	NA	70	MCL	µg/L
cis-1,3-dichloropropene	NA	NA	0.077	NA	0.077	Tap Water RBCs	µg/L
Dibromochloromethane	100	NA	0.13	NA	100	MCL	µg/L
Ethylbenzene	700	700	1,300	NA	700	MCL	µg/L
Methylene chloride	NA	5	4.1	NA	5	FI MCL	µg/L
Styrene	100	100	1,600	NA	100	MCL	µg/L
Tetrachloroethene	5	3	1.1	NA	3	FI MCL	µg/L
Toluene	1,000	1,000	750	NA	1,000	MCL	µg/L
trans-1,2-dichloroethene	100	100	120	NA	100	MCL	µg/L
trans-1,3-dichloropropene	NA	NA	0.077	NA	0.077	Tap Water RBCs	µg/L
Trichloroethene	5	3	1.6	NA	3	FI MCL	µg/L
Vinyl chloride	2	1	0.019	NA	1	FI MCL	µg/L
Xylenes, total	10,000	10,000	12,000	NA	10,000	MCL	µg/L

1 Safe Drinking Water Act Maximum Contaminant Levels (EPA, 1996a).

2 Florida Maximum Contaminant Levels (FDEP, 1995a).

3 Tap Water Risk Based Concentrations (EPA, 1997).

4 Twice the average background concentration based on a subset of data from Appendix F of the Supplemental RFI/RI for Eight Sites as NAF Key West.

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APPENDIX C

FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION CONCURRENCE LETTER

**APPENDIX C. FLORIDA DEPARTMENT OF ENVIRONMENTAL PROTECTION CONCURRENCE
LETTER**

Note: The final Decision Document will include the FDEP concurrence letter.

APPENDIX D
A RESIDUAL RISK ASSESSMENT FOR RECEPTORS
AT NAF KEY WEST BRAC SITES

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APPENDIX D. A HUMAN HEALTH RESIDUAL RISK ASSESSMENT FOR RECEPTORS AT NAF KEY WEST BRAC SITES

1.0 INTRODUCTION

This section provides a description of methods and results for a human health residual risk assessment (RRA) employed for five NAF Key West BRAC Sites: Former Location of Building 136; DRMO Waste Storage Area; Buildings 102, 103, and 104; Building 223 Hazardous Waste Storage Area; and Hamaca Hawk Missile Site Sewage Lift Station. The general objective of the RRA was to estimate the actual or potential risks to human receptors resulting from the presence of contamination remaining in soil after remediation at five BRAC sites. Sections 1.0 through 5.0 discuss the RRA.

Three major aspects of chemical contamination must be considered when assessing public health risks: (1) contaminants with toxic characteristics must be found in environmental media and must be released by either natural processes or by human action; (2) potential exposure points must exist either at the source or via migration pathways, if exposure occurs at a remote location other than the source; and (3) human or environmental receptors must be present at the point of exposure. Risk is a function of both toxicity and exposure; if none of the three factors listed above is present, there is no risk.

In order to estimate the potential for human health risk attributable to soil, data regarding the toxicity of the compounds detected, the distribution of contamination, potential migration pathways, and a site-specific estimate of chemical intake via assumed exposure routes were combined and evaluated. The risks were estimated in accordance with current EPA risk assessment guidance.

The RRA for five NAF Key West BRAC Sites was divided into the following sections: Data Evaluation (Section 2.0), Exposure Assessment (Section 3.0), Toxicity Assessment (Section 4.0), and Risk Characterization (Section 5.0).

2.0 DATA EVALUATION

This section presents the approaches used for data analysis, identification of contaminants of potential concern (COPCs), and exposure point concentrations.

2.1 Data Analysis

Inorganic constituents in soil media remain above action levels at five BRAC Sites: the Former Location of Building 136; DRMO Waste Storage Area; Buildings 102, 103, and 104; Building 223 Hazardous Waste Storage Area; and Hamaca Hawk Missile Site Sewage Lift Station. In addition, at three of the BRAC sites (the Former Location of Building 136, DRMO Waste Storage Area, and Buildings 102, 103, and 104), polynuclear aromatic hydrocarbon (PAH) constituents in soil remain above action levels. The quantitative RRA at these three BRAC sites was conducted with two data sets; (1) a data set excluding PAHs, and (2) a data set including PAHs.

PAH constituents are assumed to be caused by vehicle exhaust, due to their proximity to roads at the NAF Key West BRAC sites. Therefore, these PAHs are not considered a release under CERCLA. However, an RRA including the PAH constituents was performed because risks are posed by the chemicals. The BRAC sites of concern selected for the site and applicable sampling media were as follows:

- Building 136 - Soil (Inorganics Only)
- Building 136 - Soil (Inorganics and Semivolatiles)
- DRMO - Soil (Inorganics Only)
- DRMO - Soil (Inorganics and Semivolatiles)
- Buildings 102, 103, and 104 - Soil (Inorganics Only)
- Buildings 102, 103, and 104 - Soil (Inorganics and Semivolatiles)
- Building 223 - Soil (Inorganics Only)
- Sewage Lift Station - Soil (Inorganics Only)

2.2 Identification of COPCs

The selection of COPCs was based on chemical-specific concentrations, occurrence, distribution, and toxicity. COPCs at each BRAC site were selected to represent site contamination and to provide the framework for the quantitative RRA. Soil databases (or subsets of soil databases) at each of the five BRAC sites were analyzed in this RRA by including only those chemicals with positive detections.

A chemical was selected as a COPC if the 95% upper confidence limit (UCL) on the mean of normally distributed data (95% UCL-N) or the 95% upper confidence limit on log-transformed data (95% UCL-T) exceeded the applicable chemical-specific risk-based criteria (RBC). If an insufficient number of samples were collected to calculate a 95% UCL-N or -T (e.g., fewer than three samples), a chemical was selected as a COPC if the chemical-specific maximum concentration exceeded the applicable chemical-specific

RBC. A detailed explanation of the 95% UCL-N or -T is presented in Section 2.3. The NAF Key West Partnering Team defined the chemical-specific RBCs. Results of the selection of COPCs at each of the five NAF Key West BRAC sites are presented in the following subsections.

2.2.1 BUILDING 136 (INORGANIC CONSTITUENT ANALYSIS ONLY)

Building 136 (inorganic constituents only) COPCs for all applicable potential receptors (using site-specific RBCs) are shown in Table 1 and listed below:

- Arsenic

2.2.2 BUILDING 136 (INORGANIC AND SEMIVOLATILE CONSTITUENT ANALYSIS)

Building 136 (inorganic and semivolatile constituents only) COPCs for all applicable potential receptors (using site-specific RBCs) are shown in Table 2 and listed below:

- Arsenic
- Benzo(a)pyrene

2.2.3 DRMO (INORGANIC CONSTITUENT ANALYSIS ONLY)

DRMO (inorganic constituents only) COPCs for all applicable potential receptors (using site-specific RBCs) are shown in Table 3 and listed below:

- Beryllium

2.2.4 DRMO (INORGANIC AND SEMIVOLATILE CONSTITUENT ANALYSIS)

DRMO (inorganic and semivolatile constituents only) COPCs for all applicable potential receptors (using site-specific RBCs) are shown in Table 4 and listed below:

- Beryllium
- Benzo(a)pyrene

2.2.5 BUILDINGS 102, 103, AND 104 (INORGANIC CONSTITUENT ANALYSIS ONLY)

Buildings 102, 103, and 104 (inorganic constituents only) COPCs for all applicable potential receptors (using site-specific RBCs) are shown in Table 5 and listed below:

- Beryllium
- Thallium

2.2.6 BUILDINGS 102, 103, AND 104 (INORGANIC AND SEMIVOLATILE CONSTITUENT ANALYSIS)

Buildings 102, 103, and 104 (inorganic and semivolatile constituents only) COPCs for all applicable potential receptors (using site-specific RBCs) are shown in Table 6 and listed below:

- Beryllium
- Thallium
- Benzo(a)pyrene

2.2.7 BUILDING 223 (INORGANIC CONSTITUENT ANALYSIS ONLY)

Building 223 (inorganic constituents only) COPCs for all applicable potential receptors (using site specific-RBCs) are shown in Table 7 and listed below:

- Thallium

2.2.8 SEWAGE LIFT STATION (INORGANIC CONSTITUENT ANALYSIS ONLY)

Sewage Lift Station (inorganic constituents only) COPCs for all applicable potential receptors (using site-specific RBCs) are shown in Table 8 and listed below:

- Arsenic

2.3 Exposure Point Concentrations

In this RRA, an exposure point concentration (EPC) represents an estimated chemical concentration to which a receptor is assumed to be continuously exposed while in contact with an environmental medium. Using all analytical results for related samples, EPCs were calculated for COPCs identified at each of the NAF Key West BRAC sites. EPCs were calculated using the latest risk assessment guidance from EPA (1985, 1989a, 1991a, 1991b, 1998) and Gilbert (1987). EPCs were defined as the lesser of the maximum concentration or the 95% upper confidence limit on the mean. If the data are normally distributed, the 95% upper confidence limit of the arithmetic mean data (95% UCL-N) is used. If the data are lognormally distributed, the 95% upper confidence limit on log-transformed data (95% UCL-T) is used.

2.3.1 TREATMENT OF DATA IN EPC CALCULATIONS

Validated laboratory data were used to calculate EPCs for each of the five BRAC sites. For validated data, estimated values (J-qualified), were used as the reported values. Blank-Contamination (B qualified) values were eliminated from further consideration. Rejected results (R-qualified) were not reported for any validated data in this RRA. For chemicals with at least one positive detection in each data set, a value of one-half the sample quantitation limit was assumed for non-detect (U-qualified) results when calculating EPCs. For validated data, duplicate samples were averaged together and considered as one result. For duplicates, where one result was positive and the other result was a non-detect, the problem of calculating an average result arises whenever half the detection limit exceeded the positive result. In these situations, the positive result was used to represent the non-detect.

2.3.2 EPC CALCULATION

The calculation of an EPC involved two steps: first, the distribution of data was determined and then an EPC was calculated.

The following important assumptions were used to evaluate distribution of the data:

- The distribution of a data set was determined, using a Shapiro-Wilk test.
- The distributions were classified as normal, lognormal, or unknown.
- If the data were not determined to be either a normal or lognormal distribution, they were classified as the distribution having the apparent better fit.
- If fewer than three samples were available at a BRAC site (applicable for BRAC sites Building 223 and Sewage Lift Station only), determination of the distributional shape was not possible and the 95% UCL was not estimated.

If the data were considered to be lognormally distributed, the standard deviation of the log-transformed sample set was determined as follows:

$$S = \sqrt{\sum \left(\frac{(X_i - \mu)^2}{n-1} \right)}$$

where:

- S = Standard deviation of the log-transformed data
- X_i = Individual sample value (log-transformed)
- μ = Arithmetic mean of the log-transformed n samples
- n = Number of samples

The one-sided upper 95 percent confidence limit (UCL_{LOG}) was then calculated as follows:

$$UCL_{LOG} = e^{\left[\mu + 0.5s^2 + \left(\frac{sH}{\sqrt{n-1}} \right) \right]}$$

where:

- e = Constant (base of the natural log, equal to 2.718)
- μ = Arithmetic mean of the log-transformed data
- H = H-statistic (e.g., from table published in Gilbert, 1987)
- S = Standard deviation of the log-transformed data
- n = Number of samples

If the data were determined to be normally distributed, the standard deviation of the sample set was used to calculate the one-sided 95 percent UCL as follows:

First, the standard deviation of the sample set was determined:

$$S = \sqrt{\sum \left(\frac{(X_i - \mu)^2}{n-1} \right)}$$

where:

S	=	Standard deviation of the data
X_i	=	Individual sample value
μ	=	Arithmetic mean of the n samples
n	=	Number of samples

The one-sided upper 95 percent confidence limit (UCL_{NOR}) was calculated as follows:

$$UCL_{NOR} = \mu + \frac{(t^* S)}{\sqrt{n}}$$

where:

S	=	Standard deviation of the data
t	=	One-sided t distribution factor
μ	=	Arithmetic mean of the n samples
n	=	Number of samples

If fewer than three samples were available at a BRAC site (applicable for BRAC sites Building 223 and Sewage Lift Station only), determination of the distributional shape was not possible and the 95% UCL was not estimated. The associated EPC was then set as equal to the maximum detected site concentration.

2.3.4 EPCS FOR EXPOSURE PATHWAYS

The soil EPCs for all five BRAC sites are shown in the COPC Flag column in Tables 1 through 8. The chemical-specific screening value used for COPC selection is the chemical-specific calculated EPC.

3.0 EXPOSURE ASSESSMENT

The exposure assessment evaluates the potential for human exposure to the COPCs detected in the environmental media. The following sections characterize the exposure setting and exposed populations, identify actual or potential exposure routes, and summarize the methods used to generate exposure estimates.

3.1 Characterization of the Exposure Setting

The full characterization of the five BRAC sites (e.g., land use, hydrology, and soil characteristics) is presented in the Supplemental Site Inspection Report for BRAC Parcels (TiNUS, 1999b). As part of the property transfer activities, parcels of NAF Key West are being turned over to the Key West Local Reuse Authority. Exposure scenarios were evaluated to represent activities that would be reasonable, but conservative, representations of future land use (i.e., maintenance, occupational and excavation workers, and adolescent, adult, and lifetime trespassers).

3.2 Potential Receptors

The potential receptors chosen for this RRA are presented in this section and are listed as follows:

- **Site Maintenance Worker** - The site maintenance worker is an adult who works at the site, but is exposed in shorter durations (12 days/year) than the occupational worker. This receptor is potentially exposed to COPCs in surface soil via ingestion, dermal absorption, and inhalation.
- **Occupational Worker** - The full-time onsite worker is an adult who works at the site all year (250 days/year). This receptor is potentially exposed to COPCs in surface soil via ingestion, dermal absorption, and inhalation.
- **Excavation Worker** - The excavation worker is an adult who is assumed to work at the site in the future during any type of excavation activity (30 days/year). This receptor is potentially exposed to COPCs in surface soil via ingestion, dermal absorption, and inhalation.
- **Adolescent Trespasser** - An adolescent trespasser is a 6-16-year-old who trespasses/visits at the site for 30 days/year. This receptor is potentially exposed to COPCs in surface soil via ingestion, dermal absorption, and inhalation.
- **Adult Trespasser** - An adult trespasser is an adult who trespasses/visits at the site for 24 days/year. This receptor is potentially exposed to COPCs in surface soil via ingestion, dermal absorption, and inhalation.
- **Lifetime Trespasser** - This receptor is both an adolescent trespasser (age 6-16) and a residential adult (19 years of exposure duration) who trespasses/visits at the site. This additive trespassing exposure scenario is included to estimate the lifetime cancer risk under a trespassing land use scenario. The lifetime cancer risk is estimated by adding the cancer risk of a 19-year adult exposure to the cancer risk of an 11-year adolescent exposure. This receptor is potentially exposed to COPCs in surface soil via ingestion, dermal absorption, and inhalation.

3.3 Exposure Estimates

The estimation routes and methods presented in this section are consistent with current EPA risk assessment guidance. Exposure estimates associated with the ingestion exposure route are presented below. All exposure scenarios incorporate EPCs in the estimation of intakes.

Noncarcinogenic risks were estimated using the concept of an average annual exposure. The intake incorporates terms describing the exposure frequency that represent the number of days per year that exposure occurs. This is used along with the "averaging time", which converts the daily exposure frequency and duration to an annual exposure by dividing by 365 days per year of exposure. Noncarcinogenic risks for some exposure routes (e.g., soil) were generally greater for children than for adults because of differences in body weight and intake.

