

N00213.AR.000368
NAS KEY WEST
5090.3a

DECISION DOCUMENT AND RESPONSIVENESS SUMMARY FOR SITE 3, SITE 7 AND
AREA OF CONCERN B NAS KEY WEST FL

4/1/1999

TETRA TECH NUS

Decision Document and Responsiveness Summary

for

IR 3, IR 7, and AOC B

Naval Air Station Key West, Florida



Southern Division Naval Facilities Engineering Command

Contract Number N62467-94-D-0888

Contract Task Order 0007

April 1999

Revision 1



TETRA TECH NUS, INC.

900 Trail Ridge Road ■ Aiken, South Carolina 29803
(803) 649-7963 ■ FAX (803) 641-0375 ■ www.tetrattech.com

AIK-99-0142

April 23, 1999

Project Number HK 7046

via U.S. Mail

Mr. Dudley Patrick - Code 1858
Southern Division
NAVFACENGCOM
P.O. Box 190010
North Charleston, South Carolina 29419-9010

Reference: CLEAN Contract No. N62467-94-D-0888
Contract Task Order No. 0007

Subject: Decision Document and Responsiveness Summary for IR 3, IR 7, and AOC B, Rev. 1
Naval Air Station Key West, Florida

Dear Mr. Patrick:

Tetra Tech NUS, Inc. (TtNUS) is pleased to submit for your review the enclosed Decision Document and Responsiveness Summary for IR 3, IR 7, and AOC B, Rev. 1 at NAS Key West, Florida. At your request, copies of this decision document are being distributed to the members of the NAS Key West Partnering Team and Restoration Advisory Board. This Rev. 1 document incorporates changes made based on comments received from the NAS Key West Partnering Team on the Rev. 0 version. This document will be considered final if no additional comments are received within the next 30 days.

Please call me at (803) 649-7963, extension 345 or Scott Flickinger at extension 347, with your comments and any questions you may have regarding the enclosed document.

Sincerely,

C. M. Bryan
Project Manager

CMB:spd

Enclosures

- | | | |
|----|---|--|
| c: | Ms. Debbie Wroblewski/DER (Cover Letter Only) | Ms. M. Stafford, RAB Community Member |
| | Ms. T. Ballard, EPA (2 copies) | Mr. M. Ingram, RAB Community Member |
| | Mr. J. Caspary, FDEP (2 copies) | Ms. R. Haag, South Florida Water Management District |
| | Mr. R. Demes, NAS Key West | Mr. M. Perry/File |
| | Mr. P. Williams, NAS Key West (2 copies) | File: 7046-7.25.2 |
| | Ms. R. Orlandi, RAB Community Member | |

AIK-99-0142

DECISION DOCUMENT AND RESPONSIVENESS SUMMARY

FOR

**IR 3, IR 7, AND AOC B
NAVAL AIR STATION
KEY WEST, FLORIDA**

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT**

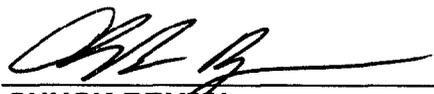
**Submitted to:
Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, South Carolina 29406**

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

**CONTRACT NUMBER N62467-94-D-0888
CONTRACT TASK ORDER 0007**

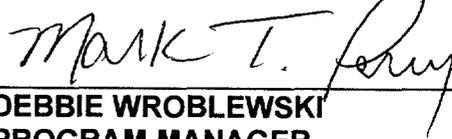
APRIL 1999

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**

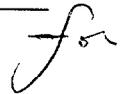


TABLE OF CONTENTS

<u>SECTION</u>	<u>PAGE</u>
ACRONYMS	VII
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.....	1-1
1.3.1 IR 3.....	1-1
1.3.2 IR 7.....	1-2
1.3.3 AOC B.....	1-3
1.4 DECLARATION STATEMENT.....	1-3
1.5 SIGNATURE AND SUPPORT AGENCY ACCEPTANCE OF THE REMEDY.....	1-4
2.0 DECISION SUMMARY	2-1
2.1 SITE NAMES, LOCATIONS, DESCRIPTIONS, AND HISTORICAL INFORMATION.....	2-1
2.1.1 IR 3.....	2-1
2.1.2 IR 7.....	2-1
2.1.3 AOC B.....	2-2
2.2 PREVIOUS INVESTIGATIONS AND ENFORCEMENT ACTIVITIES.....	2-2
2.2.1 Previous Investigations.....	2-2
2.2.2 Enforcement Actions.....	2-5
2.2.3 Highlights of Community Participation.....	2-5
2.3 SCOPE AND ROLE OF RESPONSE ACTION.....	2-6
2.3.1 IR 3.....	2-6
2.3.2 IR 7.....	2-6
2.3.3 AOC B.....	2-7
2.4 SUMMARY OF SITE CHARACTERISTICS.....	2-7
2.4.1 Sources of Contamination.....	2-7
2.4.2 Description of Contamination.....	2-8
2.4.3 Contaminant Migration.....	2-12
2.5 SUMMARY OF SITE RISKS.....	2-13
2.5.1 Human Health Risks.....	2-14
2.5.2 Environmental Evaluation.....	2-17
2.6 THE SELECTED REMEDIES.....	2-21
2.7 STATUTORY DETERMINATIONS.....	2-23
2.7.1 Protection of Human Health and the Environment.....	2-24
2.7.2 Compliance with ARARs.....	2-25
2.7.3 Long-Term Effectiveness and Permanence.....	2-25
2.7.4 Reduction of Toxicity, Mobility or Volume through Treatment.....	2-26
2.7.5 Short-Term Effectiveness.....	2-26
2.7.6 Implementability.....	2-26
2.7.7 Cost-Effectiveness.....	2-26
2.7.8 State Acceptance.....	2-26
2.7.9 Community Acceptance.....	2-27
REFERENCES	R-1

APPENDICES

- A RESPONSIVENESS SUMMARY**
- B APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS**

TABLES

<u>NUMBER</u>	<u>PAGE</u>
2-1	Maximum Detected Values for Primary COCs by Site Naval Air Station Key West..... 2-28
2-2	Human Health Chemicals of Concern and Representative Concentrations by Site Naval Air Station Key West..... 2-29
B-1	Potential ARARs and TBCs Selected Remedies for IR 3, IR 7, and AOC B Naval Air Station Key West B-1

FIGURES

<u>NUMBER</u>	<u>PAGE</u>
2-1	IR 3, IR 7, AOC B General Location Map..... 2-30
2-2	Site Location Map - IR 3..... 2-31
2-3	Site Location Map - IR 7..... 2-32
2-4	Site Location Map - AOC B 2-33
2-5	Western Soil Chemical Concentrations IR 3 2-35
2-6	Eastern Soil Chemical Concentrations IR 3 2-37
2-7	Soil Chemical Concentrations IR 7..... 2-39
2-8	Sediment Chemical Concentrations IR 7 2-41
2-9	Surface-Water Chemical Concentrations IR 7 2-43
2-10	Western Sediment Chemical Concentrations AOC B 2-45
2-11	Eastern Sediment Chemical Concentrations AOC B 2-47
2-12	Habitats at IR 3..... 2-49
2-13	Habitats - IR 7..... 2-51
2-14	Habitats - AOC B..... 2-53