Carcinogenic risks, on the other hand, were estimated as an incremental lifetime risk and, therefore, incorporate terms to average the exposure duration (years) over the course of a lifetime (70 years).

Surface soil exposure routes include incidental ingestion, dermal contact, and inhalation of fugitive dust. All scenarios are based on COPC representative concentrations in surface soils. All three exposure routes were evaluated using maintenance workers, occupational workers, excavation workers, and trespasser receptors. Table 9 presents the input parameters selected for the soil exposure pathways for each of the potential receptors.

4.0 TOXICITY ASSESSMENT

Toxicity Assessment identifies the potential health hazards associated with exposure to each of the COPCs. A toxicological evaluation characterizes the inherent toxicity of a compound. The literature indicates that these COPCs have the potential to cause carcinogenic and/or noncarcinogenic health effects in humans. Although the COPCs may cause adverse health effects, dose-response relationships and the potential for exposure must be evaluated before the risks to receptors can be determined. Dose-response relationships correlate the magnitude of the intake with the probability of toxic effects, as discussed below.

An important component of the risk assessment process is the relationship between the intake of a compound (the amount of a chemical that is absorbed by a receptor) and the potential for adverse health effects resulting from exposure to that dose. Dose-response relationships provide a means by which potential public health impacts can be quantified. The published information of doses and responses is

used in conjunction with information on the nature and magnitude of human exposure to develop an estimate of potential health risks.

Dose-response values (reference doses [RfDs] and cancer slope factors [CSFs]) have been developed by EPA and other sources for many organics and inorganics. This section provides a brief description of these parameters.

4.1 Reference Doses

The RfD is developed by EPA for chronic and/or subchronic human exposure to hazardous chemicals and is based solely on the noncarcinogenic effects of chemical substances. Subchronic RfDs are specifically developed to be protective for a portion of a lifetime exposure to a compound (as a Superfund program guideline, short-term). Chronic RfDs are specifically developed to be protective for long-term exposure to a compound (as a Superfund program guideline, long-term). The RfD is usually expressed as a dose (mg) per unit of body weight (kg) per unit time (day). It is generally derived by dividing a No-Observed-Adverse-Effect-Level (NOAEL or NOEL) or a Lowest-Observed-Adverse-Effect-Level (LOAEL) by an appropriate uncertainty factor. NOAELs, NOELs, and LOAELs are determined from laboratory or epidemiological toxicity studies.

The RfD incorporates the surety of the evidence for chronic human health effects. Even if applicable human data exist, the RfD (as diminished by an uncertainty factor) still maintains a margin of safety so that chronic human health effects are not underestimated. Thus, the RfD is an acceptable guideline for evaluation of noncarcinogenic risk, although the associated uncertainties preclude its use for precise risk quantitation. Oral and dermal RfDs, primary target organs, uncertainty/modifying factors, and sources for selected COPCs in surface soil are provided in Table 10. Inhalation RfDs, primary target organs, uncertainty/modifying factors, and sources for selected COPCs in surface soil are provided in Table 11.

4.2 Cancer Slope Factors

CSFs are applicable for estimating the lifetime probability (assumed 70-year life span) of human receptors developing cancer as a result of exposure to known or potential carcinogens. This factor is generally reported in units of 1/(mg/kg/day) and is derived through an assumed low-dosage linear relationship of extrapolation from high to low dose responses determined from animal studies. The value used in reporting the slope factor is the upper 95 percent confidence limit. Oral and dermal SFs, weight of evidence, and sources for selected COPCs in surface soil are provided in Table 12. Inhalation SFs, weight of evidence, and sources for selected COPCs in surface soil are provided in Table 13.

4.3 EPA Weight of Evidence

The weight-of-evidence designations indicate the preponderance of evidence regarding carcinogenic effects in humans and animals. Tables 12 and 13 define the categories (EPA, 1992).

4.4 Adjustment of Dose-Response Parameters

Risks associated with dermal exposures are evaluated using toxicity values that are specific to dermally absorbed doses. Most oral toxicity values are based on administered doses, rather than absorbed doses (trichloroethylene being an important exception). Therefore, in accordance with Region IV EPA (1995) and EPA (1989, Appendix A), the toxicity values based on administered doses were adjusted before they were used for evaluation of absorbed doses. Dermal RfDs and SFs are obtained from oral RfDs and SFs via the following relationships:

$$RfD_{Adjusted} = RfD_{Oral} * ABSEFF_{Oral}$$

$$SF_{Adjusted} = \frac{SF_{Oral}}{ABSEFF_{Oral}}$$

where:

$ABSEFF_{Oral}$ = gastrointestinal absorption efficiency in the study that is the basis of the oral toxicity value.

The default value of 1.0 for ABSEFF was used except where chemical-specific values are recommended (EPA, 2001). ABSEFF values are as follows:

- Arsenic – 1.0
- Beryllium – 0.007
- Thallium – 1.0
- Benzo(a)pyrene – 1.0

5.0 RISK CHARACTERIZATION

Potential human health risks resulting from the exposures outlined in the preceding sections are characterized on a quantitative and qualitative basis in this section. Quantitative risk estimates were generated based on risk assessment methods outlined in current EPA guidance (EPA, 1989).

Noncarcinogenic risk estimates were presented in the form of Hazard Quotient (HQs) and Hazard Index (HIs) that are determined through comparison of estimated intakes with published RfDs. Incremental cancer risk estimates were based on SFs and provided in the form of dimensionless probabilities.

Estimated human intakes were developed for each of the specific exposure routes discussed in the preceding sections. Both noncarcinogenic and carcinogenic risks were summarized for each exposure route.

5.1 Noncarcinogenic Risks

Noncarcinogenic risks were assessed using the concept of HQs and HIs. The HQ is defined as the ratio of the estimated intake and the RfD for a selected chemical of concern, as follows:

$$HQ = \frac{Intake}{RfD}$$

HIs were generated by summing the individual HQs for the COPCs. If the value of the HI exceeds unity (1.0), the potential for noncarcinogenic health risks associated with exposure to that particular chemical mixture cannot be ruled out (EPA, 1986b). The HI is not defined as a mathematical prediction of the severity of toxic effects; it is simply a numeric indicator of exceedance of the acceptable threshold for noncarcinogenic effects. Above an HI of 1, toxic effects would not necessarily occur, but can no longer be ruled out.

5.2 Carcinogenic Risks

Incremental cancer risk estimates were generated for each of the exposure pathways using the estimated intakes and published SFs, as follows:

$$Risk = Intake * SF$$

The risk determined by using these equations is defined as a unitless expression of an individual's increased likelihood of developing cancer as a result of exposure to carcinogenic chemicals. An incremental cancer risk of 1E-06 indicates that the exposed receptor has a one-in-a-million chance of developing cancer under the defined exposure scenario. Alternatively, such a risk may be interpreted as representing one additional case of cancer in an exposed population of one million persons. The calculated cancer risks should be recognized as upper-limit estimates. SFs are defined as the upper 95 percent confidence limit of a dose-response curve generally derived from animal studies. Actual human

risk, while not identifiable, is not expected to exceed the upper limit based on the SFs and may, in fact, be lower.

5.3 Comparison of Quantitative Risk Estimates to Benchmark Criteria

In order to interpret the quantitative risks, comparisons are generally made to typical benchmarks criteria.

An HI exceeding unity (1) indicates that there may be potential noncarcinogenic health risks associated with exposure. If an HI exceeds unity, target organ effects from individual COPCs contributing to the risk are considered. Only those chemicals that impact the same target organ(s) or exhibit similar critical effect(s) will be regarded as truly additive. EPA has defined the range of 1.0E-04 to 1.0E-06 as the incremental cancer risk (ICR) "target range" for most hazardous waste facilities evaluated. Cumulative ICRs greater than 1.0E-04 generally will indicate that some degree of remediation may be required, and ICRs below 1.0E-06 normally will not result in remedial efforts. Whenever ICRs fall between 1.0E-04 to 1.0E-06, decisions for remediation will be made on a case-specific basis.

Potential hazard indices and cancer risks were estimated for future potential receptors using the methodologies presented in Sections 2.0 through 4.0. The following sections present a summary of the results of the estimation of risk at each NAF Key West BRAC sites.

Receptor risks are presented for each BRAC site in the form of tables and summary text. Each of these sections includes summaries of the risks estimated by the exposure scenarios. It should be noted that, in each risk summary table where HQs are reported as "N/A", the HQs were not calculable because no RfD has been established. Usually in such cases, carcinogenicity is considered to be more important, since carcinogenicity will generally be seen at lower doses than noncarcinogenic effects. Cancer risks that are reported as "N/A" generally indicate that the chemical is not carcinogenic or that an SF has not yet been developed.

5.4 Site-Specific Carcinogenic and Noncarcinogenic Risks

Site-specific carcinogenic and noncarcinogenic risks were estimated for potential receptors at the NAF Key West BRAC sites. These risks are discussed below and presented in Tables A1 through A64 (Attachment A) and summarized in Table 14.

5.4.1 BUILDING 136 SOIL (INORGANIC CONSTITUENTS ONLY) - CARCINOGENIC RISKS

The estimated reasonable maximum exposure (RME) ICR for an adult occupational worker receptor (Attachment A - Tables A1 and A2) exposed to COPCs in soil at Building 136 (inorganics only) was 2.5E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-06. Arsenic was the only carcinogenic COPC at Building 136 (inorganics only), with the dermal and ingestion routes contributing to most of the risk.

The estimated RME ICRs for an adult maintenance worker, adult excavation worker, adolescent trespasser, adult trespasser, and lifetime trespasser (Attachment A - Tables A3 through A12) exposed to COPCs in soil at Building 136 (inorganic constituents only) were less than EPA's target risk range of 1.0E-06.

5.4.2 BUILDING 136 SOIL (INORGANIC/SEMIVOLATILE CONSTITUENTS) - CARCINOGENIC RISKS

The estimated RME ICR for an adult occupational worker receptor (Attachment A - Tables A13 and A14) exposed to COPCs in soil at Building 136 (inorganic/semivolatile) was 4.7E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-06. The estimated RME ICR for a lifetime trespasser receptor (Attachment A - Tables A23 and A24) exposed to COPCs in soil at Building 136 (inorganic/semivolatile) was 1.6E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-06. Arsenic was the primary carcinogenic COPC at Building 136 (inorganic/semivolatile), with the dermal and ingestion routes contributing to most of the risk.

The estimated RME ICRs for an adult maintenance worker, adult excavation worker, adolescent trespasser, and adult trespasser (Attachment A - Tables A15 through A22) exposed to COPCs in soil at Building 136 (inorganic/semivolatile constituents) were less than EPA's target risk range of 1.0E-06.

5.4.3 BUILDING 136 SOIL (INORGANIC CONSTITUENTS ONLY) - NONCARCINOGENIC RISKS

The estimated RME HIs for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, and an adult trespasser (Attachment A - Tables A25 through A34) exposed to COPCs in soil at Building 136 (inorganic constituents only) were below the threshold level of 1.0

**5.4.4 BUILDING 136 SOIL (INORGANIC/SEMIVOLATILE CONSTITUENTS) -
NONCARCINOGENIC RISKS**

The estimated RME HIs for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, and an adult trespasser (Attachment A - Tables A35 through A44) exposed to COPCs in soil at Building 136 (inorganic/semivolatile constituents) were below the threshold level of 1.0.

5.4.5 DRMO SOIL (INORGANIC CONSTITUENTS ONLY) - CARCINOGENIC RISKS

The estimated RME ICRs for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, adult trespasser, and lifetime trespasser (Attachment A - Tables A45 through A56) exposed to COPCs in soil at DRMO (inorganic constituents only) were less than EPA's target risk range of 1.0E-06.

**5.4.6 DRMO SOIL (INORGANIC/SEMIVOLATILE CONSTITUENTS) - CARCINOGENIC
RISKS**

The estimated reasonable maximum exposure (RME) ICR for an adult occupational worker receptor (Attachment A - Tables A59 and A60) exposed to COPCs in soil at DRMO (inorganic/semivolatile constituents) was 1.6E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-06. Benzo(a)pyrene was the only carcinogenic COPC at DRMO (inorganic/semivolatile constituents), with the dermal and ingestion routes contributing to most of the risk.

The estimated RME ICRs for an adult maintenance worker, adult excavation worker, adolescent trespasser, adult trespasser, and lifetime trespasser (Attachment A - Tables A57, A61 through A68) exposed to COPCs in soil at DRMO (inorganic/semivolatile constituents) were less than EPA's target risk range of 1.0E-06.

5.4.7 DRMO SOIL (INORGANIC CONSTITUENTS ONLY) - NONCARCINOGENIC RISKS

The estimated RME HIs for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, and adult trespasser (Attachment A - Tables A69 through A78) exposed to COPCs in soil at DRMO (inorganic constituents only) were below the threshold level of 1.0.

5.4.8 DRMO SOIL (INORGANIC/SEMIVOLATILE CONSTITUENTS) - NONCARCINOGENIC RISKS

The estimated RME HIs for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, and adult trespasser (Attachment A - Tables A79 through A88) exposed to COPCs in soil at DRMO (inorganic/semivolatile constituents) were below the threshold level of 1.0.

5.4.9 BUILDINGS 102, 103, AND 104 SOIL (INORGANIC CONSTITUENTS ONLY) - CARCINOGENIC RISKS

The estimated RME ICRs for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, adult trespasser, and lifetime trespasser (Attachment A - Tables A89 through A100) exposed to COPCs in soil at Buildings (inorganic constituents only) were less than EPA's target risk range of 1.0E-06.

5.4.10 BUILDINGS 102, 103, AND 104 SOIL (INORGANIC/SEMIVOLATILE CONSTITUENTS) - CARCINOGENIC RISKS

The estimated reasonable maximum exposure (RME) ICR for an adult occupational worker receptor (Attachment A - Tables A103 and A104) exposed to COPCs in soil at Buildings (inorganic/semivolatile constituents) was 2.5E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-06. Benzo(a)pyrene was the only carcinogenic COPC at Buildings (inorganic/semivolatile constituents), with the dermal and ingestion routes contributing to most of the risk.

The estimated RME ICRs for an adult maintenance worker, adult excavation worker, adolescent trespasser, adult trespasser, and lifetime trespasser (Attachment A - Tables A101, A102, A105 through A112) exposed to COPCs in soil at Buildings (inorganic/semivolatile constituents) were less than EPA's target risk range of 1.0E-06.

5.4.11 BUILDINGS 102, 103, AND 104 SOIL (INORGANIC CONSTITUENTS ONLY) - NONCARCINOGENIC RISKS

The estimated RME HIs for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, and adult trespasser (Attachment A - Tables A113 through A122) exposed to COPCs in soil at Buildings (inorganic constituents only) were below the threshold level of 1.0.

5.4.12 BUILDINGS 102, 103, AND 104 SOIL (INORGANIC/SEMIVOLATILE CONSTITUENTS) - NONCARCINOGENIC RISKS

The estimated RME HIs for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, and adult trespasser (Attachment A - Tables A123 through A132) exposed to COPCs in soil at Buildings (inorganic/semivolatile constituents) were below the threshold level of 1.0.

5.4.13 BUILDING 223 SOIL (INORGANIC CONSTITUENTS ONLY) - CARCINOGENIC RISKS

Cancer risks were not estimated for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, adult trespasser, or a lifetime trespasser (Attachment A - Tables A133 through 144) exposed to COPCs in soil at Building 223 (inorganic constituents only) because no carcinogenic COPCs were selected.

5.4.14 BUILDING 223 SOIL (INORGANIC CONSTITUENTS ONLY) - NONCARCINOGENIC RISKS

The estimated RME HIs for an adult maintenance worker, adult occupational worker, adult excavation worker, adolescent trespasser, and adult trespasser (Attachment A - Tables A145 through A154) exposed to COPCs in soil at Building 223 (inorganic constituents only) were below the threshold level of 1.0.

5.4.15 SEWAGE LIFT STATION SOIL (INORGANIC CONSTITUENTS ONLY) - CARCINOGENIC RISKS

The estimated RME ICR for an adult occupational worker (Attachment A - Tables A155 and A156) exposed to COPCs in soil at Sewage Lift Station (inorganic constituents only) was 1.E-05, which was within EPA's target risk range of 1.0E-04 to 1.0E-06. The estimated ICR for an adult maintenance worker (Attachment A - Tables A157 and A158) exposed to COPCs in soil at Sewage Lift Station (inorganic constituents only) was 1.6E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-06. The estimated ICR for an adolescent trespasser (Attachment A - Tables A159 and A160) exposed to COPCs in soil at Sewage Lift Station (inorganic constituents only) was 2.4E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-06. The estimated ICR for an adult trespasser (Attachment A - Tables A161 and A162) exposed to COPCs in soil at Sewage Lift Station (inorganic constituents only) was 2.3E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-06. The estimated ICR for a lifetime trespasser (Attachment A - Tables A163 and A164) exposed to COPCs in soil at Sewage Lift Station (inorganic constituents only) was 4.7E-06, which was within EPA's target risk range of 1.0E-04 to 1.0E-

06. Arsenic was the only carcinogenic COPC at Sewage Lift Station (inorganic constituents only), with the dermal and ingestion routes contributing to most of the risk.

The estimated RME ICR for an adult excavation worker (Attachment A - Tables A165 and A166) exposed to COPCs in soil at Sewage Lift Station (inorganic constituents only) was less than EPA's target risk range of 1.0E-06.

**5.4.16 SEWAGE LIFT STATION SOIL (INORGANIC CONSTITUENTS ONLY) -
NONCARCINOGENIC RISKS**

The estimated RME HIs for an adult maintenance worker, adult occupational worker, adolescent trespasser, and adult trespasser (Attachment A - Tables A167 through A176) exposed to COPCs in soil at Sewage Lift Station (inorganic constituents only) were below the threshold level of 1.0.

5.4.17 SUMMARY OF RISK CHARACTERIZATION

No estimated carcinogenic risks or noncarcinogenic risks above EPA's target risk levels of 1.0E-04 and 1.0, respectively, were present under the exposure scenarios evaluated for COPCs remaining in soil at five NAF Key West BRAC Sites (Building 136, DRMO, Buildings 102, 103, and 104, Building 223, and Sewage Lift Station). The only potential receptor who had an estimated cancer risk above a level of 1E-05 was the occupational worker at Building 223. Arsenic was the only carcinogenic COPC at Building 223.

TABLE 1
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
BUILDING 136 (WITHOUT PAH SAMPLES)
NAVAL AIR FACILITY
KEY WEST, FLORIDA

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion
7429-90-5	Aluminum	129		1640		mg/kg	E2-CONF-03	27/27	N/A	836	N/A	7500 N			N	BSL
7440-38-2	Arsenic	0.77		16.2		mg/kg	E2-SS-2C	14/27	0.3-2.2	3.90	N/A	2.66 C			Y	ASL
7440-39-3	Barium	11.85		48		mg/kg	E2-SS-2B	27/27	N/A	30.67	N/A	520 N			N	BSL
7440-43-9	Cadmium	0.14		1		mg/kg	E2-SS-1C	10/27	0.05-0.8	0.32	N/A	3.7 N			N	BSL
7440-70-2	Calcium	205000		449000		mg/kg	E2-CONF-13	27/27	N/A	307201	N/A	NA N			N	NUT
7440-47-3	Chromium	1.8		18.2		mg/kg	E2-CONF-02	26/27	2.5-2.5	6.60	N/A	29 N			N	BSL
7440-48-4	Cobalt	0.1		0.87		mg/kg	E2-SS-1B	13/27	0.07-0.61	0.36	N/A	470 N			N	BSL
7440-50-8	Copper	1.2		49.9		mg/kg	E2-CONF-13	27/27	N/A	17.91	N/A	310 N			N	BSL
7439-89-6	Iron	136.5		3700		mg/kg	E2-SS-1B	27/27	N/A	1813	N/A	2300 N			N	BSL
7439-92-1	Lead	1.3		221		mg/kg	E2-CONF-02	26/27	1-1	106	N/A	400 C			N	BSL
7439-95-4	Magnesium	700		9730		mg/kg	E2-SS-4C	27/27	N/A	3594	N/A	NA N			N	NUT
7439-96-5	Manganese	3.15		43.4		mg/kg	E2-CONF-10	27/27	N/A	23.02	N/A	37 N			N	BSL
7439-97-6	Mercury	0.05		0.07		mg/kg	E2-CONF-13	4/27	0.04-0.06	0.03	N/A	2.3 N			N	BSL
7440-02-0	Nickel	0.68		4.2		mg/kg	E2-CONF-14	23/27	0.18-1.4	2.22	N/A	150 N			N	BSL
7440-09-7	Potassium	42.7		239		mg/kg	E2-SS-1B	21/27	2.8-340	122	N/A	NA N			N	NUT
7782-49-2	Selenium	0.68		1.9		mg/kg	E2-SS-2C	15/27	0.26-1.4	0.98	N/A	39 N			N	BSL
7440-23-5	Sodium	606		2870		mg/kg	E2-SS-4C	27/27	N/A	2090	N/A	NA N			N	NUT
7440-31-5	Tin	1		17.6		mg/kg	E2-CONF-03	13/22	0.72-3.7	9.52	N/A	4400 N			N	BSL
7440-62-2	Vanadium	0.61		14.2		mg/kg	E2-CONF-02	21/27	0.12-0.17	14.2	N/A	49 N			N	BSL
7440-66-6	Zinc	3.7		206		mg/kg	E2-CONF-02	27/27	N/A	90.37	N/A	2300 N			N	BSL

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.

(3) Values determined by Key West BRAC Partnering Team based on toxicity and site specific characteristics.

(4) Rationale Codes Selection Reason:

- Infrequent Detection but Associated Historically (HIST)
 - Frequent Detection (FD)
 - Toxicity Information Available (TX)
 - Above Screening Levels (ASL)
 - Dioxin Toxicity Equivalents above criteria (DIOX)
 - Another member of DDT family above criteria (DDT)
- Deletion Reason:
- Infrequent Detection (IFD)
 - Background Levels (BKG)
 - No Toxicity Information (NTX)
 - Essential Nutrient (NUT)
 - Below Screening Level (BSL)

Definitions:

- N/A = Not Applicable
- SQL = Sample Quantitation Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- MCL = Federal Maximum Contaminant Level
- SMCL = Secondary Maximum Contaminant Level
- J = Estimated Value
- L - Biased Low Value
- K - Biased High Value
- C = Carcinogenic
- N = Non-Carcinogenic

TABLE 2
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
BUILDING 136 (WITH PAH SAMPLES)
NAVAL AIR FACILITY
KEY WEST, FLORIDA

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion
7429-90-5	Aluminum	129		1640		mg/kg	E2-CONF-03	27/27	N/A	836	N/A	7500 N			N	BSL
7440-38-2	Arsenic	0.77		16.2		mg/kg	E2-SS-2C	14/27	0.3-2.2	3.90	N/A	2.66 C			Y	ASL
7440-39-3	Barium	11.85		48		mg/kg	E2-SS-2B	27/27	N/A	30.67	N/A	520 N			N	BSL
7440-43-9	Cadmium	0.14		1		mg/kg	E2-SS-1C	10/27	0.05-0.8	0.32	N/A	3.7 N			N	BSL
7440-70-2	Calcium	205000		449000		mg/kg	E2-CONF-13	27/27	N/A	307201	N/A	NA N			N	NUT
7440-47-3	Chromium	1.8		18.2		mg/kg	E2-CONF-02	26/27	2.5-2.5	6.60	N/A	29 N			N	BSL
7440-48-4	Cobalt	0.1		0.87		mg/kg	E2-SS-1B	13/27	0.07-0.61	0.36	N/A	470 N			N	BSL
7440-50-8	Copper	1.2		49.9		mg/kg	E2-CONF-13	27/27	N/A	17.91	N/A	310 N			N	BSL
7439-89-6	Iron	136.5		3700		mg/kg	E2-SS-1B	27/27	N/A	1813	N/A	2300 N			N	BSL
7439-92-1	Lead	1.3		221		mg/kg	E2-CONF-02	26/27	1-1	106	N/A	400 C			N	BSL
7439-95-4	Magnesium	700		9730		mg/kg	E2-SS-4C	27/27	N/A	3594	N/A	NA N			N	NUT
7439-96-5	Manganese	3.15		43.4		mg/kg	E2-CONF-10	27/27	N/A	23.02	N/A	37 N			N	BSL
7439-97-6	Mercury	0.05		0.07		mg/kg	E2-CONF-13	4/27	0.04-0.06	0.03	N/A	2.3 N			N	BSL
7440-02-0	Nickel	0.68		4.2		mg/kg	E2-CONF-14	23/27	0.18-1.4	2.22	N/A	150 N			N	BSL
7440-09-7	Potassium	42.7		239		mg/kg	E2-SS-1B	21/27	2.8-340	122	N/A	NA N			N	NUT
7782-49-2	Selenium	0.68		1.9		mg/kg	E2-SS-2C	15/27	0.26-1.4	0.98	N/A	39 N			N	BSL
7440-23-5	Sodium	606		2870		mg/kg	E2-SS-4C	27/27	N/A	2090	N/A	NA N			N	NUT
7440-31-5	Tin	1		17.6		mg/kg	E2-CONF-03	13/22	0.72-3.7	9.52	N/A	4400 N			N	BSL
7440-62-2	Vanadium	0.61		14.2		mg/kg	E2-CONF-02	21/27	0.12-0.17	14.2	N/A	49 N			N	BSL
7440-66-6	Zinc	3.7		206		mg/kg	E2-CONF-02	27/27	N/A	90.37	N/A	2300 N			N	BSL
83-32-9	Acenaphthene	235	J	235	J	ug/kg	E2-CONF-25	1/27	65.6-65.6	43.52	N/A	470000 N			N	BSL
208-96-8	Acenaphthylene	132	J	132	J	ug/kg	E2-CONF-14	1/27	53.1-53.1	32.97	N/A	NA N			N	NTX
120-12-7	Anthracene	144	J	321	J	ug/kg	E2-SS-6B	3/27	93.3-93.3	76.34	N/A	2300000 N			N	BSL
56-55-3	Benz(a)anthracene	101	J	1260		ug/kg	E2-CONF-25	8/27	88.6-88.6	238	N/A	870 C			N	BSL
50-32-8	Benzo(a)pyrene	85.9	J	1410		ug/kg	E2-CONF-25	9/27	92.9-92.9	244	N/A	87 C			Y	ASL
205-99-2	Benzo(b)fluoranthene	206	J	1290		ug/kg	E2-CONF-25	7/27	105.8-105.8	221	N/A	870 C			N	BSL
191-24-2	Benzo(g,h,i)perylene	218	J	1430		ug/kg	E2-CONF-25	6/27	78.8-78.8	213	N/A	NA N			N	NTX
207-08-9	Benzo(k)fluoranthene	203	J	1200		ug/kg	E2-CONF-25	7/27	98.6-98.6	209	N/A	8700 C			N	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	177	J	177	J	ug/kg	E2-CONF-16	1/27	108.9-108.9	63.13	N/A	46000 C			N	BSL
218-01-9	Chrysene	124	J	1400		ug/kg	E2-CONF-25	8/27	64.5-64.5	283	N/A	87000 C			N	BSL
53-70-3	Dibenz(a,h)anthracene	74	J	323	J	ug/kg	E2-CONF-25	3/27	72.1-72.1	54.89	N/A	87 C			N	BSL
206-44-0	Fluoranthene	161	J	1850		ug/kg	E2-CONF-25	10/27	91-91	595	N/A	310000 N			N	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	209	J	1300		ug/kg	E2-CONF-25	6/27	101.7-101.7	203	N/A	870 C			N	BSL
85-01-8	Phenanthrene	113	J	1190		ug/kg	E2-SS-6B	7/27	64.1-64.1	199	N/A	NA N			N	NTX
129-00-0	Pyrene	143	J	1960		ug/kg	E2-CONF-25	10/27	74.6-74.6	499	N/A	230000 N			N	BSL

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.

(3) Values determined by Key West BRAC Partnering Team based on toxicity and site specific characteristics.

(4) Rationale Codes Selection Reason:

Infrequent Detection but Associated Historically (HIST)

Frequent Detection (FD)

Toxicity Information Available (TX)

Above Screening Levels (ASL)

Dioxin Toxicity Equivalents above criteria (DIOX)

Another member of DDT family above criteria (DDT)

Deletion Reason:

Infrequent Detection (IFD)

Background Levels (BKG)

No Toxicity Information (NTX)

Essential Nutrient (NUT)

Below Screening Level (BSL)

Definitions:

N/A = Not Applicable
 SQL = Sample Quantitation Limit
 COPC = Chemical of Potential Concern
 ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
 MCL = Federal Maximum Contaminant Level
 SMCL = Secondary Maximum Contaminant Level
 J = Estimated Value
 L - Biased Low Value
 K - Biased High Value
 C = Carcinogenic
 N = Non-Carcinogenic

TABLE 3
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DRMO (WITHOUT PAH SAMPLES)
NAVAL AIR FACILITY
KEY WEST, FLORIDA

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion
7429-90-5	Aluminum	76		6370		mg/kg	C3-CONF-50	116/116	N/A	507	N/A	7500 N			N	BSL
7440-36-0	Antimony	0.62		30.6		mg/kg	C3-CONF-14	7/115	0.32-2.5	0.51	N/A	2.6 N			N	BSL
7440-38-2	Arsenic	0.33		8.7		mg/kg	C3-SS-29B	84/116	0.29-2.4	1.49	N/A	2.66 C			N	BSL
7440-39-3	Barium	8.7		141		mg/kg	C3-CONF-50	116/116	N/A	27.91	N/A	520 N			N	BSL
7440-41-7	Beryllium	0.05		0.13		mg/kg	C4-CONF-27	3/116	0.02-0.68	0.13	N/A	0.02 N			Y	ASL
7440-43-9	Cadmium	0.06		12.6		mg/kg	C3-CONF-14	83/116	0.02-1	0.45	N/A	3.7 N			N	BSL
7440-70-2	Calcium	54500		451000	J	mg/kg	C3-CONF-15R	116/116	N/A	274981	N/A	NA N			N	NUT
7440-47-3	Chromium	1.9		32.6		mg/kg	C3-CONF-14	110/116	2.3-2.9	5.80	N/A	29 N			N	BSL
7440-48-4	Cobalt	0.06		1.8		mg/kg	C3-CONF-50	57/116	0.04-0.85	0.25	N/A	470 N			N	BSL
7440-50-8	Copper	0.91		431		mg/kg	C3-CONF-05	116/116	N/A	33.93	N/A	310 N			N	BSL
7439-89-6	Iron	106		16000		mg/kg	C4-SS-1C	116/116	N/A	1591	N/A	2300 N			N	BSL
7439-92-1	Lead	1.4		2890		mg/kg	C3-CONF-14	116/116	N/A	201	N/A	400 C			N	BSL
7439-95-4	Magnesium	636		32600		mg/kg	C3-CONF-50	116/116	N/A	3774	N/A	NA N			N	NUT
7439-96-5	Manganese	2.2		656		mg/kg	C3-CONF-50	116/116	N/A	23.74	N/A	37 N			N	BSL
7439-97-6	Mercury	0.05		0.88		mg/kg	C3-CONF-05	32/116	0.04-0.06	0.07	N/A	2.3 N			N	BSL
7440-02-0	Nickel	0.26		10.8		mg/kg	C3-CONF-14	94/116	0.18-2.9	1.81	N/A	150 N			N	BSL
7440-09-7	Potassium	34.9		709		mg/kg	C3-SS-29B	62/116	3-72.9	67.47	N/A	NA N			N	NUT
7782-49-2	Selenium	0.57		2.6		mg/kg	C3-SS-23C	80/116	0.28-1.3	0.87	N/A	39 N			N	BSL
7440-22-4	Silver	0.1		10.8		mg/kg	C4-CONF-15	11/116	0.08-0.275	0.16	N/A	39 N			N	BSL
7440-23-5	Sodium	516		2940		mg/kg	C3-SS-25C	116/116	N/A	1894	N/A	NA N			N	NUT
7440-31-5	Tin	0.8		40.7		mg/kg	CE-CONF-65	96/112	0.73-3.4	5.98	N/A	4400 N			N	BSL
7440-62-2	Vanadium	0.79		17.4		mg/kg	C3-CONF-14	113/116	0.13-1.2	3.26	N/A	49 N			N	BSL
7440-66-6	Zinc	3.9		874		mg/kg	C3-CONF-04	116/116	N/A	108	N/A	2300 N			N	BSL

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.