ACRONYMS

AOC	Area of Concern
ARAR	applicable or relevant and appropriate requirement
BEI	Bechtel Environmental, Inc.
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	chemical of concern
EE/CA	Engineer's Evaluation/Cost Analysis
EFA	Engineering Field Activity
EPA	United States Environmental Protection Agency
ERA	ecological risk assessment
F.A.C.	Florida Administrative Code
FDEP	Florida Department of Environmental Protection
HI	hazard index
HQ	hazard quotient
IR	Installation Restoration
IRA	Interim Remedial Action
LUC	land use control
LUCIP	land use control implementation plan
MOA	Memorandum of Agreement
NAS	Naval Air Station
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priority List
PCB	polychlorinated biphenyl
ppt	parts per trillion
RAB	Restoration Advisory Board
RAC	Remedial Action Contractor
RCRA	Resource Conservation and Recovery Act
RfD	reference dose
RFI	RCRA Facility Investigation
RGO	remedial goal option
RI	remedial investigation
RME	reasonable maximum exposure
SAL	screening action level
SARA	Superfund Amendments and Reauthorization Act

SF	slope factor
SouthDiv	U.S. Navy Facilities Engineering Command, Southern Division
SSC	species of special concern
SVOC	semi-volatile organic compound
TRC	Technical Review Committee
UCL	<i>upper confidence limit</i>
USDA	U.S. Department of Agriculture
VOC	volatile organic compound

1.0 THE DECLARATION

1.1 SITE NAMES AND LOCATIONS

The Naval Air Station (NAS) Key West sites addressed by this decision document are located in and around the island of Key West, Florida.

- IR 3 Truman Annex DDT Mixing Area
- IR 7 Fleming Key North Landfill
- Area of Concern (AOC) B Big Coppitt Key Abandoned Civilian Disposal Area

1.2 STATEMENT OF BASIS AND PURPOSE

This combined decision document presents the selected remedies for three Installation Restoration (IR) sites at NAS Key West, Key West, Florida. The sites are IR 3 Truman Annex DDT Mixing Area, IR 7 Fleming Key North Landfill, and AOC B Big Coppitt Key Abandoned Civilian Disposal Area. This document focuses on remedies for each of the three sites. This determination has been made in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA), 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 NAS Key West) and decisions made by the NAS Key West Partnering Team.

1.3 DESCRIPTION OF THE SELECTED REMEDIES

The remedial actions selected in this Decision Document address the remaining contamination associated with site IR 3 and monitoring at site IR 7 to prevent potential future impacts to human health and the environment. In addition each remedial action will utilize land use controls. AOC B requires no additional remedial action beyond land use controls.

1.3.1 IR 3

The remedial action selected in this Decision Document for IR 3 addresses the remaining soil contamination. In 1995, approximately 926 tons of contaminated soil were removed from IR 3 as part of

an Interim Remedial Action (IRA). The selected remedy for IR 3 is to install an asphalt cap to decrease direct exposure to remaining soil contamination and migration of contaminants to groundwater and to provide land use controls. The final decision will be based on the Engineer's Evaluation/Cost Analysis (EE/CA), that will compare the remedial alternatives for the site, and information presented in the Action Memorandum which will be the detailed and final decision document.

The major components of the selected remedy are site preparation, asphalt cap and landscaping. The asphalt cap would provide sound engineering controls in accordance with Section 62-785.680(2)(b) 4 of the Florida Administrative Code (F.A.C.). The asphalt cap will address F.A.C. requirements to prevent human exposure and limit water infiltration by: 1) cutting off potential contact exposure to contaminated soil at the site; and 2) reducing the percolation of precipitation through the soil that could mobilize the contaminants. Upon completion of the asphalt cap, vegetation appropriate to the setting will be re-introduced and maintained along the site boundaries.

Lastly, site-specific land use controls will be implemented at IR 3 as described in Section 1.4. Implementation of the selected remedy for IR 3 will address the principal threats at the site by reducing the potential risk to human health and the environment associated with the remaining contaminated soils.

1.3.2 IR 7

The selected remedy for IR 7 is to perform groundwater monitoring to detect any contaminant migration from the landfill. In 1995, as part of an IRA, clean topsoil was imported to fill a low area and promote runoff. This IRA has successfully eliminated the problem of standing water at IR 7.

The major component of the selected remedy is the development of a groundwater monitoring plan. The groundwater monitoring would provide for an eventual no-further action approval from FDEP in accordance with Section 62-785.680 of the F.A.C., No Further Action Criteria. The Brownfield no-further action criteria is being adopted as relevant and appropriate regulations for this IR site.

In addition, site-specific land use controls will be implemented at the IR 7 as described in Section 1.4. Implementation of the selected remedy for IR 7 will address the principal threats at the site by reducing the potential risk to human health and the environment associated with the remaining wastes in the landfill.

1.3.3 AOC B

No additional remedial action has been selected in this Decision Document for AOC B. The 1996 IRA removed the soil contaminant source that reduced the threat to human health and the environment to acceptable levels in accordance with CERCLA and the NCP. Site specific land use controls will be implemented at the AOC B as described in Section 1.4.

1.4 DECLARATION STATEMENT

It has been determined by the Navy, USEPA, and FDEP that an additional remedial action will be required at IR 3 and IR 7 will require long-term groundwater monitoring and a five-year review. AOC B will require no-further action.

By separate Memorandum of Agreement (MOA) with the USEPA and the FDEP, NAS Key West, on behalf of the Department of the Navy, agreed to implement basewide certain periodic site inspection, condition certification, and agency notification procedures designed to ensure the maintenance by NAS Key West personnel of any site-specific land-use controls (LUCs) deemed necessary for future protection of human health and the environment. A fundamental premise underlying execution of that agreement was that through the Navy's substantial good-faith compliance with the procedures called for therein, reasonable assurances would be provided to the USEPA and FDEP as to the permanency of those remedies, which included the use of site-specific LUCs.

Although the terms and conditions of the MOA are not specifically incorporated herein by reference, it is understood and agreed by the Navy, USEPA, and FDEP that the contemplated permanence of the remedy reflected herein shall be dependent upon substantial good-faith compliance with the specific LUC maintenance commitments reflected in the MOA by NAS Key West personnel. Should such compliance not occur or should the MOA be terminated, it is understood that the protectiveness of the remedy concurred in may be reconsidered and that additional measures may need to be taken to adequately ensure necessary protection of human health and the environment in the future.

The "no further cleanup action with land use controls and groundwater monitoring" is protective of human health and the environment under current industrial land use, complies with State and Federal applicable or relevant and appropriate requirements (ARARs), and is cost effective.

1.5 SIGNATURE AND SUPPORT AGENCY ACCEPTANCE OF THE REMEDY

Capt. Scott T. Johnson, USN
Commanding Officer
Naval Air Station
Key West, Florida

Date

Director
Florida Department of Environmental Protection

Date

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 (Navy) selected remedies for IR 3 (Truman Annex Former DDT Mixing Area), IR 7 (Former Fleming Key North Landfill), and AOC B (Big Coppitt Key Abandoned Civilian Disposal Area), located at NAS Key West, Key West, Florida (Figure 2-1). These sites are three of several IR sites that have been investigated or remediated under the NAS Key West IR program. The histories of these sites have been developed primarily from the NAS Key West Supplemental RCRA Facility Investigation/Remedial Investigation (RFI/RI) for Eight Sites (B&RE, 1998). Summaries of the sites histories are discussed in the following paragraphs.

2.1.1 IR 3

The Former DDT Mixing Area is the location of former Building 265, approximately 0.25 acre in size, off DeKalb Avenue on the eastern edge of Truman Annex, adjacent to Fort Street in the City of Key West (Figure 2-2). The site is currently an open lot covered with grass. Parking lots are to the northwest, west and southwest of the site. Private residential housing is 60 feet across Fort Street to the northeast. Additional private residential housing is to the east and southeast. A base residential building across DeKalb Avenue is 60 feet from the site to the south. A fence divides Truman Annex from the City of Key West on the south side of Fort Street.

Historic information indicates that the facility was used as a DDT Mixing Area from the early 1940s until the early 1970s. Powdered DDT concentrate was mixed with water and temporarily stored in 55-gallon drums both inside and outside former Building 265. The mixed solution was transferred to trucks for dissemination. Discharges at the site were from accidental spills.

2.1.2 IR 7

The Fleming Key North Landfill (IR 7) covers approximately 30 acres in the northern portion of Fleming Key (Figure 2-3). The site currently houses the U.S. Department of Agriculture (USDA) Animal Import Center. South of the site is a munitions storage area for NAS Key West. North of the site is a small Army Special Forces base. Docks are on the northeastern edge of the island, within the Army Special Forces base, for launching and docking Army boats. The site is generally flat and vegetation consists of turf grass, weeds, brush, and trees. The eastern shoreline has a cover of concrete rubble and riprap for

erosion protection. The northwestern part of the site is wooded, with the exotic Australian pine and Brazilian pepper as dominant species. A narrow strip of black mangroves is along the western shoreline.

From 1952 to 1962, the site was used as the landfill for NAS Key West and the City of Key West. Approximately 4,000 to 5,000 tons of unknown wastes reportedly were disposed of annually. The wastes were placed in trenches typically 25 feet wide, 10 feet deep, and 500 to 1,000 feet long.

In 1977, the USDA Animal Import Center was constructed over a portion of the landfill. During construction, wastes were excavated and transferred to an area immediately to the west of the construction site and buried under a soil and rock cover. Currently, the entire landfill area is covered with soil and is vegetated by grass, weeds, or trees. In September 1995, Bechtel Environmental, Inc. (BEI) performed an IRA at IR 7 by importing clean topsoil, filling and grading low areas to promote runoff of surface water and eliminate ponding.

2.1.3 AOC B

Big Coppitt Key Abandoned Civilian Disposal Area (AOC B) is located on Big Coppitt Key to the east of Boca Chica Key (Figure 2-4). The site encompasses approximately 10 acres, of which approximately 1.6 acres is occupied by a dead-end canal. At the southeastern end of this canal is the former disposal area. A mangrove swamp extends east, west, and south of the former disposal area. The canal and a large cleared area are north of the former disposal area. The ground elevations at the site vary from sea level to approximately 2 feet above sea level. All runoff from precipitation appears to drain directly into the canal or the mangrove wetlands.

The site was used for disposal of discarded car/truck body and frame parts. The exact date and method of debris placement is not known. The Navy purchased this property in 1985 to comply with the Federal Aviation Agency requirements for an Aircraft Compatibility Usage Installation Zone. In 1996, the Navy conducted an IRA to excavate and dispose of contaminated soils at the site. The action removed 1,251 cubic yards of soil for offsite treatment and disposal.

2.2 PREVIOUS INVESTIGATIONS AND ENFORCEMENT ACTIVITIES

2.2.1 Previous Investigations

The following summaries of previous investigation are based on information from the *NAS Key West Supplemental RFI/RI for Eight Sites*, Revision 2 (B&RE, 1998) and material provided by the NAS Key West Partnering Team.

2.2.1.1 IR 3

In 1986, Geraghty and Miller conducted an initial investigation of IR 3. Surface soil samples were analyzed for pesticides. All the samples were collected from the area that was later excavated by BEI. Analytical results indicated that DDT and other pesticides, such as BHC, were present. In 1990, IT Corporation conducted a preliminary RI. Analysis of groundwater samples from the site indicated that cadmium and seven different pesticide compounds were present in concentrations above established standards. The pesticide concentrations in the groundwater suggested that leaching could be occurring at the site.

In 1993, IT Corporation conducted soil and groundwater sampling during the RFI/RI at this site. Characterization of contamination at the site indicated that surface soil and groundwater appeared to be impacted by metals (i.e., lead and arsenic) and pesticides. The source of groundwater contamination appeared to be the leaching of metals and pesticides from the soil. The Final RFI/RI prepared by IT Corporation recommended installing new monitoring wells and additional soil sampling to further delineate the extent of groundwater contamination; conducting an IRA to remove or cap contaminated surface soils; and performing a preliminary feasibility study to determine appropriate remedial actions to prevent further migration of contaminants.

Subsequent to the submittal of the Draft Supplemental RFI/RI workplan, BEI began implementation of IRAs at some of the sites at NAS Key West. Delineation and characterization sampling of soil focusing on certain pesticides was conducted at IR 3 to supplement the previous data. In 1995, BEI performed an IRA to excavate and dispose of pesticide-contaminated soil. The IRA removed 926 tons of DDT contaminated soil from the site for treatment and disposal, and reduced the maximum DDT concentration at the site from 60,000 $\mu\text{g}/\text{kg}$ to 21,000 $\mu\text{g}/\text{kg}$. There were small areas of IR 3 that could not be excavated because of the presence of permanent structures such as sidewalks, fences and utility poles. As a result, there were locations that remained with elevated pesticide levels. The chemicals that remain at IR 3 are discussed in Section 2.4.2.1.

2.2.1.2 IR 7

In 1986, Geraghty and Miller conducted an initial investigation of IR 7. This investigation involved the installation of four shallow monitoring wells. Several organic compounds including semi-volatile organic compounds (SVOCs) and volatile organic compounds (VOCs) were found in samples from the wells. Analyses for priority pollutant metals indicated concentrations of copper, mercury, and arsenic above detection limits. In 1990, IT Corporation conducted a preliminary RI, which included the installation of five soil borings (converted to monitoring wells) and the excavation of 21 test pits to characterize the waste

types and distribution patterns. Waste consisted of household, construction, and electrical debris, and scrap metal. The majority of the waste was household debris, including tires, glass, plastic, and basic household trash. Construction debris included concrete slabs, steel cables, and piping. Electrical debris consisted of electrical conduit, wire, and low-voltage batteries. Scrap metal waste included sheet metal and refrigerator parts. Groundwater samples from the site indicated metals (i.e., antimony, chromium, cadmium, mercury, and lead) were present in concentrations above established standards. Wells located downgradient along the shoreline within the landfill area had the highest concentrations of metals.

In 1993, IT Corporation conducted soil, sediment, surface-water, and groundwater sampling during the RFI/RI at this site. Characterization of contamination at the site indicated that groundwater appeared to be impacted by cyanide, metals (i.e., arsenic, cadmium, lead, and mercury), and pesticides. Mercury and cyanide also were detected in surface water at concentrations exceeding surface-water quality standards. The Final RFI/RI prepared by IT Corporation recommended continued monitoring of the site for possible migration of contaminants, grading the west side of the site to provide drainage and prevent ponding of water over the waste material, maintaining the soil and vegetative cover for the site, performing a preliminary ecological risk assessment (ERA), and conducting a baseline human health risk assessment based on monitoring data.

In September 1995, BEI performed an IRA at IR 7 to prevent ponding of rainwater and minimize infiltration through the waste. Clean topsoil was imported to fill low areas and promote runoff. A vegetative cover was established to prevent erosion. BEI mowed the non-wooded surface of IR 7 to visually identify low spots to be filled with clean topsoil. Forty cubic yards of topsoil was put in place and sodded with grass to meet the objectives of the IRA. The majority of IR 7 is currently covered in grass and is maintained as the grounds around the USDA Animal Import Center. The IRA achieved the goal to promote rainfall runoff from the site. The chemicals that remain at IR 7 are discussed in Section 2.4.2.2.