(3) Values determined by Key West BRAC Partnering Team based on toxicity and site specific characteristics.

(4) Rationale Codes Selection Reason:

- Infrequent Detection but Associated Historically (HIST)
- Frequent Detection (FD)
- Toxicity Information Available (TX)
- Above Screening Levels (ASL)
- Dioxin Toxicity Equivalents above criteria (DIOX)
- Another member of DDT family above criteria (DDT)
- Infrequent Detection (IFD)
- Background Levels (BKG)
- No Toxicity Information (NTX)
- Essential Nutrient (NUT)
- Below Screening Level (BSL)

Deletion Reason:

Definitions:

N/A = Not Applicable

SQL = Sample Quantitation Limit

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

MCL = Federal Maximum Contaminant Level

SMCL = Secondary Maximum Contaminant Level

J = Estimated Value

L - Biased Low Value

K - Biased High Value

C = Carcinogenic

N = Non-Carcinogenic

TABLE 4
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
DRMO (WITH PAH SAMPLES)
NAVAL AIR FACILITY
KEY WEST, FLORIDA

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	g (3) Toxicity Value	Potential ARAR/TBC Value	Potential C Source	COPC Flag	Rationale for (4) Contaminant Deletion
7429-90-5	Aluminum	76		6370		mg/kg	C3-CONF-50	117/117	N/A	513	N/A	7500 N			N	BSL
7440-36-0	Antimony	0.62		30.6		mg/kg	C3-CONF-14	7/115	0.32-2.5	0.51	N/A	2.6 N			N	BSL
7440-38-2	Arsenic	0.33		8.7		mg/kg	C3-SS-29B	84/116	0.29-2.4	1.49	N/A	2.66 C			N	BSL
7440-39-3	Barium	8.7		141		mg/kg	C3-CONF-50	116/116	N/A	27.91	N/A	520 N			N	BSL
7440-41-7	Beryllium	0.05		0.13		mg/kg	C4-CONF-27	3/116	0.02-0.68	0.13	N/A	0.02 N			Y	ASL
7440-43-9	Cadmium	0.06		12.6		mg/kg	C3-CONF-14	83/116	0.02-1	0.45	N/A	3.7 N			N	BSL
7440-70-2	Calcium	54500		451000	J	mg/kg	C3-CONF-15R	116/116	N/A	274981	N/A	NA N			N	NUT
7440-47-3	Chromium	1.9		32.6		mg/kg	C3-CONF-14	110/116	2.3-2.9	5.80	N/A	29 N			N	BSL
7440-48-4	Cobalt	0.06		1.8		mg/kg	C3-CONF-50	57/116	0.04-0.85	0.25	N/A	470 N			N	BSL
7440-50-8	Copper	0.91		431		mg/kg	C3-CONF-05	116/116	N/A	33.93	N/A	310 N			N	BSL
7439-89-6	Iron	106		16000		mg/kg	C4-SS-1C	116/116	N/A	1591	N/A	2300 N			N	BSL
7439-92-1	Lead	1.4		2890		mg/kg	C3-CONF-14	116/116	N/A	201	N/A	400 C			N	BSL
7439-95-4	Magnesium	636		32600		mg/kg	C3-CONF-50	116/116	N/A	3774	N/A	NA N			N	NUT
7439-96-5	Manganese	2.2		656		mg/kg	C3-CONF-50	116/116	N/A	23.74	N/A	37 N			N	BSL
7439-97-6	Mercury	0.05		0.88		mg/kg	C3-CONF-05	32/116	0.04-0.06	0.07	N/A	2.3 N			N	BSL
7440-02-0	Nickel	0.26		10.8		mg/kg	C3-CONF-14	94/116	0.18-2.9	1.81	N/A	150 N			N	BSL
7440-09-7	Potassium	34.9		709		mg/kg	C3-SS-29B	62/116	3-72.9	67.47	N/A	NA N			N	NUT
7782-49-2	Selenium	0.57		2.6		mg/kg	C3-SS-23C	80/116	0.28-1.3	0.87	N/A	39 N			N	BSL
7440-22-4	Silver	0.1		10.8		mg/kg	C4-CONF-15	11/116	0.08-0.275	0.16	N/A	39 N			N	BSL
7440-23-5	Sodium	516		2940		mg/kg	C3-SS-25C	116/116	N/A	1894	N/A	NA N			N	NUT
7440-31-5	Tin	0.8		40.7		mg/kg	CE-CONF-65	96/112	0.73-3.4	5.98	N/A	4400 N			N	BSL
7440-62-2	Vanadium	0.79		17.4		mg/kg	C3-CONF-14	113/116	0.13-1.2	3.26	N/A	49 N			N	BSL
7440-66-6	Zinc	3.9		874		mg/kg	C3-CONF-04	116/116	N/A	108	N/A	2300 N			N	BSL
91-57-6	2-Methylnaphthalene	832.5		832.5		ug/kg	C4-SS-9B	1/106	64.1-64.1	36.66	N/A	160000 N			N	BSL
83-32-9	Acenaphthene	88.6	J	1353.1	J	ug/kg	C4-SS-9B	3/106	65.6-65.6	40.18	N/A	470000 N			N	BSL
208-96-8	Acenaphthylene	23.5	J	847		ug/kg	C3-SS-18B	8/106	53.1-53.1	37.36	N/A	NA N			N	NTX
120-12-7	Anthracene	22.9		1212.4	J	ug/kg	C4-SS-9B	8/106	93.3-93.3	58.61	N/A	2300000 N			N	BSL
56-55-3	Benz(a)anthracene	22.8		1920	J	ug/kg	C4-SS-9B	36/106	88.6-88.6	115	N/A	870 C			N	BSL
50-32-8	Benzo(a)pyrene	28		3200		ug/kg	C3-SS-18B	46/106	92.9-92.9	177	N/A	87 C			Y	ASL
205-99-2	Benzo(b)fluoranthene	41		5478		ug/kg	C3-SS-18B	46/106	105.8-105.8	224	N/A	870 C			N	BSL
191-24-2	Benzo(g,h,i)perylene	18.5		2180		ug/kg	C3-SS-18B	40/106	78.8-78.8	130	N/A	NA N			N	NTX
207-08-9	Benzo(k)fluoranthene	28.3	J	1782		ug/kg	C3-SS-18B	46/106	98.6-98.6	155	N/A	8700 C			N	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	187	J	258	J	ug/kg	C4-SS-10B	2/106	108.9-108.9	58.78	N/A	46000 C			N	BSL
86-74-8	Carbazole	75.4	J	479		ug/kg	C3-SS-22B	5/106	85.5-85.5	52.37	N/A	32000 C			N	BSL
218-01-9	Chrysene	29.9	J	3120		ug/kg	C3-SS-22B	43/106	64.5-64.5	159	N/A	87000 C			N	BSL
84-74-2	Di-n-butylphthalate	41.4	J	41.4	J	ug/kg	C3-SS-22C	1/106	69.6-69.6	34.97	N/A	780000 N			N	BSL
53-70-3	Dibenz(a,h)anthracene	31		1050		ug/kg	C3-SS-18B	11/106	72.1-72.1	49.68	N/A	87 C			N	BSL
132-64-9	Dibenzofuran	42	J	972.5		ug/kg	C4-SS-9B	2/106	70.1-70.1	40.32	N/A	31000 N			N	BSL
206-44-0	Fluoranthene	18.8	J	7820		ug/kg	C3-SS-22B	49/106	91-91	201	N/A	310000 N			N	BSL
86-73-7	Fluorene	68.3	J	1433.5	J	ug/kg	C4-SS-9B	4/106	69.7-69.7	42.69	N/A	310000 N			N	BSL
193-39-5	Indeno(1,2,3-cd)pyrene	18		2120		ug/kg	C3-SS-18B	40/106	101.7-101.7	127	N/A	870 C			N	BSL
91-20-3	Naphthalene	27.1	J	1017.5		ug/kg	C4-SS-9B	2/106	89.4-89.4	50.61	N/A	160000 C			N	BSL
87-86-5	Pentachlorophenol	838	J	838	J	ug/kg	C4-CONF-05	1/106	120-120	79.52	N/A	5300 C			N	BSL
85-01-8	Phenanthrene	23.9		6975.5	J	ug/kg	C4-SS-9B	24/106	64.1-64.1	104	N/A	NA N			N	NTX
129-00-0	Pyrene	29.8	J	8480		ug/kg	C3-SS-22B	50/106	74.6-74.6	214	N/A	230000 N			N	BSL

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.

(3) Values determined by Key West BRAC Partnering Team based on toxicity and site specific characteristics.

(4) Rationale Codes Selection Reason:
 Infrequent Detection but Associated Historically (HIST)
 Frequent Detection (FD)
 Toxicity Information Available (TX)
 Above Screening Levels (ASL)
 Dioxin Toxicity Equivalents above criteria (DIOX)
 Another member of DDT family above criteria (DDT)
 Deletion Reason:
 Infrequent Detection (IFD)
 Background Levels (BKG)
 No Toxicity Information (NTX)
 Essential Nutrient (NUT)
 Below Screening Level (BSL)

Definitions:

- N/A = Not Applicable
- SQL = Sample Quantitation Limit
- COPC = Chemical of Potential Concern
- ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
- MCL = Federal Maximum Contaminant Level
- SMCL = Secondary Maximum Contaminant Level
- J = Estimated Value
- L - Biased Low Value
- K - Biased High Value
- C = Carcinogenic
- N = Non-Carcinogenic

TABLE 5
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
BUILDINGS 102, 103, and 104 (WITHOUT PAH SAMPLES)
NAVAL AIR FACILITY
KEY WEST, FLORIDA

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion
7429-90-5	Aluminum	46.6		2690		mg/kg	E09-SS-11B	89/90	101-101	627	N/A	7500 N			N	BSL
7440-36-0	Antimony	8.8		14.1		mg/kg	E03-SS-14-B	2/90	0.36-1.5	0.42	N/A	2.6 N			N	BSL
7440-38-2	Arsenic	0.42		16.2		mg/kg	E2-SS-2C	47/90	0.3-2.2	1.60	N/A	2.66 C			N	BSL
7440-39-3	Barium	7.4	J	192		mg/kg	E09-SS-11D	90/90	N/A	25.64	N/A	520 N			N	BSL
7440-41-7	Beryllium	0.28		0.28		mg/kg	E09-SS-11B	1/90	0.02-0.54	0.13	N/A	0.02 N			Y	ASL
7440-43-9	Cadmium	0.045		509		mg/kg	E03-SS-13-A	51/90	0.05-0.8	1.35	N/A	3.7 N			N	BSL
7440-70-2	Calcium	118000		449000		mg/kg	E2-CONF-13	90/90	N/A	294746	N/A	NA N			N	NUT
7440-47-3	Chromium	1.6		218		mg/kg	E03-SS-14-B	84/90	1.9-5.3	6.78	N/A	29 N			N	BSL
7440-48-4	Cobalt	0.09		9.6		mg/kg	E03-SS-09-A	39/90	0.07-0.82	0.58	N/A	470 N			N	BSL
7440-50-8	Copper	0.44		232		mg/kg	E03-SS-13-A	82/90	3.4-19.5	18.43	N/A	310 N			N	BSL
7439-89-6	Iron	59.7		13700		mg/kg	E09-SS-09A	90/90	N/A	1866	N/A	2300 N			N	BSL
7439-92-1	Lead	0.58		726		mg/kg	E03-SS-13-C	89/90	1-1	69	N/A	400 C			N	BSL
7439-95-4	Magnesium	558		11200		mg/kg	E09-SS-10B	90/90	N/A	3339	N/A	NA N			N	NUT
7439-96-5	Manganese	1.2		64.6		mg/kg	E03-SS-10-A	90/90	N/A	17.85	N/A	37 N			N	BSL
7439-97-6	Mercury	0.04		0.43		mg/kg	E05-SS-02	23/90	0.03-0.19	0.059	N/A	2.3 N			N	BSL
7440-02-0	Nickel	0.22		40.8		mg/kg	E03-SS-14-B	76/90	0.18-4.2	2.47	N/A	150 N			N	BSL
7440-09-7	Potassium	42.7		509		mg/kg	E03-SS-12-A	63/90	2.8-340	135	N/A	NA N			N	NUT
7782-49-2	Selenium	0.34		1.9		mg/kg	E2-SS-2C	42/90	0.26-2.5	0.88	N/A	39 N			N	BSL
7440-22-4	Silver	0.22		95.5		mg/kg	E3-CONF-05	11/90	0.09-3	0.44	N/A	39 N			N	BSL
7440-23-5	Sodium	414		3780		mg/kg	E03-SS-07-A	90/90	N/A	1941	N/A	NA N			N	NUT
7440-28-0	Thallium	2.5		6.3		mg/kg	E01-SS-02	16/90	0.3-0.72	1.03	N/A	0.55 N			Y	ASL
7440-31-5	Tin	0.79		19.3		mg/kg	E03-SS-09-A	62/85	0.72-11	4.99	N/A	4400 N			N	BSL
7440-62-2	Vanadium	0.43		24.2		mg/kg	E09-SS-11C	83/90	0.12-1.8	6.03	N/A	49 N			N	BSL
7440-66-6	Zinc	3.7		572		mg/kg	E03-SS-13-A	88/90	4.9-7.7	67.01	N/A	2300 N			N	BSL
11097-69-1	Aroclor-1254	150		150		ug/kg	E9-CONF-05	1/21	35-190	34.63	N/A	900 C			N	BSL
11096-82-5	Aroclor-1260	19.6	J	152		ug/kg	E9-CONF-14	5/21	35-190	40.03	N/A	900 C			N	BSL