2.2.1.3 AOC B

In 1993, samples of groundwater, soils, surface water, and sediments were collected and analyzed by IT Corporation during the RFI/RI. Analytical results indicated metal concentrations above background in all media, and polychlorinated biphenyls (PCBs) compounds in the surface water. The Final RFI/RI Report recommended an IRA to remove waste from the site to prevent further contact of the waste with surface water and sediment, the installation of groundwater monitoring wells, a survey of the area for potable water wells, a receptor survey to determine impacts to aquatic organisms, the collection of additional sediment samples, and a baseline human health risk assessment based on data to be collected after the IRA.

In 1996, BEI conducted an IRA to excavate and dispose of contaminated sediments at AOC B. The action removed 1,251 tons of sediment and soil for offsite treatment and disposal. BEI subsequently performed confirmation sampling to verify that the IRA goals had been met. The IRA achieved the goal of removal of the contaminant source material with minimal impact to the surrounding mangrove swamp. In addition, the removal area was graded such that standing water was maintained to promote growth of mangroves. The chemicals that remain at AOC B are discussed in Section 2.4.2.3.

2.2.2 Enforcement Actions

No enforcement actions have been taken at IR 3, IR 7, or AOC B. The federal government has owned two of these sites (IR 3 and IR 7) since the late 1800s and the third (AOC B) since 1985, and the Navy is currently identified as the responsible party.

2.2.3 Highlights of Community Participation

The Navy and NAS 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 NAS Key West. The TRC was composed mostly of government personnel; however, a few private citizens 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 Supplemental RFI /RI and the Proposed Plan for IR 3, IR 7, and AOC B were discussed at several RAB meetings.

Community relations activities for the final selected remedy include:

- The documents concerning the investigations and analyses at IR 3, IR 7, and AOC B, 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 Citizen* on October 18, 1998.
- The Navy established a 60-day public comment period starting October 18, 1998 and ending December 18, 1998 to present the Proposed Plans. No written comments were received during the 60-day public comment period.

A public meeting was held November 16, 1998 to answer any questions concerning the IR 3, IR 7, and AOC B Proposed Plans. 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).

2.3 SCOPE AND ROLE OF RESPONSE ACTION

2.3.1 IR 3

The remedial action described in this portion of the Decision Document addresses the remaining soil contamination associated with IR 3, Former DDT Mixing Area, as identified in the Final RFI/RI Report and the Supplemental RFI/RI for IR 3. Past operations at the site are believed to be the source of soil contamination at the site.

The human health risk to all but one receptor (excavation worker) exceeds FDEP's target risk and the EPA target risk range for cancer-causing chemicals. These risks are associated with the level of contaminants remaining in soil at IR 3. Only one receptor (future resident) exceeds the hazard index for noncancer-causing chemicals, meaning the level of contaminants are present at concentrations such that adverse noncarcinogenic health effects might occur for the future residential exposure scenario. The threat to ecological receptors was found to be negligible given the lack of habitat associated with the sod-covered lot.

2.3.2 IR 7

Metals and pesticides are the most widespread contaminants detected at the site. VOCs and SVOCs are present in sediment and groundwater, and PCBs, to a limited extent, are present in soil and sediment.

The human health risk for current receptors from the low level of contaminants at IR 7 exceeds FDEP's target risk in several exposure scenarios, but is within or below the EPA target risk range for cancer-causing chemicals, and no receptors exceed the hazard index for noncancer-causing chemicals. Contaminants are present at concentrations indicating that adverse noncarcinogenic health effects might occur for the future residential exposure scenario. The ERA at IR 7 indicates that contaminants in groundwater, surface water, soil, and sediment do not pose environmental risks.

2.3.3 AOC B

No remedial action is identified for AOC B Big Coppitt Key Abandoned Civilian Disposal Area. The previous soil removal eliminated the need for additional remedial action. Metals and pesticides were the most frequently-detected contaminants at AOC B. In general, the number of metals detected and the concentrations of these metals were highest at the edge of the excavated area and decreased with distance into the surrounding mangrove swamp. PCBs were detected in isolated surface water and sediment samples. VOCs and SVOCs were rarely detected in any medium, while pesticides were detected in groundwater and sediment at low concentrations.

The human health risk assessment indicates that contaminants are not present at sufficient concentrations to cause possible adverse carcinogenic or noncarcinogenic health effects to current potential receptors. Although inorganic contaminants (i.e., antimony and arsenic) are present at concentrations that might contribute to the risk for the hypothetical future resident, these metals may not be associated with past site-related activity. Antimony and arsenic appear to be present at concentrations within or slightly above background.

2.4 SUMMARY OF SITE CHARACTERISTICS

The site characterizations for IR 3, IR 7 and AOC B were completed in phases. In 1986 the initial site investigations were performed and soil samples were collected and analyzed to determine the nature of contaminants present at IR 3 and IR 7. In 1990 the preliminary RI was performed and groundwater-monitoring wells were installed and sampled at IR 3 and IR 7. Additional RI sampling was conducted in 1993 and 1996, consisting of additional soil sampling and groundwater monitoring activities for IR 3. In addition, sediment and surface water samples were taken at IR 7. In 1993, the initial soil, groundwater, sediment, and surface water sampling were performed at AOC B and in 1996 additional sediment and surface water sampling was performed. In 1995, an IRA was performed at IR 7 to grade the site for proper drainage. IRAs were performed at IR 3 in 1995 and AOC B in 1996 to remove contaminated soils (at IR 3) and sediment (at AOC B).

2.4.1 Sources of Contamination

The sources of contamination at sites IR 3, IR 7, and AOC B are presented in the following sections. This information is primarily based on the RFI/RI and Supplemental RFI/RI reports.

2.4.1.1 IR 3

The source of contamination was the contaminated soils (DDT) around the former Building 265 site.

2.4.1.2 IR 7

The source of the contamination was the landfill contents (reportedly municipal waste).

2.4.1.3 AOC B

The source of the contamination was the landfill contents (discarded auto/truck body parts).

2.4.2 Description of Contamination

The following description of contamination are based on information from the Supplemental RFI/RI Report.

2.4.2.1 IR 3

Soil and groundwater samples were collected and analyzed to determine the nature and extent of contamination at IR 3. The contaminants (i.e., pesticides and metals) at IR 3 are associated with the DDT mixing activities that occurred at the site. Surface soil, subsurface soil, and groundwater have been impacted. The primary chemical of concern (COC) are pesticides, and metals (Table 2-1). The results of the sampling and analyses are presented below.

Surface Soils

After completion of the IRA at IR 3, elevated levels of inorganics and pesticides remain in the soil. The concentrations are sufficient to cause potential health effects to the hypothetical future resident.

Some of the elevated levels of metals were antimony (4.4 mg/kg), arsenic (13 mg/kg), beryllium (0.17 mg/kg), iron (10,700 mg/kg), lead (566 mg/kg), mercury (4.1 mg/kg), and zinc (1,430 mg/kg). Elevated levels of pesticides were 4,4'-DDD (7,500 µg/kg), 4,4'-DDT (21,000 µg/kg), 4,4'-DDE (19,000 µg/kg), and endrin (370 µg/kg). Concentrations were generally highest on the eastern edge of the area used for mixing the DDT solutions. Figures 2-5 and 2-6 depict the remaining contaminants in soil at IR 3. All concentrations exceeded their respective action levels.

Groundwater

Many of the inorganics and pesticides detected in the soil also were detected in the groundwater. Inorganics detected above action levels were aluminum (2,830 µg/l), antimony (83.2 µg/l), arsenic (36.5 µg/l), cadmium (13.6 µg/l), iron (895 µg/l), and lead (26.9 µg/l). The levels of pesticides detected were 4,4'-DDD (2.7 µg/l), 4,4'-DDE (0.84 µg/l), 4,4'-DDT (0.5 µg/l), and dieldrin (1.8 µg/l). VOCs were detected but did not exceed ARARs and screening action levels (SALs).

2.4.2.2 IR 7

Soil, sediment, surface water, and groundwater samples were collected and analyzed to determine the nature and extent of contamination at IR 7. The contaminants at IR 7 are the result of the former landfill activities at the site. Surface soil, subsurface soil, surface water, and groundwater have been impacted by the landfill activities. The primary COCs are metals (Table 2-1). The results of the sampling and analyses are presented below.

Surface Soils

In September 1995, an IRA was performed to minimize infiltration of rainwater through the former landfill waste. Clean topsoil was imported to fill low areas and promote runoff, and a vegetative cover was established to prevent erosion.

VOCs and SVOCs were not detected in soil in excess of ARAR/SALs. No PCBs were detected. Metals and pesticides were most consistently detected in surface soil above ARAR/SALs at the north end of IR 7 near Building 1419. Metals detected at greater than three times their screening values were antimony (4.8 mg/kg), iron (2,560 mg/kg), mercury (0.31 mg/kg), and zinc (90 mg/kg). Pesticides detected in excess of their screening criteria were 4,4'-DDD (160 µg/kg) and 4,4'-DDT (1,900 µg/kg). Figure 2-7 depicts the remaining contaminants in soil at IR 7.

Sediment

Sediment from the Gulf of Mexico to the north, east, and west of the site was sampled. No VOCs were found at concentrations that exceeded ARAR/SALs. SVOC exceedances were found only during the 1990 sampling event. The pesticide 4,4'-DDT and its degradation products and several metals were detected most frequently in excess of ARAR/SALs. Elevated levels of pesticides detected were 4,4'-DDE (23.2 µg/kg) and 4,4'-DDT (32.1 µg/kg). Elevated levels of metals detected were arsenic (9.7 mg/kg), beryllium (0.24 mg/kg), copper (115 mg/kg), lead (42.2 mg/kg), mercury (0.14 mg/kg), and silver

(7 mg/kg). Two PCBs, Aroclor-1254 (47 µg/kg) and Aroclor-1260 (146 µg/kg), were detected in concentrations exceeding their screening levels. Figure 2-8 depicts the contaminants in sediments at IR 7.

Groundwater

Limited contamination was found in groundwater samples. For all investigations, groundwater analytical results indicated metals were present, however, in 1996 the frequency and magnitude of the detections were reduced from previous investigations. Pesticides were consistently found in 1996, but were detected infrequently in previous investigations.

VOCs were not detected in groundwater in 1996. Bis(2-ethylhexyl)phthalate (4 µg/l) and dibenzo(a,h)anthracene (0.1 µg/l) were the only two SVOCs detected in excess of groundwater screening values at IR 7. These detections occurred during 1990 and 1993 sampling efforts. Six pesticides were detected in excess of groundwater screening values at IR 7 during 1996 sampling efforts. Pesticides in excess of screening levels include aldrin (0.016 µg/l), alpha-BHC (0.1 µg/l), dieldrin (0.033 µg/l), gamma-BHC (1.1 µg/l), and heptachlor (0.012 µg/l).

Surface Water

Limited contamination was found in surface water samples. As in soil and sediment, inorganics were the most common contaminants detected in surface water. Antimony was the only metal that consistently exceeded the screening criteria at each sample location. Antimony exceedance values ranged from 148 to 229 µg/L. No VOCs, SVOCs, pesticides, or PCBs exceeded their screening values. Figure 2-9 depicts the contaminants in surface water at IR 7.

2.4.2.3 AOC B

In 1996, an IRA was conducted to excavate and dispose of contaminated soils at AOC B. The action removed 993 cubic yards of soil for offsite treatment and disposal. Soil, sediment, surface water, and groundwater samples were collected and analyzed to determine the nature and extent of contamination at AOC B. The contaminants at AOC B are associated with the former civilian disposal activities that occurred at the site. Surface soil, subsurface soil, surface water, and groundwater have been impacted by the disposal activities. The primary COCs are metals (Table 2-1). The results of the sampling and analyses are presented below.

Surface Soils

Only data from the 1995 Delineation Study were considered in the analysis of surface soil contamination at AOC B. SVOCs, VOCs, pesticides, and PCBs were not tested or "detected" in the single surface soil sample collected at AOC B. A single inorganic, zinc, was detected in excess of its 30 mg/kg screening value. Other metals detected included aluminum, arsenic, barium, chromium, cobalt, copper, manganese, and nickel.

Sediment

Data from a number of sampling efforts between 1993 and 1996, including the Delineation Study and Confirmation Investigation, were considered in the analysis of sediment contamination at AOC B. Sediment samples were collected along the perimeter of the IRA excavation area, and from the canal. No VOCs were detected and a single SVOC, phenanthrene, was detected, but below its screening value. Several pesticides were detected in excess of screening criteria. Maximum concentrations for all pesticide compounds detected in excess of screening values were from the eastern side of the wetlands area, except for gamma-BHC (lindane) (8.7 µg/kg) which was highest at the southern tip of the wetlands area. Maximum concentrations detected were 4,4'-DDD (12.6 µg/kg), 4,4'-DDE (15.7 µg/kg), dieldrin (28.8 µg/kg), endosulfan I (19.5 µg/kg), endrin (32.5 µg/kg), and heptachlor (6.9 µg/kg). Two PCBs, Aroclor-1254 (470 µg/kg) and Aroclor-1260 (402 µg/kg), were detected in excess of their screening criteria. Inorganic contamination in surface sediment appears fairly widespread at AOC B. Maximum concentrations commonly occurred along the southeastern boundary between the wetland area and the mangrove. Maximum metals concentrations detected in excess of screening criteria were arsenic (27.1 mg/kg), beryllium (1.5 mg/kg), cadmium (15.6 mg/kg), chromium (141 mg/kg), copper (420 mg/kg), iron (116,000 mg/kg), lead (302 mg/kg), mercury (1.2 mg/kg), nickel (151 mg/kg), and zinc (3,680 mg/kg). Figures 2-10 and 2-11 depict the remaining contaminants in sediment at AOC B.

Surface Water

No VOCs or SVOCs were detected in surface-water samples at AOC B. A single pesticide, 2,4,5-TP (silvex), was detected below its screening value in surface water at AOC B. Four PCBs were detected in excess of screening values at a single surface-water sample location. Aroclor-1016, Aroclor-1232, Aroclor-1242, and Aroclor-1248 were all detected at 2 µg/L. At least one inorganic was detected at each surface-water sample location at AOC B, and several were detected in excess of screening values. Maximum metals concentrations were detected most frequently at the northwest edge of the wetlands area and included antimony (268 µg/L), beryllium, (1.6 µg/L), chromium (115 µg/L), copper (72.5 µg/L), lead (71 µg/L), nickel (49.6 µg/L), tin (98.7 µg/L), and zinc (1,290 µg/L).

Groundwater

No VOCs, SVOCs or PCBs were detected in groundwater samples at AOC B. Several pesticides were detected at AOC B in excess of screening criteria. Exceedances were limited almost exclusively to the center of the wetland area. The pesticides detected in excess of screening values were 4,4'-DDD (0.93 µg/L), 4,4'-DDE (0.65 µg/L), 4,4'-DDT (1 µg/L), aldrin (0.071 µg/L), beta-BHC (0.11 µg/L), delta-BHC (0.097 µg/L), dieldrin (0.64 µg/L), endosulfan sulfate (0.7 µg/L), endrin aldehyde (0.59 µg/L), heptachlor (0.026 µg/L), and heptachlor epoxide (0.43 µg/L). Groundwater samples were collected and analyzed for inorganics in 1993 and 1996, and between those sampling events, inorganic concentrations generally decreased. In 1993, antimony, arsenic, chromium, lead, mercury, and nickel were detected in excess of screening values. In 1996, thallium, which had not been detected in 1993, was the only inorganic parameter detected in excess of screening values.