- (1) Minimum/maximum detected concentration.
- (2) N/A - Refer to supporting information for background discussion.
Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.
- (3) Values determined by Key West BRAC Partnering Team based on toxicity and site specific characteristics.
- (4) Rationale Codes Selection Reason:
 Infrequent Detection but Associated Historically (HIST)
 Frequent Detection (FD)
 Toxicity Information Available (TX)
 Above Screening Levels (ASL)
 Dioxin Toxicity Equivalents above criteria (DIOX)
 Another member of DDT family above criteria (DDT)
 Deletion Reason:
 Infrequent Detection (IFD)
 Background Levels (BKG)
 No Toxicity Information (NTX)
 Essential Nutrient (NUT)
 Below Screening Level (BSL)

- Definitions:
 N/A = Not Applicable
 SQL = Sample Quantitation Limit
 COPC = Chemical of Potential Concern
 ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
 MCL = Federal Maximum Contaminant Level
 SMCL = Secondary Maximum Contaminant Level
 J = Estimated Value
 L - Biased Low Value
 K - Biased High Value
 C = Carcinogenic
 N = Non-Carcinogenic

TABLE 6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
BUILDINGS 102, 103, and 104 (WITH PAH SAMPLES)
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 1 OF 2

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (95% UCL - MEAN)	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
7429-90-5	Aluminum	46.6		2690		mg/kg	E09-SS-11B	89/90	101-101	627	N/A	7500 N			N	BSL
7440-36-0	Antimony	8.8		14.1		mg/kg	E03-SS-14-B	2/90	0.36-1.5	0.42	N/A	2.6 N			N	BSL
7440-38-2	Arsenic	0.42		16.2		mg/kg	E2-SS-2C	47/90	0.3-2.2	1.60	N/A	2.66 C			N	BSL
7440-39-3	Barium	7.4	J	192		mg/kg	E09-SS-11D	90/90	N/A	25.64	N/A	520 N			N	BSL
7440-41-7	Beryllium	0.28		0.28		mg/kg	E09-SS-11B	1/90	0.02-0.54	0.13	N/A	0.02 N			Y	ASL
7440-43-9	Cadmium	0.045		509		mg/kg	E03-SS-13-A	51/90	0.05-0.8	1.35	N/A	3.7 N			N	BSL
7440-70-2	Calcium	118000		449000		mg/kg	E2-CONF-13	90/90	N/A	294746	N/A	NA N			N	NUT
7440-47-3	Chromium	1.6		218		mg/kg	E03-SS-14-B	84/90	1.9-5.3	6.78	N/A	29 N			N	BSL
7440-48-4	Cobalt	0.09		9.6		mg/kg	E03-SS-09-A	39/90	0.07-0.82	0.58	N/A	470 N			N	BSL
7440-50-8	Copper	0.44		232		mg/kg	E03-SS-13-A	82/90	3.4-19.5	18.43	N/A	310 N			N	BSL
7439-89-6	Iron	59.7		13700		mg/kg	E09-SS-09A	90/90	N/A	1866	N/A	2300 N			N	BSL
7439-92-1	Lead	0.58		726		mg/kg	E03-SS-13-C	89/90	1-1	69	N/A	400 C			N	BSL
7439-95-4	Magnesium	558		11200		mg/kg	E09-SS-10B	90/90	N/A	3339	N/A	NA N			N	NUT
7439-96-5	Manganese	1.2		64.6		mg/kg	E03-SS-10-A	90/90	N/A	17.85	N/A	37 N			N	BSL
7439-97-6	Mercury	0.04		0.43		mg/kg	E05-SS-02	23/90	0.03-0.19	0.06	N/A	2.3 N			N	BSL
7440-02-0	Nickel	0.22		40.8		mg/kg	E03-SS-14-B	76/90	0.18-4.2	2.47	N/A	150 N			N	BSL
7440-09-7	Potassium	42.7		509		mg/kg	E03-SS-12-A	63/90	2.8-340	135	N/A	NA N			N	NUT
7782-49-2	Selenium	0.34		1.9		mg/kg	E2-SS-2C	42/90	0.26-2.5	0.88	N/A	39 N			N	BSL
7440-22-4	Silver	0.22		95.5		mg/kg	E3-CONF-05	11/90	0.09-3	0.44	N/A	39 N			N	BSL
7440-23-5	Sodium	414		3780		mg/kg	E03-SS-07-A	90/90	N/A	1941	N/A	NA N			N	NUT
7440-28-0	Thallium	2.5		6.3		mg/kg	E01-SS-02	16/90	0.3-0.72	1.03	N/A	0.55 N			Y	ASL
7440-31-5	Tin	0.79		19.3		mg/kg	E03-SS-09-A	62/85	0.72-11	4.99	N/A	4400 N			N	BSL
7440-62-2	Vanadium	0.43		24.2		mg/kg	E09-SS-11C	83/90	0.12-1.8	6.03	N/A	49 N			N	BSL
7440-66-6	Zinc	3.7		572		mg/kg	E03-SS-13-A	88/90	4.9-7.7	67.01	N/A	2300 N			N	BSL
11097-69-1	Aroclor-1254	150		150		ug/kg	E9-CONF-05	1/21	35-190	34.63	N/A	900 C			N	BSL
11096-82-5	Aroclor-1260	19.6	J	152		ug/kg	E9-CONF-14	5/21	35-190	40.03	N/A	900 C			N	BSL
120-82-1	1,2,4-Trichlorobenzene	3.4	J	5.4	J	ug/kg	E04-SS-02	5/100	36.4-1550	5.40	N/A	78000 N			N	BSL
91-57-6	2-Methylnaphthalene	265	J	63500		ug/kg	E03-SS-09-C	8/100	36.4-1550	391	N/A	160000 N			N	BSL
83-32-9	Acenaphthene	32.7		13100		ug/kg	E03-SS-13-C	10/100	36.4-1550	204	N/A	470000 N			N	BSL
208-96-8	Acenaphthylene	6.1	J	211	J	ug/kg	E9-CONF-02	5/100	36.4-1550	51.19	N/A	NA N			N	NTX
120-12-7	Anthracene	5.8	J	12600	J	ug/kg	E09-SS-11B	15/100	36.4-1550	250	N/A	2300000 N			N	BSL
56-55-3	Benz(a)anthracene	9.2	J	85400		ug/kg	E09-SS-11B	30/100	36.4-1550	363	N/A	870 C			N	BSL
50-32-8	Benzo(a)pyrene	18.3	J	70800		ug/kg	E09-SS-11B	34/100	39.6-1550	278	N/A	87 C			Y	ASL
205-99-2	Benzo(b)fluoranthene	20.1	J	88600		ug/kg	E09-SS-11B	30/100	39.6-1550	309	N/A	870 C			N	BSL
191-24-2	Benzo(g,h,i)perylene	10.6	J	22800		ug/kg	E09-SS-11B	20/100	39.6-1550	170	N/A	NA N			N	NTX
207-08-9	Benzo(k)fluoranthene	12.1	J	34300		ug/kg	E09-SS-11B	25/100	36.4-1550	249	N/A	8700 C			N	BSL
117-81-7	Bis(2-ethylhexyl)phthalate	177	J	1300		ug/kg	E09-SS-05C	3/100	36.4-1550	90	N/A	46000 C			N	BSL
86-74-8	Carbazole	216	J	11100	J	ug/kg	E09-SS-11B	4/100	36.4-1550	97	N/A	32000 C			N	BSL
218-01-9	Chrysene	45.7		76600		ug/kg	E09-SS-11B	30/100	36.4-1550	363	N/A	87000 C			N	BSL
53-70-3	Dibenz(a,h)anthracene	74	J	364	J	ug/kg	E9-CONF-12	5/100	36.4-1550	67.26	N/A	87 C			N	BSL
132-64-9	Dibenzofuran	70.5	J	8260		ug/kg	E03-SS-13-C	2/100	36.4-1550	72.00	N/A	31000 N			N	BSL
84-66-2	Diethylphthalate	251	J	1680	J	ug/kg	E09-SS-09C	4/100	36.4-1550	83.37	N/A	6300000 N			N	BSL
206-44-0	Fluoranthene	11.2	J	108000		ug/kg	E09-SS-11B	45/100	39.6-1550	875	N/A	310000 N			N	BSL
86-73-7	Fluorene	1450	J	11700		ug/kg	E03-SS-13-C	8/100	36.4-1550	260	N/A	310000 N			N	BSL

TABLE 6
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
BUILDINGS 102, 103, and 104 (WITH PAH SAMPLES)
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 2 OF 2

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening (95% UCL - MEAN)	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion or Selection
193-39-5	Indeno(1,2,3-cd)pyrene	30.2		29800		ug/kg	E09-SS-11B	19/100	39.6-1550	186	N/A	870 C			N	BSL
91-20-3	Naphthalene	159		51200		ug/kg	E03-SS-09-C	7/100	36.4-1550	260	N/A	160000 N			N	BSL
85-01-8	Phenanthrene	113	J	38000		ug/kg	E09-SS-11B	21/100	36.4-1550	790	N/A	NA N			N	NTX
129-00-0	Pyrene	4.9	J	90300		ug/kg	E09-SS-11B	46/100	39.6-1550	788	N/A	230000 N			N	BSL
78-93-3	2-Butanone	3.7	J	3.7	J	ug/kg	E05-SS-03	1/12	5.4-7.1	3.27	N/A	4700000 N			N	BSL
67-64-1	Acetone	29.4	J	120	J	ug/kg	E05-SS-03	4/4	N/A	120	N/A	780000 N			N	BSL
75-09-2	Methylene Chloride	6.5		75.5		ug/kg	E05-SS-01	8/12	2-6	59	N/A	85000 C			N	BSL
127-18-4	Tetrachloroethene	4		4		ug/kg	E03-SS-02	1/12	1.1-1.4	1.20	N/A	12000 C			N	BSL
108-88-3	Toluene	0.495	J	0.64	J	ug/kg	E03-SS-05	2/12	1.1-1.4	0.63	N/A	1600000 N			N	BSL

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.

(3) Values determined by Key West BRAC Partnering Team based on toxicity and site specific characteristics.

(4) Rationale Codes Selection Reason:

Infrequent Detection but Associated Historically (HIST)
Frequent Detection (FD)
Toxicity Information Available (TX)
Above Screening Levels (ASL)
Dioxin Toxicity Equivalents above criteria (DIOX)
Another member of DDT family above criteria (DDT)

Deletion Reason:

Infrequent Detection (IFD)
Background Levels (BKG)
No Toxicity Information (NTX)
Essential Nutrient (NUT)
Below Screening Level (BSL)

Definitions:

N/A = Not Applicable

SQL = Sample Quantitation Limit

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

MCL = Federal Maximum Contaminant Level

SMCL = Secondary Maximum Contaminant Level

J = Estimated Value

L - Biased Low Value

K - Biased High Value

C = Carcinogenic

N = Non-Carcinogenic

TABLE 7
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
BUILDING 223
NAVAL AIR FACILITY
KEY WEST, FLORIDA

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion
108-88-3	Toluene	0.34	J	0.34	J	ug/kg	F03-SS-01	1/2	1.2-1.2	0.34	N/A	1600000 N			N	BSL

(1) Minimum/maximum detected concentration.

(2) N/A - Refer to supporting information for background discussion.

Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.

(3) Values determined by Key West BRAC Partnering Team based on toxicity and site specific characteristics.

(4) Rationale Codes Selection Reason:

Infrequent Detection but Associated Historically (HIST)

Frequent Detection (FD)

Toxicity Information Available (TX)

Above Screening Levels (ASL)

Dioxin Toxicity Equivalents above criteria (DIOX)

Another member of DDT family above criteria (DDT)

Deletion Reason:

Infrequent Detection (IFD)

Background Levels (BKG)

No Toxicity Information (NTX)

Essential Nutrient (NUT)

Below Screening Level (BSL)

Definitions:

N/A = Not Applicable

SQL = Sample Quantitation Limit

COPC = Chemical of Potential Concern

ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered

MCL = Federal Maximum Contaminant Level

SMCL = Secondary Maximum Contaminant Level

J = Estimated Value

L - Biased Low Value

K - Biased High Value

C = Carcinogenic

N = Non-Carcinogenic

TABLE 8
OCCURRENCE, DISTRIBUTION AND SELECTION OF CHEMICALS OF POTENTIAL CONCERN
SEWAGE LIFT STATION
NAVAL AIR FACILITY
KEY WEST, FLORIDA

CAS Number	Chemical	Minimum (1) Concentration	Minimum Qualifier	Maximum (1) Concentration	Maximum Qualifier	Units	Location of Maximum Concentration	Detection Frequency	Range of Detection Limits	Concentration Used for Screening	Background (2) Value	Screening (3) Toxicity Value	Potential ARAR/TBC Value	Potential ARAR/TBC Source	COPC Flag	Rationale for (4) Contaminant Deletion
7440-38-2	Arsenic	21.4		21.4		mg/kg	SEWAGE LIFT STAT.	1/1	-	21.40	N/A	2.66 C			Y	ASL

- (1) Minimum/maximum detected concentration.
 (2) N/A - Refer to supporting information for background discussion.
 Background values derived from statistical analysis. Follow Regional guidance and provide supporting information.
 (3) Values determined by Key West BRAC Partnering Team based on toxicity and site specific characteristics.
 (4) Rationale Codes Selection Reason:
 Infrequent Detection but Associated Historically (HIST)
 Frequent Detection (FD)
 Toxicity Information Available (TX)
 Above Screening Levels (ASL)
 Dioxin Toxicity Equivalents above criteria (DIOX)
 Another member of DDT family above criteria (DDT)
 Deletion Reason:
 Infrequent Detection (IFD)
 Background Levels (BKG)
 No Toxicity Information (NTX)
 Essential Nutrient (NUT)
 Below Screening Level (BSL)

- Definitions:
 N/A = Not Applicable
 SQL = Sample Quantitation Limit
 COPC = Chemical of Potential Concern
 ARAR/TBC = Applicable or Relevant and Appropriate Requirement/To Be Considered
 MCL = Federal Maximum Contaminant Level
 SMCL = Secondary Maximum Contaminant Level
 J = Estimated Value
 L - Biased Low Value
 K - Biased High Value
 C = Carcinogenic
 N = Non-Carcinogenic

**TABLE 9
RECEPTOR SPECIFIC EXPOSURE PARAMETERS AND TOXICITY ASSESSMENT METHODOLOGY
NAVAL AIR FACILITY
KEY WEST, FLORIDA**

Exposure Parameters - Soil	Symbol	Units	Maintenance Worker	Occupational Worker	Excavation Worker	Adolescent Trespasser	Adult Trespasser
Concentration In Soil	CS	mg/kg	Chemical Specific	Chemical Specific	Chemical Specific	Chemical Specific	Chemical Specific
Ingestion Rate	IR	mg/day	118	50	118	100	100
Fraction Ingested From Contaminated Area	FI	unitless	100%	100%	100%	100%	100%
Exposure Frequency	EF	days/year	12	250	30	30	24
Exposure Duration	ED	years	25	25	1	11	19
Exposure Time	ET	hours	8	8	8	4	4
Skin Surface Area Available for Contact	SA	cm2	5750	2300	5750	NA	5750
Age Adjusted Skin Surface Area/Body Wt. Ratio	SA-ADJ	cm2-years/kg	NA	NA	NA	1136.3	NA
Inhalation Rate	IH	m3/hour	0.833	0.833	2.5	0.833	0.833
Adherence Factor	AF	mg/cm2	1	1	1	1	1
Dermal Absorption Factor	ABS	unitless	Chemical Specific	Chemical Specific	Chemical Specific	Chemical Specific	Chemical Specific
Particulate Emission Factor	PEF	m3/kg	1.32E+09	1.32E+09	1.32E+09	1.32E+09	1.32E+09
Conversion Factor	CF	kg/mg	1.00E-06	1.00E-06	1.00E-06	1.00E-06	1.00E-06
Body Weight	BW	kg	70	70	70	40	70
Averaging Time (For Carcinogenic Estimation)	AT-C	days	25550	25550	25550	25550	25550
Averaging Time (For Noncarcinogenic Estimation)	AT-N	days	9125	9125	365	4015	6935