2.4.3 Contaminant Migration

The following summaries of potential contaminants migration pathways are based on information from the Supplemental RFI/RI Report.

2.4.3.1 IR 3

The major contaminant source at IR 3 is soil contaminated from past pesticide mixing activities. However, a large area of contaminated soil (926 tons) was removed in an IRA conducted in 1995. Groundwater data collected prior to the IRA indicated shallow groundwater contamination, suggesting migration of contaminants from subsurface soils to the water table. Groundwater investigations in 1993 indicated that groundwater flow was toward the east-southeast. Data from the Supplemental RFI/RI groundwater sampling indicates flow toward the north and east. The nearest surface water in the direction of groundwater flow is approximately 2,000 feet to the east-southeast and 6,000 feet to the north or east of the site. Thus, groundwater to surface water and groundwater to sediment contaminant migration pathways are not applicable at this site. The IRA has removed contaminated surface soil from the area where pesticide-mixing operations were conducted. The remediated area was backfilled and re-sodded, significantly reducing potential exposure via the surface soil migration pathway. Contaminant release mechanisms and migration pathways from surface water and sediment are absent at IR 3.

2.4.3.2 IR 7

The contaminant source at IR 7 is the former landfill. Contaminant release pathways are volatilization, wind erosion, overland runoff, and infiltration of contaminants. Constituents in soil could volatilize from

surficial material or become airborne via wind erosion. Contaminated fugitive dust can be generated during ground-disturbing activities, such as construction or excavation. The contaminants could then be dispersed in the surrounding environment and transported to downwind locations where they could repartition to surface soil, surface water, or sediment through gravitational settling, precipitation, and deposition. However, vegetation over the landfill minimizes the airborne contaminant transport pathway. An IRA was conducted in 1995 to prevent ponding of rainwater and minimize infiltration. Clean topsoil was placed in low areas to promote runoff and a vegetative cover was established to reduce erosion. This action has presumably reduced the infiltration pathway.

2.4.3.3 AOC B

The contaminant source at AOC B is debris (e.g., discarded car and truck body and frame parts) and 1,251 tons of sediment and soil that were removed from AOC B during the IRA completed in 1996. Debris left in the outlying mangrove swamp and residual sediment contamination (metals, pesticides, and PCBs) in the excavated area remain as potential contamination sources.

Volatilization, wind erosion, and overland runoff from the disposal area are no longer release pathways to any appreciable degree since the debris disposal area has been excavated. The fact that much of the remaining debris is in the water of the mangrove swamp and that the excavated area is wet serve to minimize the airborne transport of volatile contaminants.

Chemical reactions (e.g., oxidation) of the debris in the mangrove swamp may contribute to the partitioning of contaminants into surface water and sediments. Infiltration of contaminants from surface water and sediments into groundwater is possible. Contaminants with a stronger tendency to adsorb to organic matter in a soil are expected to migrate at a slower rate. After reaching the water table, contaminants can be carried with the flow of groundwater to downgradient locations. Data from 1996 groundwater sampling indicate that groundwater flow from the former disposal area is toward the canal.

2.5 SUMMARY OF SITE RISKS

The human health and ecological risks associated with exposure to contaminated media at IR 3, IR 7, and AOC B were evaluated in the *Supplemental RFI/RI Report for Eight Sites* (B&RE, 1998). An element in all the risk evaluations is that groundwater in the shallow aquifer is not a current source of drinking water and will not be used as one in the future for NAS Key West or any of the Florida Keys. IR 3 has no groundwater contamination above action levels; however, IR 7 and AOC B both border surface water bodies. Off-site migration of contaminated groundwater from these sites is not anticipated to pose a human health or environmental concern because the contaminant levels are low. In addition, the

properties are all part of NAS Key West and residential use of the properties is not envisioned in the future. Therefore, land use controls will be implemented to prohibit residential land use and groundwater use.

2.5.1 Human Health Risks

Exposure Pathways and Potential Receptors

Occupational worker, trespasser (adolescent and adult), site maintenance worker, excavation worker and resident were evaluated as potential receptors in the quantitative risk assessment. The excavation worker and resident were evaluated for future conditions only. The remaining receptors are considered for current conditions.

Exposure Assessment

The COCs that were evaluated and their maximum exposure-point concentrations are presented in Table 2-2. Exposure-point concentrations are used to determine potential human health risks.

Toxicity Assessment

Cancer slope factors (SFs) have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals.

SFs, which are unitless, are multiplied by the estimated intake of a potential carcinogen (in mg/kg/day) to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the SFs. This approach makes underestimation of the actual cancer risk highly unlikely. Cancer potency factors are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

EPA has developed reference doses (RfDs) associated with potential adverse health effects for chemicals exhibiting noncarcinogenic effects. RfDs, which are expressed in units (mg/kg-day) are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainty factors have been applied (to account for the use of animal data to

predict effects on humans). These uncertainty factors help ensure that the RfDs will not underestimate the potential for adverse noncarcinogenic effects to occur.

Risk Characterization

Excess lifetime cancer risks are determined by multiplying the chemical intake level times its cancer potency factor. These risks are expressed as probabilities. The risks are small so they are generally expressed in scientific notation (e.g., 1×10^{-6}). For example, an excess lifetime cancer risk of 1×10^{-6} for the specific exposure conditions at a site indicates that, at most, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime.

The noncarcinogenic effect of a single contaminant in a single medium is expressed as the hazard quotient (HQ) (or the ratio of the estimated intake derived from the contaminant concentration in a given medium to the contaminant's reference dose). By adding the HQs for all contaminants within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

IR 3 – Risk Values

Occupational Worker. The cumulative noncancer HI for ingestion of and dermal contact with soils for IR 3, under industrial land use conditions is less than 1.0 (0.3), which indicates that no significant hazards are associated with soils at IR 3. The cumulative ingestion and dermal contact cancer risk under a “reasonable maximum exposure” scenario is 3.4×10^{-5} , which is within EPA's target risk range of 1×10^{-6} to 1×10^{-4} and above the FDEP target risk of 1×10^{-6} .

Adolescent or Adult Trespasser. The cumulative noncancer HI for ingestion of and dermal contact with soils for IR 3, under industrial land use conditions are less than 1.0 (0.16), which indicates that no significant hazards are associated with soils at IR 3. The cumulative ingestion and dermal contact cancer risk under a “reasonable maximum exposure” scenario is 1.2×10^{-6} within EPA's target risk range of 1×10^{-6} to 1×10^{-4} and above the FDEP target risk of 1×10^{-6} .

Site Maintenance Worker. The cumulative noncancer HI for ingestion of and dermal contact with soils for IR 3, under industrial land use conditions is less than 1.0 (0.03), which indicates that no significant hazards are associated with soils at IR 3. The cumulative ingestion and dermal contact cancer risk under a “reasonable maximum exposure” scenario is 4.4×10^{-6} within EPA's target risk range of 1×10^{-6} to 1×10^{-4} and above the FDEP target risk of 1×10^{-6} .

Future Excavation Worker. No cumulative noncancer hazards or cancer risks are associated with ingestion and dermal contact exposure to IR 3 soil under industrial land use conditions for excavation workers.