NA = Not Applicable

Ingestion (All Receptors)

Carcinogenic Exposure Equation [EXP-C] = CS*IR*FI*EF*ED*CF/(BW*AT-C)

Noncarcinogenic Exposure Equation [EXP-N] = CS*IR*FI*EF*ED*CF/(BW*AT-N)

Dermal Absorption (Adult Receptors Only)

Carcinogenic Exposure Equation [EXP-C] = CS*SA*AF*ABS*EF*ED*CF/(BW*AT-C)

Noncarcinogenic Exposure Equation [EXP-N] = CS*SA*AF*ABS*EF*ED*CF/(BW*AT-N)

Dermal Absorption (Adolescent and Child Receptors Only)

Carcinogenic Exposure Equation [EXP-C] = CS*SA-ADJ*AF*ABS*EF*CF/(AT-C)

Noncarcinogenic Exposure Equation [EXP-N] = CS*SA-ADJ*AF*ABS*EF*CF/(AT-N)

Inhalation (All Receptors)

Carcinogenic Exposure Equation [EXP-C] = (CS/PEF)*IH*ET*EF*ED/(BW x AT-C)

Noncarcinogenic Exposure Equation [EXP-N] = (CS/PEF)*IH*ET*EF*ED/(BW x AT-N)

Carcinogenic Risk = [EXP-C] * (Chemical Specific Slope Factor)

Noncarcinogenic Risk = [EXP-N] / (Chemical Specific Oral Reference Dose)

**TABLE 10
NON-CANCER TOXICITY DATA -- ORAL/DERMAL
NAVAL AIR FACILITY
KEY WEST, FLORIDA**

Chemical of Potential Concern	Chronic/Subchronic	Oral RfD Value	Oral RfD Units	Oral to Dermal Adjustment Factor ⁽¹⁾	Adjusted Dermal RfD ⁽²⁾	Units	Primary Target Organ	Combined Uncertainty / Modifying Factors	Sources of RfD: Target Organ	Dates of RfD: Target Organ ⁽³⁾	Dermal Absorption Factor for Soil (1)
Arsenic	Chronic	3.00E-04	mg/kg-day	1.00E+00	3.00E-04	mg/kg-day	Skin/Vascular	3	IRIS	02/01/02	0.032
Beryllium	Chronic	2.00E-03	mg/kg-day	7.00E-03	1.40E-05	mg/kg-day	GI Tract	300	IRIS	02/01/02	0.01
Thallium	Chronic	7.00E-05	mg/kg-day	1.00E+00	7.00E-05	mg/kg-day	NOAEL	3000	IRIS	02/04/02	0.01
Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.13

N/A = Not Applicable

Acronyms: CNS = Central Nervous System; GI = Gastrointestinal Tract.

(1) Refer to EPA (1989, Appendix A), EPA (1995), and EPA (2001, Appendix E).

(2) Adjusted RfD = oral RfD x GI absorption value in toxicity study upon which the RfD is based. To be used for dermal pathway only.

(3) IRIS - Integrated Risk Information System (EPA, 2002)

EPA, 1989 - Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA 540/1-89/002. Office of Emergency and Remedial Response. Washington, DC.

EPA, 1995 - Assessing Dermal Exposure from Soil, EPA Region III Technical Guidance manual, EPA/903-K-95-003, December.

EPA, 2001 - Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA 540/R/99/005 - Office of Emergency and Remedial Response, Washington, DC.

EPA-NCEA - EPA Office of Research and Development, National Center for Environmental Assessment

**TABLE 11
NON-CANCER TOXICITY DATA – INHALATION
NAVAL AIR FACILITY
KEY WEST, FLORIDA**

Chemical of Potential Concern	Chronic/ Subchronic	Value Inhalation RfC	Units	Adjusted Inhalation RfD	Units	Primary Target Organ	Combined Uncertainty/ Modifying Factors	Sources of RfC:RfD: Target Organ	Dates ⁽¹⁾
Arsenic	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Beryllium	Chronic	N/A	N/A	5.70E-06	mg/kg-day	Respiratory/Immune	10	IRIS	02/01/02
Thallium	N/A	---	---	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

N/A = Not Applicable
 Acronyms: CNS = Central Nervous System
 (1) IRIS - Integrated Risk Information System (EPA, 2001)

**TABLE 12
CANCER TOXICITY DATA – ORAL/KERMAL
NAVAL AIR FACILITY
KEY WEST, FLORIDA**

Chemical of Potential Concern	Oral Cancer Slope Factor	Oral to Dermal Adjustment Factor ⁽¹⁾	Adjusted Dermal Cancer Slope Factor ⁽²⁾	Units	Weight of Evidence/ Cancer Guideline Description ⁽⁴⁾	Source Target Organ	Date ⁽³⁾	Dermal Absorption Factor for Soil
Arsenic	1.50E+00	1.00E+00	1.50E+00	1/(mg/kg-day)	A	IRIS	02/01/02	0.032
Beryllium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
Thallium	N/A	N/A	N/A	N/A	N/A	N/A	N/A	0.01
Benzo(a)pyrene	7.30E+00	1.00E+00	7.30E+00	1/(mg/kg-day)	B2	IRIS	02/04/02	0.13

N/A = Not Applicable

Refer to EPA (1989, Appendix A), EPA (1995), and EPA (2001, Appendix E)

EPA 1989 – Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA 540/1-89/002. Office of Emergency and Remedial Response. Washington, DC.

EPA 1995 – Assessing Dermal Exposure from Soil, EPA Region III Technical Guidance manual, EPA/903-K-95-003. December.

EPA 2001 – Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. EPA 540/R/99/005.

(1) Office of Emergency and Remedial Response. Washington, DC.

(2) Adjusted SF dermal = oral SF/GI absorption value in toxicity study upon which the SF is based. To be used for dermal pathway only.

(3) IRIS - Integrated Risk Information System (EPA, 2001)

(4) PA Group (Weight of Evidence); Weight of Evidence is only shown for those chemicals that have numerical cancer slope factors.

A Human carcinogen

B1 Probable human carcinogen - indicates that limited human data are available

B2 Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C Possible human carcinogen

D Not classifiable as a human carcinogen

E Evidence of noncarcinogenicity

**TABLE 13
CANCER TOXICITY DATA – INHALATION
NAVAL AIR FACILITY
KEY WEST, FLORIDA**

Chemical of Potential Concern	Unit Risk	Units	Adjustment	Inhalation Cancer Slope Factor	Units	Weight of Evidence/ Cancer Guideline Description ⁽²⁾	Source	Date ⁽¹⁾
Arsenic	---	---	---	1.51E+01	1/(mg/kg-day)	A	IRIS	02/01/02
Beryllium	---	---	---	8.40E+00	1/(mg/kg-day)	B1	IRIS	02/02/02
Thallium	---	---	---	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	---	---	---	3.10E+00	1/(mg/kg-day)	B2	EPA-NCEA	10/01/01

N/A = Not Applicable

(1) IRIS - Integrated Risk Information System (EPA, 2001)

EPA-NCEA - EPA Office of Research and Development, National Center for Environmental Assessment

(2) EPA Group (Weight of Evidence); Weight of Evidence is only shown for those chemicals that have numerical cancer slope factors

A Human carcinogen

B1 Probable human carcinogen - indicates that limited human data are available

B2 Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C Possible human carcinogen

D Not classifiable as a human carcinogen

E Evidence of noncarcinogenicity

TABLE 14
SUMMARY OF THE CANCER RISKS
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 1 OF 2

Receptor		Maintenance Worker Cancer Risk	Occupational Worker Cancer Risk	Excavation Worker Cancer Risk	Adolescent Trespasser Cancer Risk	Adult Trespasser Cancer Risk	Lifetime Trespasser Cancer Risk
Site							
Building 136 w/o PAHs	Soil Ingestion	1.16E-07	1.02E-06	1.16E-08	1.89E-07	1.49E-07	3.38E-07
	Soil Dermal	1.81E-07	1.50E-06	1.81E-08	2.50E-07	2.74E-07	5.24E-07
	Soil Inhalation	4.99E-11	1.04E-09	1.50E-11	4.80E-11	3.79E-11	8.59E-11
	TOTAL	2.97E-07	2.52E-06	2.97E-08	4.39E-07	4.23E-07	8.62E-07
Building 136 w/ PAHs	Soil Ingestion	1.51E-07	1.33E-06	1.51E-08	2.46E-07	1.95E-07	4.41E-07
	Soil Dermal	4.04E-07	3.37E-06	4.04E-08	5.59E-07	6.14E-07	1.17E-06
	Soil Inhalation	5.05E-11	1.05E-09	1.52E-11	4.86E-11	3.84E-11	8.70E-11
	TOTAL	5.55E-07	4.70E-06	5.55E-08	8.05E-07	8.09E-07	1.61E-06
DRMO w/o PAHs	Soil Ingestion	--	--	--	--	--	--
	Soil Dermal	--	--	--	--	--	--
	Soil Inhalation	9.25E-13	1.93E-11	2.78E-13	8.90E-13	7.03E-13	1.59E-12
	TOTAL	9.25E-13	1.93E-11	2.78E-13	8.90E-13	7.03E-13	1.59E-12
DRMO w/ PAHs	Soil Ingestion	2.56E-08	2.26E-07	2.56E-09	4.17E-08	3.29E-08	7.47E-08
	Soil Dermal	1.62E-07	1.35E-06	1.62E-08	2.24E-07	2.46E-07	4.70E-07
	Soil Inhalation	1.39E-12	2.89E-11	4.17E-13	1.34E-12	1.06E-12	2.39E-12
	TOTAL	1.88E-07	1.58E-06	1.88E-08	2.66E-07	2.79E-07	5.45E-07
Buildings w/o PAH	Soil Ingestion	--	--	--	--	--	--
	Soil Dermal	--	--	--	--	--	--
	Soil Inhalation	9.53E-13	1.99E-11	2.86E-13	9.17E-13	7.24E-13	1.64E-12
	TOTAL	9.53E-13	1.99E-11	2.86E-13	9.17E-13	7.24E-13	1.64E-12
Buildings w/ PAH	Soil Ingestion	4.02E-08	3.55E-07	4.02E-09	6.55E-08	5.17E-08	1.17E-07
	Soil Dermal	2.54E-07	2.12E-06	2.54E-08	3.52E-07	3.87E-07	7.39E-07
	Soil Inhalation	1.68E-12	3.51E-11	5.05E-13	1.62E-12	1.28E-12	2.90E-12
	TOTAL	2.94E-07	2.48E-06	2.94E-08	4.18E-07	4.39E-07	8.56E-07
Building 223 w/o PAHs	Soil Ingestion	--	--	--	--	--	--
	Soil Dermal	--	--	--	--	--	--
	Soil Inhalation	--	--	--	--	--	--
	TOTAL	--	--	--	--	--	--
Sewage Lift Station	Soil Ingestion	6.35E-07	5.61E-06	6.35E-08	1.04E-06	8.18E-07	1.85E-06
	Soil Dermal	9.91E-07	8.26E-06	9.91E-08	1.37E-06	1.51E-06	2.88E-06
	Soil Inhalation	2.74E-10	5.70E-09	8.21E-11	2.63E-10	2.08E-10	4.71E-10
	TOTAL	1.63E-06	1.39E-05	1.63E-07	2.41E-06	2.33E-06	4.73E-06

Shading indicates an exceedance of EPA's lower target and FDEP's threshold ICR of 1.0E-06.

TABLE 14
SUMMARY OF THE NONCANCER RISKS
NAVAL AIR FACILITY
KEY WEST, FLORIDA
PAGE 2 OF 2

Receptor		Maintenance Worker Non Cancer Risk	Occupational Worker Non Cancer Risk	Excavation Worker Non Cancer Risk	Adolescent Trespasser Non Cancer Risk	Adult Trespasser Non Cancer Risk	Lifetime Trespasser Non Cancer Risk
Site							
Building 136 w/o PAHs	Soil Ingestion	7.20E-04	6.36E-03	1.80E-03	2.67E-03	1.22E-03	NA
	Soil Dermal	1.12E-03	9.36E-03	2.81E-03	3.53E-03	2.25E-03	NA
	Soil Inhalation	--	--	--	--	--	NA
	TOTAL	1.84E-03	1.57E-02	4.61E-03	6.20E-03	3.47E-03	NA
Building 136 w/ PAHs	Soil Ingestion	7.20E-04	6.36E-03	1.80E-03	2.67E-03	1.22E-03	NA
	Soil Dermal	1.12E-03	9.36E-03	2.81E-03	3.53E-03	2.25E-03	NA
	Soil Inhalation	--	--	1.52E-11	--	--	NA
	TOTAL	1.84E-03	1.57E-02	4.61E-03	6.20E-03	3.47E-03	NA
DRMO w/o PAHs	Soil Ingestion	3.60E-06	3.18E-05	9.01E-06	1.34E-05	6.11E-06	NA
	Soil Dermal	2.51E-04	2.09E-03	6.27E-04	7.88E-04	5.02E-04	NA
	Soil Inhalation	5.41E-08	1.13E-06	4.06E-07	1.18E-07	5.41E-08	NA
	TOTAL	2.55E-04	2.12E-03	6.36E-04	8.02E-04	5.08E-04	NA
DRMO w/ PAHs	Soil Ingestion	3.60E-06	3.18E-05	9.01E-06	1.34E-05	6.11E-06	NA
	Soil Dermal	2.51E-04	2.09E-03	6.27E-04	7.88E-04	5.02E-04	NA
	Soil Inhalation	5.41E-08	1.13E-06	4.06E-07	1.18E-07	5.41E-08	NA
	TOTAL	2.55E-04	2.12E-03	6.36E-04	8.02E-04	5.08E-04	NA
Buildings w/o PAH	Soil Ingestion	8.19E-04	7.23E-03	2.05E-03	3.04E-03	1.39E-03	NA
	Soil Dermal	6.56E-04	5.47E-03	1.64E-03	2.06E-03	1.31E-03	NA
	Soil Inhalation	5.57E-08	1.16E-06	4.18E-07	1.22E-07	5.57E-08	NA
	TOTAL	1.48E-03	1.27E-02	3.69E-03	5.10E-03	2.70E-03	NA
Buildings w/ PAH	Soil Ingestion	8.19E-04	7.23E-03	2.05E-03	3.04E-03	1.39E-03	NA
	Soil Dermal	6.56E-04	5.47E-03	1.65E-03	2.06E-03	1.31E-03	NA
	Soil Inhalation	5.57E-08	1.16E-06	4.18E-07	1.22E-07	5.57E-08	NA
	TOTAL	1.48E-03	1.27E-02	3.70E-03	5.10E-03	2.70E-03	NA
Building 223 w/o PAHs	Soil Ingestion	4.12E-03	3.63E-02	1.03E-02	1.53E-02	6.98E-03	NA
	Soil Dermal	2.01E-03	1.67E-02	5.02E-03	6.31E-03	4.01E-03	NA
	Soil Inhalation	--	--	--	--	--	NA
	TOTAL	6.13E-03	5.30E-02	1.53E-02	2.16E-02	1.10E-02	NA
Sewage Lift Station	Soil Ingestion	3.95E-03	3.49E-02	9.88E-03	1.47E-02	6.70E-03	NA
	Soil Dermal	6.16E-03	5.14E-02	1.54E-02	1.94E-02	1.23E-02	NA
	Soil Inhalation	--	--	--	--	--	NA
	TOTAL	1.01E-02	8.63E-02	2.53E-02	3.41E-02	1.90E-02	NA

NA = Not Applicable

APPENDIX D

ATTACHMENT 1

SITE-SPECIFIC NORCARCINOGENIC AND CARCINOGENIC RISKS

NAF KEY WEST BRAC SITES

TABLE A1
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL) WITH BUILDING 136 SOIL,
WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	6.81E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.02E-06
	(Total)										1.02E-06
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.00E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.50E-06
	(Total)										1.50E-06
Total of Routes											2.53E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A2
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION) WITH PARTICULATES FROM BUILDING 136 SOIL,
WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
 Receptor Population: Occupational Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	6.88E-11	mg/kg-day	1.51E+01	1/(mg/kg-day)	1.04E-09
	(Total)										1.04E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A3
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL) WITH BUILDING 136 SOIL,
WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	7.72E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.16E-07
	(Total)										1.16E-07
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.20E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.81E-07
	(Total)										1.81E-07
Total of Routes											2.96E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A4
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INHALATION) WITH PARTICULATES FROM BUILDING 136 SOIL,
WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.30E-12	mg/kg-day	1.51E+01	1/(mg/kg-day)	4.99E-11
	(Total)										4.99E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A5
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL) WITH BUILDING 136 SOIL,
WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	7.72E-09	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.16E-08
	(Total)										1.16E-08
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.20E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.81E-08
	(Total)										1.81E-08
Total of Routes											2.96E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A6
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INHALATION) WITH PARTICULATES FROM BUILDING 136 SOIL,
WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	9.91E-13	mg/kg-day	1.51E+01	1/(mg/kg-day)	1.50E-11
	(Total)										1.50E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A7
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL) WITH BUILDING 136 SOIL,
WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.26E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.89E-07
	(Total)										1.89E-07
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.67E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	2.50E-07
	(Total)										2.50E-07
Total of Routes											4.39E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A8
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil Receptor Population: Trespasser/Visitor Receptor Age: Adolescent (Teens)
--

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.18E-12	mg/kg-day	1.51E+01	1/(mg/kg-day)	4.80E-11
	(Total)										4.80E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

**TABLE A9
 CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL) WITH BUILDING 136 SOIL,
 WITHOUT PAH SAMPLES
 REASONABLE MAXIMUM EXPOSURE
 NAVAL AIR FACILITY
 KEY WEST, FLORIDA**

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	9.94E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.49E-07
	(Total)										1.49E-07
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.83E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	2.74E-07
	(Total)										2.74E-07
Total of Routes											4.24E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A10
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES FROM BUILDING 136 SOIL,
WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR STATION
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.51E-12	mg/kg-day	1.51E+01	1/(mg/kg-day)	3.79E-11
	(Total)										3.79E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A11
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL) WITH BUILDING 136 SOIL,
WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.25E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	3.38E-07
	(Total)										3.38E-07
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.49E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	5.24E-07
	(Total)										5.24E-07
Total of Routes											8.62E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A12
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	5.69E-12	mg/kg-day	1.51E+01	1/(mg/kg-day)	8.59E-11
	(Total)										8.59E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A13
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL) WITH BUILDING 136 SOIL,
INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	6.81E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.02E-06
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	4.26E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	3.11E-07
	(Total)										1.33E-06
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.00E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.50E-06
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	2.55E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	1.86E-06
	(Total)										3.37E-06
Total of Routes											4.70E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A14
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	6.88E-11	mg/kg-day	1.51E+01	1/(mg/kg-day)	1.04E-09
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	4.30E-12	mg/kg-day	3.10E+00	1/(mg/kg-day)	1.33E-11
	(Total)										1.05E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A15
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INGESTION. & DERMAL)
WITH BUILDING 136 SOIL WITH PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	7.72E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.16E-07
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	4.83E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	3.53E-08
	(Total)										1.51E-07
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.20E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.81E-07
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	3.06E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.23E-07
	(Total)										4.04E-07
Total of Routes											5.55E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A16
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, WITH PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.30E-12	mg/kg-day	1.51E+01	1/(mg/kg-day)	4.99E-11
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	2.07E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	6.41E-13
	(Total)										5.05E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A17
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	7.72E-09	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.16E-08
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	4.83E-10	mg/kg-day	7.30E+00	1/(mg/kg-day)	3.53E-09
	(Total)										1.51E-08
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.20E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.81E-08
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	3.06E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.23E-08
	(Total)										4.04E-08
Total of Routes											5.55E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A18
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	9.91E-13	mg/kg-day	1.51E+01	1/(mg/kg-day)	1.50E-11
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	6.20E-14	mg/kg-day	3.10E+00	1/(mg/kg-day)	1.92E-13
	(Total)										1.52E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A19
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.26E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.89E-07
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	7.88E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	5.75E-08
	(Total)										2.46E-07
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.67E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	2.50E-07
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	4.23E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	3.09E-07
	(Total)										5.59E-07
Total of Routes											8.05E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A20
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.18E-12	mg/kg-day	1.51E+01	1/(mg/kg-day)	4.80E-11
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	1.99E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	6.17E-13
	(Total)										4.86E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A21
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	9.94E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.49E-07
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	6.22E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	4.54E-08
	(Total)										1.95E-07
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.83E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	2.74E-07
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	4.65E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	3.39E-07
	(Total)										6.14E-07
Total of Routes											8.08E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A22
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.51E-12	mg/kg-day	1.51E+01	1/(mg/kg-day)	3.79E-11
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	1.57E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	4.87E-13
	(Total)										3.84E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A23
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.25E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	3.38E-07
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	1.41E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	1.03E-07
	(Total)										4.41E-07
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.49E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	5.24E-07
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	8.88E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	6.48E-07
	(Total)										1.17E-06
Total of Routes											1.61E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A24
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	5.69E-12	mg/kg-day	1.51E+01	1/(mg/kg-day)	8.59E-11
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	3.56E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	1.10E-12
	(Total)										8.70E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A25
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.16E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.20E-04
	(Total)												7.20E-04
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.37E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.12E-03
	(Total)												1.12E-03
Total of Routes													1.84E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A26
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	9.25E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A27
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.91E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.36E-03
	(Total)												6.36E-03
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.81E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.36E-03
	(Total)												9.36E-03
Total of Routes													1.57E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A28
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.93E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A29
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	5.40E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.80E-03
	(Total)												1.80E-03
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	8.43E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.81E-03
	(Total)												2.81E-03
Total of Routes													4.61E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A30
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	6.94E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A31
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	8.01E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.67E-03
	(Total)												2.67E-03
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.06E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.53E-03
	(Total)												3.53E-03
Total of Routes													6.20E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A32
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 136 SOIL,
WITHOUT PAH SAMPLES, REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil Receptor Population: Trespasser/Visitor Receptor Age: Adolescent (Teens)
--

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.02E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A33
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.66E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A
	(Total)											
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	6.74E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A
	(Total)											

Total of Routes

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A34
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	9.25E-12	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A35
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.16E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	7.20E-04
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	1.35E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												7.20E-04
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.37E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.12E-03
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	8.57E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.12E-03
Total of Routes													1.84E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A36
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INHALATION) WITH PARTICULATES FROM BUILDING 136 SOIL,
INCLUDING PAH SAMPLES, REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	9.25E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	5.79E-13	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A37
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
 Receptor Population: Occupational Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.91E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.36E-03
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	1.19E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												6.36E-03
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.81E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.36E-03
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	7.14E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												9.36E-03
Total of Routes													1.57E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A38
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 136 SOIL,
INCLUDING PAH SAMPLES REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.93E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	1.21E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A39
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	5.40E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.80E-03
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	3.38E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.80E-03
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	8.43E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.81E-03
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	2.14E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												2.81E-03
Total of Routes													4.61E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A40
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil Receptor Population: Excavation Worker Receptor Age: Adult
--

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	6.94E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	4.34E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A41
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	8.01E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.67E-03
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	5.01E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												2.67E-03
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	1.06E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.53E-03
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	2.69E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												3.53E-03
Total of Routes													6.20E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A42

CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES FROM BUILDING 136 SOIL,
INCLUDING PAH SAMPLES REASONABLE MAXIMUM EXPOSURE

NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	2.02E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	1.27E-12	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A43
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	3.66E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.22E-03
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	2.29E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.22E-03
Dermal	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	6.74E-07	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	2.25E-03
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	1.71E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												2.25E-03
Total of Routes													3.47E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A44
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES
FROM BUILDING 136 SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 136 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	3.90E+00	mg/kg	3.90E+00	mg/kg	M	9.25E-12	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	2.44E+02	ug/kg	2.44E+02	ug/kg	M	5.79E-13	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A45
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.57E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.25E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A46
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.10E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	9.25E-13
	(Total)										9.25E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A47
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Occupational Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.27E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.04E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A48
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.29E-12	mg/kg-day	8.40E+00	1/(mg/kg-day)	1.93E-11
	(Total)										1.93E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A49
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.57E-10	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.25E-10	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A50
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.30E-14	mg/kg-day	8.40E+00	1/(mg/kg-day)	2.78E-13
	(Total)										2.78E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A51
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 136 SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	4.20E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.73E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A52
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.06E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	8.90E-13
	(Total)										8.90E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A53
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.31E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.91E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A54
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES
FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	8.37E-14	mg/kg-day	8.40E+00	1/(mg/kg-day)	7.03E-13
	(Total)										7.03E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A55
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.31E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.91E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A56
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INHALATION) WITH PARTICULATES
FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.90E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	1.59E-12
	(Total)										1.59E-12

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A57
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.57E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	3.50E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.56E-08
	(Total)										2.56E-08
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.25E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	2.22E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	1.62E-07
	(Total)										1.62E-07
Total of Routes											1.88E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A58
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.10E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	9.25E-13
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	1.50E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	4.65E-13
	(Total)										1.39E-12

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A59
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with DRMO Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.27E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	3.09E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.26E-07
	(Total)										2.26E-07
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.04E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	1.85E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	1.35E-06
	(Total)										1.35E-06
Total of Routes											1.58E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A60
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.29E-12	mg/kg-day	8.40E+00	1/(mg/kg-day)	1.93E-11
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	3.12E-12	mg/kg-day	3.10E+00	1/(mg/kg-day)	9.68E-12
	(Total)										2.89E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A61
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.57E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	3.50E-10	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.56E-09
	(Total)										2.56E-09
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.25E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	2.22E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	1.62E-08
	(Total)										1.62E-08
Total of Routes											1.88E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A62
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INHALATION) WITH PARTICULATES
FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.30E-14	mg/kg-day	8.40E+00	1/(mg/kg-day)	2.78E-13
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	4.50E-14	mg/kg-day	3.10E+00	1/(mg/kg-day)	1.39E-13
	(Total)										4.17E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A63
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	4.20E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	5.72E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	4.17E-08
	(Total)										4.17E-08
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.73E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	3.07E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.24E-07
	(Total)										2.24E-07
Total of Routes											2.66E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A64
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.06E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	8.90E-13
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	1.44E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	4.47E-13
	(Total)										1.34E-12

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A65
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with DRMO Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.31E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	4.51E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	3.29E-08
	(Total)										3.29E-08
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.91E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	3.37E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.46E-07
	(Total)										2.46E-07
Total of Routes											2.79E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A66
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from DRMO Soil Receptor Population: Trespasser/Visitor Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	8.37E-14	mg/kg-day	8.40E+00	1/(mg/kg-day)	7.03E-13
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	1.14E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	3.53E-13
	(Total)										1.06E-12

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A67
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.31E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	1.02E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	7.47E-08
	(Total)										7.47E-08
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.91E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	6.44E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	4.70E-07
	(Total)										4.70E-07
Total of Routes											5.45E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A68
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.90E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	1.59E-12
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	2.58E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	8.00E-13
	(Total)										2.39E-12

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A69
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with DRMO Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	7.20E-09	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.60E-06
	(Total)												3.60E-06
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.51E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.51E-04
	(Total)												2.51E-04
Total of Routes													2.54E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A70
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from DRMO Soil Receptor Population: Maintenance Worker Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.08E-13	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	5.41E-08
	(Total)												5.41E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A71
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with DRMO Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	6.36E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.18E-05
	(Total)												3.18E-05
Dermal	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.93E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.09E-03
	(Total)												2.09E-03
Total of Routes													2.12E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A72
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from DRMO Soil Receptor Population: Occupational Worker Receptor Age: Adult
--

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	6.42E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.13E-06
	(Total)												1.13E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A73
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.80E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	9.01E-06
	(Total)												9.01E-06
Dermal Absorption	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	8.78E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	6.27E-04
	(Total)												6.27E-04
Total of Routes													6.36E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A74
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from DRMO Soil Receptor Population: Excavation Worker Receptor Age: Adult
--

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.31E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	4.06E-07
	(Total)												4.06E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A75
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with DRMO Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.67E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.34E-05
	(Total)												1.34E-05
Dermal Absorption	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.10E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	7.88E-04
	(Total)												7.88E-04
Total of Routes													8.02E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A76
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL,
WITHOUT PAH SAMPLES, REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from DRMO Soil Receptor Population: Trespasser/Visitor Receptor Age: Adolescent (Teens)
--

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	6.74E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	1.18E-07
	(Total)												1.18E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A77
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with DRMO Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.22E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	6.11E-06
	(Total)												6.11E-06
Dermal Absorption	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	7.02E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	5.02E-04
	(Total)												5.02E-04
Total of Routes													5.08E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A78
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.08E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	5.41E-08
	(Total)												5.41E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A79
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with DRMO Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	7.20E-09	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.60E-06
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	9.81E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												3.60E-06
Dermal Absorption	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.51E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.51E-04
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	6.21E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												2.51E-04
Total of Routes													2.54E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A80
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from DRMO Soil Receptor Population: Maintenance Worker Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.08E-13	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	5.41E-08
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	4.20E-13	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												5.41E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A81
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL) WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Occupational Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	6.36E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.18E-05
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	8.66E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												3.18E-05
Dermal Absorption	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.93E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.09E-03
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	5.18E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												2.09E-03
Total of Routes													2.12E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A82
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	6.42E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	1.13E-06
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	8.74E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.13E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A83
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with DRMO Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.80E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	9.01E-06
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	2.45E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												9.01E-06
Dermal Absorption	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	8.78E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	6.27E-04
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	1.55E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												6.27E-04
Total of Routes													6.36E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A84
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.31E-12	mg/kg-day	5.70E-06	mg/kg-day	N/A	N/A	4.06E-07
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	3.15E-12	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												4.06E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A85
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with DRMO Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	2.67E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.34E-05
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	3.64E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.34E-05
Dermal Absorption	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.10E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	7.88E-04
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	1.95E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												7.88E-04
Total of Routes													8.02E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A86
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL,
INCLUDING PAH SAMPLES, REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	6.74E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	1.18E-07
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	9.18E-13	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												1.18E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A87
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with DRMO Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	1.22E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	6.11E-06
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	1.66E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												6.11E-06
Dermal Absorption	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	7.02E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	5.02E-04
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	1.24E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												5.02E-04
Total of Routes													5.08E-04

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A88
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM DRMO SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from DRMO Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.30E-01	mg/kg	1.30E-01	mg/kg	M	3.08E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	5.41E-08
	Benzo(a)pyrene	1.77E+02	ug/kg	1.77E+02	ug/kg	M	4.20E-13	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												5.41E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A89
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Surface Soil Exposure Point: Contact (Ing. & Der.) with Buildings Soil Receptor Population: Maintenance Worker Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.65E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.04E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.29E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	9.93E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A90
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.13E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	9.53E-13
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	8.72E-13	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										9.53E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A91
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Surface Soil Exposure Point: Contact (Ing. & Der.) with Buildings Soil Receptor Population: Occupational Worker Receptor Age: Adult
--