Future Resident. The cumulative noncancer HI and cancer risk associated with ingestion and dermal contact exposure to IR 3 soil under hypothetical residential land use conditions are 2.0 and 2×10^{-4} , respectively, under reasonable maximum exposure scenarios. These risks exceed both the EPA target risk range and FDEP target risk levels.

IR 7- Risk Values

Occupational Worker. The cumulative noncancer HI for ingestion of and dermal contact with soils for IR 7, under industrial land use conditions is less than 1.0 (0.007), which indicates that no significant hazards are associated with soils at IR 7. No cumulative ingestion and dermal contact cancer risks exist for occupational workers at IR 7.

Adolescent or Adult Trespasser. The cumulative noncancer HI for ingestion of and dermal contact with soils for IR 7, under industrial land use conditions is less than 1.0 (0.37), which indicates that no significant hazards are associated with soils at IR 7. The cumulative ingestion and dermal contact cancer risk under a "reasonable maximum exposure" scenario is 4.9×10^{-6} within EPA's target risk range of 1×10^{-6} to 1×10^{-4} and above the FDEP target risk of 1×10^{-6} .

Site Maintenance Worker. The cumulative noncancer HI for ingestion of and dermal contact with soils for IR 7, under industrial land use conditions is less than 1.0 (0.0008), which indicates that no significant hazards are associated with soils at IR 7. No cumulative ingestion and dermal contact cancer risks exist for a site maintenance worker at IR 7.

Excavation Worker. The cumulative noncancer HI and cancer risk associated with ingestion and dermal contact exposure to IR 7 soil under industrial land use conditions is less than 1.0 (0.005) and 3×10^{-7} , respectively, under a reasonable maximum exposure scenario. Both of these numbers are below the values that would indicate a risk to the excavation worker.

Future Resident. The cumulative noncancer HI for ingestion of and dermal contact with soils for IR 7, under industrial land use conditions are greater than 1.0 (3), which indicates that hazards are associated with soils at IR 7. The cumulative ingestion and dermal contact cancer risk under a "reasonable maximum exposure" scenario is 3×10^{-5} within EPA's target risk range of 1×10^{-6} to 1×10^{-4} and above the FDEP target risk of 1×10^{-6} .

AOC B – Risk Values

Occupational Worker. No occupational workers are located at AOC B. Therefore, risks do not exist from ingestion of and dermal contact with soils for AOC B.

Adolescent or Adult Trespasser. The cumulative noncancer HI for ingestion of and dermal contact with soils for AOC B, under industrial land use conditions is less than 1.0 (0.6), which indicates that no significant hazards are associated with soils at AOC B. The cumulative ingestion and dermal contact cancer risk under a “reasonable maximum exposure” scenario is 8×10^{-6} within EPA's target risk range of 1×10^{-6} to 1×10^{-4} and above the FDEP target risk of 1×10^{-6} .

Site Maintenance Worker. No site maintenance workers are located at AOC B. Therefore, risks do not exist from ingestion of and dermal contact with soils for AOC B.

Future Excavation Worker. No cumulative noncancer hazards or cancer risks are associated with ingestion and dermal contact exposure to AOC B soil under industrial land use conditions for excavation workers.

Future Resident. The cumulative noncancer HI for ingestion of and dermal contact with soils for AOC B, under industrial land use conditions is greater than 1.0 (4), which indicates that hazards are associated with soils. The cumulative ingestion and dermal contact cancer risk under a “reasonable maximum exposure” scenario is 6×10^{-5} within EPA's target risk and above the FDEP target risk of 1×10^{-6} .

2.5.2 **Environmental Evaluation**

2.5.2.1 **IR 3**

IR 3 is an open, flat, rectangular area approximately 0.25 acre, near downtown Key West. The site is covered with turf grass and surrounded by parking lots, paved streets, residential areas, and other developed areas. Vegetation in the areas surrounding IR 3 consists of turf grass and scattered ornamental trees along streets and in residential areas. No surface water is present at IR 3, and the nearest surface water is approximately 1,100 feet to the south. Thus, IR 3 and the adjacent areas provide only limited terrestrial habitat of marginal quality in an urban and suburban setting. Ecological receptors in the vicinity of IR 3 consist of those typically found in urban areas, such as terrestrial invertebrates, lizards, songbirds, and exotic rodents such as the Norway rat, black rat, and house mouse.

A complete exposure pathway has three components: a source of contaminants; a route of transport through an environmental medium; and an exposure or contact point for an ecological receptor. The source of contaminants was largely removed when contaminated soil was removed in 1996. Groundwater contaminants remain at the site, but it is unlikely that the contaminant plume could travel the distance necessary to reach the coastline. Thus, aquatic receptors would not be exposed to groundwater contaminants from IR 3. Terrestrial receptors consist of species acclimated to urban conditions, and a point of contaminant exposure for these species is largely absent. For these reasons, a complete exposure pathway does not exist at IR 3 so no baseline ecological risk assessment (ERA) was done. The habitat of IR 3 is depicted in Figure 2-12.

2.5.2.2 IR 7

The intent of the baseline ERA is to characterize terrestrial and aquatic receptors and to estimate the potential hazard or risk to these receptors. The Fleming Key North Landfill (IR 7) covers approximately 30 acres in the northern portion of Fleming Key. The site includes the USDA Animal Import Center and surrounding grounds, a wooded area to the west of this facility, and shorelines along the east and west sides of Fleming Key. Terrestrial habitat over much of the site consists of turf grass and weedy areas. Wooded portions of the site are dominated by Australian pine and Brazilian pepper. A narrow strip of black mangrove is along the west shoreline. The east shoreline is rocky, with turf grass extending down to the high tide line. Thus, the site provides poor habitat for terrestrial receptors. The habitat IR 7 is depicted in Figure 2-13.

Terrestrial receptors at IR 7 include various invertebrates, reptiles, birds, and mammals such as raccoons, opossums, and possibly cotton rats, as well as exotic rodents such as the black rat) and house mouse. There is no fresh water at the site.

Aquatic habitat along both the east and west shorelines of IR 7 is dominated by vast expanses of turtle grass, with manatee grass and shoal grass present in some areas. Numerous fish were observed near both shorelines during sampling activities of August through October 1996. Other aquatic animal life included spiny lobster, queen conch, stone crab, spiny spider crab, and loggerhead sponge.

Sample locations were selected to detect potential groundwater contamination discharging to nearby surface water bodies via the shallow aquifer, and contaminated surface water runoff. Water and sediment samples were collected from the Gulf of Mexico east and west of IR 7. Selected resident aquatic receptors (i.e., manatee and shoal grass, spiny lobster, queen conch, stone crab) were sampled near the shoreline of IR 7. Information from the ERA in the NAS Key West RFI/RI Report (IT Corporation, 1994) was used to support the ERA in the Supplemental RFI/RI.

Hazard Quotients (HQ) were derived for each COC in all media. An HQ is the ratio of the maximum concentration of a constituent to an associated ecological threshold value. An HQ equal to or greater than 1.0 indicates a potential risk to ecological receptors. In addition to the media and tissue analyses, food chain modeling was performed for cotton rats, kestrels, great blue herons, and raccoons.

Aquatic and semi-aquatic organisms utilizing the open water adjacent to IR 7 can be exposed to contaminants through direct contact with surface water and sediments, incidental ingestion of surface water and sediments, and consumption of contaminated food items. Aquatic and semi-aquatic organisms also can be exposed to constituents in contaminated groundwater that discharges into surface water. Inhalation does not represent a significant exposure pathway because air contaminant concentrations are quite low, even for burrowing wildlife.