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.34E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.80E-07	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.08E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	8.28E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A92
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
 Receptor Population: Occupational Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.36E-12	mg/kg-day	8.40E+00	1/(mg/kg-day)	1.99E-11
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.82E-11	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										1.99E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A93
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Buildings Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.65E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.04E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.29E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	9.93E-10	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A94
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.41E-14	mg/kg-day	8.40E+00	1/(mg/kg-day)	2.86E-13
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.62E-13	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										2.86E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A95
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	4.33E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	3.33E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.79E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.37E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A96
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from Buildings Soil Receptor Population: Trespasser/Visitor Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.09E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	9.17E-13
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	8.40E-13	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										9.17E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A97
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Surface Soil Exposure Point: Contact (Ing. & Der.) with Buildings Soil Receptor Population: Trespasser/Visitor Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.42E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.63E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.96E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.51E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A98
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	8.62E-14	mg/kg-day	8.40E+00	1/(mg/kg-day)	7.24E-13
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	6.63E-13	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										7.24E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A99
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDIA

Scenario Timeframe: Future Medium: Surface Soil Exposure Medium: Surface Soil Exposure Point: Contact (Ing. & Der.) with Buildings Soil Receptor Population: Trespasser/Visitor Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.42E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.63E-08	mg/kg-day	--		--
	(Total)									1/(mg/kg-day)	--
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.96E-09	mg/kg-day	--		--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.51E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)									1/(mg/kg-day)	--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A101
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.65E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.04E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	5.50E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	4.02E-08
	(Total)										4.02E-08
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.29E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	9.93E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	3.49E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.54E-07
	(Total)										2.54E-07
Total of Routes											2.95E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A102
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.13E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	9.53E-13
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	8.72E-13	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	2.35E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	7.30E-13
	(Total)										1.68E-12

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A103
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.34E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.80E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	4.86E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	3.55E-07
	(Total)										3.55E-07
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.08E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	8.28E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	2.90E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.12E-06
	(Total)										2.12E-06
Total of Routes											2.48E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A104
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Buildings Surface Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.36E-12	mg/kg-day	8.40E+00	1/(mg/kg-day)	1.99E-11
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.82E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	4.90E-12	mg/kg-day	3.10E+00	1/(mg/kg-day)	1.52E-11
	(Total)										3.51E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A105
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Buildings Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.65E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.04E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	5.50E-10	mg/kg-day	7.30E+00	1/(mg/kg-day)	4.02E-09
	(Total)										4.02E-09
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.29E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	9.93E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	3.49E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.54E-08
	(Total)										2.54E-08
Total of Routes											2.95E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A106
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from Buildings Soil Receptor Population: Excavation Worker Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.41E-14	mg/kg-day	8.40E+00	1/(mg/kg-day)	2.86E-13
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.62E-13	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	7.07E-14	mg/kg-day	3.10E+00	1/(mg/kg-day)	2.19E-13
	(Total)										5.05E-13

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A107
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Buildings Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	4.33E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	3.33E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	8.98E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	6.55E-08
	(Total)										6.55E-08
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.79E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.37E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	4.82E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	3.52E-07
	(Total)										3.52E-07
Total of Routes											4.18E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A108
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from Buildings Soil Receptor Population: Trespasser/Visitor Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.09E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	9.17E-13
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	8.40E-13	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	2.27E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	7.02E-13
	(Total)										1.62E-12

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A109
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.42E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.63E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	7.09E-09	mg/kg-day	7.30E+00	1/(mg/kg-day)	5.17E-08
	(Total)										5.17E-08
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.96E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.51E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	5.30E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	3.87E-07
	(Total)										3.87E-07
Total of Routes											4.39E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A110
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from Buildings Soil Receptor Population: Trespasser/Visitor Receptor Age: Adult
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Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	8.62E-14	mg/kg-day	8.40E+00	1/(mg/kg-day)	7.24E-13
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	6.63E-13	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	1.79E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	5.55E-13
	(Total)										1.28E-12

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A111
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.42E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.63E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	1.61E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	1.17E-07
	(Total)										1.17E-07
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.96E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.51E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	1.01E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	7.39E-07
	(Total)										7.39E-07
Total of Routes											8.56E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A112
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.95E-13	mg/kg-day	8.40E+00	1/(mg/kg-day)	1.64E-12
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	6.63E-13	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	4.06E-13	mg/kg-day	3.10E+00	1/(mg/kg-day)	1.26E-12
	(Total)										2.90E-12

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A113
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	7.43E-09	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.71E-06
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	5.71E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	8.15E-04
	(Total)												8.19E-04
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.62E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.58E-04
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.78E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.97E-04
	(Total)												6.56E-04
Total of Routes													1.48E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A114
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.18E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	5.57E-08
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.44E-12	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												5.57E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A115
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Surface Soil Exposure Point: Contact (Ing. & Der.) with Buildings Soil Receptor Population: Occupational Worker Receptor Age: Adult
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Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	6.56E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.28E-05
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	5.04E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	7.20E-03
	(Total)												7.23E-03
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.02E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.15E-03
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.32E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.31E-03
	(Total)												5.47E-03
Total of Routes													1.27E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A116
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	6.62E-12	mg/kg-day	--	--	5.70E-06	mg/kg-day	1.16E-06
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	5.09E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												1.16E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A117
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.86E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	9.28E-06
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.43E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.04E-03
	(Total)												2.05E-03
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	9.05E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	6.46E-04
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	6.95E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	9.93E-04
	(Total)												1.64E-03
Total of Routes													3.69E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A118
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.38E-12	mg/kg-day	--	--	5.70E-06	mg/kg-day	4.18E-07
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.83E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												4.18E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A119
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.75E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.38E-05
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.12E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.02E-03
	(Total)												3.04E-03
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.14E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	8.13E-04
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	8.75E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.25E-03
	(Total)												2.06E-03
Total of Routes													5.10E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A120
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	6.95E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	1.22E-07
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	5.34E-12	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												1.22E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A121
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	.34E-01	mg/kg	1.34E-01	mg/kg	M	1.26E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	6.29E-06
	Thallium	.03E+00	mg/kg	1.03E+00	mg/kg	M	9.68E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.38E-03
	(Total)												1.39E-03
Dermal	Beryllium	.34E-01	mg/kg	1.34E-01	mg/kg	M	7.24E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	5.17E-04
	Thallium	.03E+00	mg/kg	1.03E+00	mg/kg	M	5.56E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	7.95E-04
	(Total)												1.31E-03
Total of Routes													2.70E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A122
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, WITHOUT PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.18E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	5.57E-08
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.44E-12	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												5.57E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A123
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	7.43E-09	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.71E-06
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	5.71E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	8.15E-04
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	1.54E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												8.19E-04
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.62E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.58E-04
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.78E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.97E-04
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	9.76E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												6.56E-04
Total of Routes													1.48E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A124
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.18E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	5.57E-08
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.44E-12	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	6.59E-13	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												5.57E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A125
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	6.56E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	3.28E-05
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	5.04E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	7.20E-03
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	1.36E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												7.23E-03
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.02E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	2.15E-03
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.32E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.31E-03
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	8.13E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												5.47E-03
Total of Routes													1.27E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A126
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	6.62E-12	mg/kg-day	--	--	5.70E-06	mg/kg-day	1.16E-06
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	5.09E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	1.37E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												1.16E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A127
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.86E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	9.28E-06
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.43E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.04E-03
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	3.85E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												2.05E-03
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	9.05E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	6.46E-04
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	6.95E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	9.93E-04
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	2.44E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.64E-03
Total of Routes													3.69E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A128
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.38E-12	mg/kg-day	--	--	5.70E-06	mg/kg-day	4.18E-07
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	1.83E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	4.95E-12	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												4.18E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A129
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	2.75E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.38E-05
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.12E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.02E-03
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	5.71E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												3.04E-03
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.14E-08	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	8.13E-04
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	8.75E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.25E-03
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	3.07E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												2.06E-03
Total of Routes													5.10E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A130
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL,
INCLUDING PAH SAMPLES, REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	6.95E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	1.22E-07
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	5.34E-12	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	1.44E-12	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												1.22E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A131
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	1.26E-08	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	6.29E-06
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	9.68E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.38E-03
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	2.61E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.39E-03
Dermal	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	7.24E-09	mg/kg-day	1.40E-05	mg/kg-day	N/A	N/A	5.17E-04
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	5.56E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	7.95E-04
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	1.95E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.31E-03
Total of Routes													2.70E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A132
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDINGS SOIL, INCLUDING PAH SAMPLES
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Buildings Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Beryllium	1.34E-01	mg/kg	1.34E-01	mg/kg	M	3.18E-13	mg/kg-day	--	--	5.70E-06	mg/kg-day	5.57E-08
	Thallium	1.03E+00	mg/kg	1.03E+00	mg/kg	M	2.44E-12	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	2.78E+02	ug/kg	2.78E+02	ug/kg	M	6.59E-13	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												5.57E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A133
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	9.09E-07	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	4.18E-07	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A134
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
 Receptor Population: Occupational Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	9.17E-11	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A135
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.03E-07	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	5.02E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A136
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	4.40E-12	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A137
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.03E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	5.02E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A138
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.32E-12	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A139
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.68E-07	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	6.94E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A140
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	4.24E-12	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A141
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.33E-07	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	7.62E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A142
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	3.35E-12	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A143
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.33E-07	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	7.62E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--
Total of Routes											--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A144
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	3.35E-12	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A145
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	2.88E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	4.12E-03
	(Total)												4.12E-03
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.40E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	2.01E-03
	(Total)												2.01E-03
Total of Routes													6.12E-03

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A146
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.23E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A147
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	2.54E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	3.63E-02
	(Total)												3.63E-02
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.17E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.67E-02
	(Total)												1.67E-02
Total of Routes													5.31E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A148
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil Receptor Population: Occupational Worker Receptor Age: Adult
--

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	2.57E-10	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A149
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	7.20E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.03E-02
	(Total)												1.03E-02
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	3.51E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	5.02E-03
	(Total)												5.02E-03
Total of Routes													1.53E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A150
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	9.25E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A151
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.07E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.53E-02
	(Total)												1.53E-02
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	4.42E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	6.31E-03
	(Total)												6.31E-03
Total of Routes													2.16E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A152
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	2.70E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A153
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Building 223 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	4.88E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	6.98E-03
	(Total)												6.98E-03
Dermal	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	2.81E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	4.01E-03
	(Total)												4.01E-03
Total of Routes													1.10E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A154
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM BUILDING 223 SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Building 223 Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Thallium	5.20E+00	mg/kg	5.20E+00	mg/kg	M	1.23E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A155
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	3.74E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	5.61E-06
	(Total)										5.61E-06
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	5.50E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	8.26E-06
	(Total)										8.26E-06
Total of Routes											1.39E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A156
CALCULATION OF CANCER RISKS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	3.78E-10	mg/kg-day	1.51E+01	1/(mg/kg-day)	5.70E-09
	(Total)										5.70E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A157
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
 Receptor Population: Maintenance Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	4.24E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	6.35E-07
	(Total)										6.35E-07
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	6.60E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	9.91E-07
	(Total)										9.91E-07
Total of Routes											1.63E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A158
CALCULATION OF CANCER RISKS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.81E-11	mg/kg-day	1.51E+01	1/(mg/kg-day)	2.74E-10
	(Total)										2.74E-10

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A159
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Surface Soil
 Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	6.91E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.04E-06
	(Total)										1.04E-06
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	9.14E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.37E-06
	(Total)										1.37E-06
Total of Routes											2.41E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A160
CALCULATION OF CANCER RISKS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
 Receptor Population: Trespasser/Visitor
 Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.74E-11	mg/kg-day	1.51E+01	1/(mg/kg-day)	2.63E-10
	(Total)										2.63E-10

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A161
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	5.46E-07	mg/kg-day	1.50E+00	1/(mg/kg-day)	8.18E-07
	(Total)										8.18E-07
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.00E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.51E-06
	(Total)										1.51E-06
Total of Routes											2.32E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A162
CALCULATION OF CANCER RISKS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.38E-11	mg/kg-day	1.51E+01	1/(mg/kg-day)	2.08E-10
	(Total)										2.08E-10

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A163
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.24E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	1.85E-06
	(Total)										1.85E-06
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.92E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	2.88E-06
	(Total)										2.88E-06
Total of Routes											4.73E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A164
CALCULATION OF CANCER RISKS - LIFETIME TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Future Medium: Surface Soil Exposure Medium: Particulates Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil Receptor Population: Trespasser/Visitor Receptor Age: Adolescent (Teens)/Adult
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Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	3.12E-11	mg/kg-day	1.51E+01	1/(mg/kg-day)	4.71E-10
	(Total)										4.71E-10

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A165
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	4.24E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	6.35E-08
	(Total)										6.35E-08
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	6.60E-08	mg/kg-day	1.50E+00	1/(mg/kg-day)	9.91E-08
	(Total)										9.91E-08
Total of Routes											1.63E-07

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A166
CALCULATION OF CANCER RISKS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
 Receptor Population: Excavation Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	5.44E-12	mg/kg-day	1.51E+01	1/(mg/kg-day)	8.21E-11
	(Total)										8.21E-11

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE A167
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.19E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	3.95E-03
	(Total)												3.95E-03
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.85E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.16E-03
	(Total)												6.16E-03
Total of Routes													1.01E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A168
CALCULATION OF NON-CANCER HAZARDS - ADULT MAINTENANCE WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
Receptor Population: Maintenance Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	5.07E-11	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A169
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INGESTION)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
Receptor Population: Occupational Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.05E-05	mg/kg-day	3.00E-04	mg/kg-day
	(Total)									
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.54E-05	mg/kg-day	3.00E-04	mg/kg-day
	(Total)									

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A170
CALCULATION OF NON-CANCER HAZARDS - ADULT OCCUPATIONAL WORKER CONTACT (INHALATION) WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
 Medium: Surface Soil
 Exposure Medium: Particulates
 Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
 Receptor Population: Occupational Worker
 Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.06E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A171
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	2.97E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	9.88E-03
	(Total)												9.88E-03
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	4.62E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.54E-02
	(Total)												1.54E-02
Total of Routes													2.53E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A172
CALCULATION OF NON-CANCER HAZARDS - ADULT EXCAVATION WORKER CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
Receptor Population: Excavation Worker
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	3.81E-10	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A173
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	4.40E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.47E-02
	(Total)												1.47E-02
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	5.81E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.94E-02
	(Total)												1.94E-02
Total of Routes													3.40E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A174
CALCULATION OF NON-CANCER HAZARDS - ADOLESCENT (TEENS) TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adolescent (Teens)

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	1.11E-10	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A175
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INGESTION & DERMAL)
WITH SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Sewage Lift Station Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	2.01E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	6.70E-03
	(Total)												6.70E-03
Dermal	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	3.70E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.23E-02
	(Total)												1.23E-02
Total of Routes													1.90E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE A176
CALCULATION OF NON-CANCER HAZARDS - ADULT TRESPASSER/VISITOR CONTACT (INHALATION)
WITH PARTICULATES FROM SEWAGE LIFT STATION SOIL
REASONABLE MAXIMUM EXPOSURE
NAVAL AIR FACILITY
KEY WEST, FLORIDA

Scenario Timeframe: Current
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Contact (Inh.) with Particulates from Sewage Lift Station Soil
Receptor Population: Trespasser/Visitor
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Arsenic	2.14E+01	mg/kg	2.14E+01	mg/kg	M	5.07E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												--

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.