Numerous contaminants were evaluated in soil, sediment, surface water, plants, and animal tissue. Analyses of media at IR 7 indicate that migration of site-related contaminants from groundwater or soil to sediment and surface water has not been significant, with the possible exception of organochlorine compounds (4,4'-DDT and daughter products [4,4'-DDD and 4,4'-DDE]). These compounds were detected in some sediment samples. Their previous use in the lower Florida Keys was widespread, and they remain in soil and sediment for extremely long periods. However, the potential risks to aquatic and benthic biota from these compounds appear to be insignificant. HQs and frequencies of detection of other chemicals of potential concern in media indicate low potential risk to aquatic, benthic and terrestrial biota. Contaminants in groundwater, surface water, soil and sediment do not appear to pose environmental risks.

2.5.2.3 AOC B

The intent of the baseline ERA was to characterize terrestrial and aquatic receptors and to estimate the potential hazard or risk to these receptors. AOC B encompasses approximately 10 acres, of which approximately 1.6 acres is occupied by a dead-end canal. The former disposal area is bordered on the east, south, and west by a dense mangrove swamp. This swamp, consisting primarily of red and black mangroves, extends to the eastern end of Big Coppitt Key. A dead-end canal is located to the north of the site. Vegetation in the area between Old Boca Chica Road and the canal is sparse and consists of glasswort, saltwort, and sea oxeye daisy. A thin strip of black mangroves borders most of the canal. Buttonwood and white mangroves are found in the slightly more elevated portions of the site. The area surrounding the canal is slightly higher in elevation than the mangrove swamp. Thus, surface water from the mangrove swamp does not drain into the canal. In addition, the canal (unlike the swamp) is not subjected to tidal input, except in major storm events such as hurricanes. The habitat at AOC B is depicted in Figure 2-14.

The canal is approximately 65 feet wide and 12 feet deep, and extends north approximately 450 yards to a filled area over which a road has been constructed. Presumably, the canal was once linked to nearby ocean waters, but presently the outlet is blocked by riprap, concrete, and fill. This barrier prevents the passage of aquatic organisms, but some water probably seeps through the barrier. The salinity ranged from 27.3 to 31.3 ppt in August through October of 1996, slightly lower than sea water, suggesting a small freshwater influence. For the period August through October 1996, dissolved oxygen concentrations ranged from 3.5 to 5.01 mg/l in the canal, indicating marginal conditions that would support a limited community of aquatic organisms. Various marine fish and invertebrate species exist in the canal. Minnows (sailfin molly and crested goby), tarpon, blue crabs, and mud crabs were collected from the canal for tissue analysis. There are no freshwater resources at the site, except for shallow ephemeral pools after rain showers.

Terrestrial habitat is absent except in the area north of the former disposal area, where vegetation is sparse. However, the extensive mangrove swamp adjacent to the site provides good habitat for a variety of terrestrial receptors such as invertebrates, reptiles, amphibians, small mammals, and arboreal birds. Wading bird species seen foraging either along the edge of the canal or in the remediated area included white ibis, little blue heron, snowy egret, tricolored heron (all state listed as SSC), and yellow-crowned night heron. Other ecological receptors listed as threatened, endangered, or of special concern that could potentially occur on the site include the red rat snake (state listed as SSC), the indigo snake (threatened), and the silver rice rat (endangered). The Lower Keys marsh rabbit is not known to exist in the vicinity.

Sample locations were selected to detect potential groundwater contamination discharging to nearby surface water bodies via the shallow aquifer and contaminated surface water runoff. Water and sediment samples were collected from the tidal waters of Similar Sound that connects to the Atlantic Ocean east of AOC B. Selected resident aquatic receptors (i.e., minnows and tarpon, and blue crabs) were collected in the canal and wetlands. Information from the ERA in the NAS Key West RFI/RI Report (IT Corporation, 1994) also was used to support the ERA in the Supplemental RFI/RI.

HQs were derived for each COC in all media. Food chain modeling was performed for cotton rats, kestrels, great blue herons, and raccoons.

Aquatic and terrestrial organisms inhabiting the mangrove swamp and canal of AOC B may be exposed to contaminants through direct contact with surface water and sediments, incidental ingestion of surface water and sediments, or consumption of contaminated food items. Aquatic and semi-aquatic organisms can also be exposed to constituents in contaminated groundwater that flows into surface water.

Inhalation does not represent a significant exposure pathway because air contaminant concentrations are quite low.

The ERA indicates low potential risk to most ecological receptors at AOC B. Some contaminants may pose potential risks to benthic organisms. However, conditions at the site probably preclude the existence of diverse and abundant benthic communities regardless of the presence of contaminants. Results of the foodchain modeling indicate low potential risks to mammals and piscivorous birds from AOC B related contaminants. In addition, contaminants present in surface water and sediments have not accumulated in fish and crabs. This suggests that the contaminants may not be in bioavailable form. Therefore, although remediation of sediments at AOC B may remove contaminants, it would not improve the quality of the benthic habitat and may resuspend contaminants in water, potentially increasing their bioavailability (B&RE 1998).

2.6 THE SELECTED REMEDIES

The remedies selected in this Decision Document address IR 3, IR 7 and AOC B. Based on available information and the current understanding of site conditions by the NAS 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 anticipated to meet the following statutory requirements:

- Protection of human health and the environment
- Compliance with ARARs
- Cost-effectiveness

IR 3

In 1995, approximately 926 tons of contaminated soil was removed from IR 3 as part of an IRA. Following the IRA, the Supplemental RI indicated the presence of residual soil contamination at the site that presented a risk to human health.

The selected remedy for IR 3 is to cover the site with an asphalt cap to eliminate direct exposure to the soil, restrict surface water infiltration and contaminant migration to groundwater, and to provide land use controls. On October 6, 1998, the NAS Key West Partnering Team discussed appropriate remedial alternatives for this site and selected an asphalt cap as the final remedy. The contaminated soils that remain at the site following the IRA will be covered with semi-permeable asphalt. The selected remedy will reduce the potential risk to human receptors associated with pesticides and metals present in soils.

The decision will be based on the EE/CA that will compare the remedial alternatives for the site and the Action Memorandum that will be the detailed and final decision document.

This remedy is consistent with long-term remedial goals for IR 3. The selected remedy will reduce the principal threat to human receptors at the site from soil contamination. An asphalt cap with land-use controls will be protective of human health and the environment, and will prevent current and future residential land use.

IR 7

In 1977, during the construction of the USDA Animal Import Center, wastes were excavated, transferred and buried under a soil and rock cover in an area near the center. The entire landfill area is covered with soil and is vegetated by grass, weeds, or trees. Following the IRA, the Supplemental RI recommended future monitoring of the landfill through groundwater monitoring. Access to approximately 30 acres would be restricted. The final decision will be based on a groundwater monitoring plan that will be the detailed and final decision document.

The selected remedy for IR 7 is groundwater monitoring with land-use controls. On October 6, 1998, the NAS Key West Partnering Team discussed and selected this remedy. Monitoring with land-use controls will be protective of human health and the environment, and will prevent future residential land use.

AOC B

In 1996, the Navy conducted an IRA to excavate and dispose of contaminated soils at the site. The action removed 1,251 tons of sediment and soil for offsite treatment and disposal. Following the IRA, the Supplemental RI recommended no further action at the site. However, access to approximately 10 acres would be restricted.

The selected remedy for AOC B is land-use controls. Based on the minimal human health and ecological risks posed by the site, land-use controls will be protective of human health and the environment, and will prevent future residential land use.

Land Use Controls

Land use controls will be implemented to limit future site land use. For each site, a LUCIP will be developed as a part of the remedial action. The LUCIP will include, when applicable: details on access controls, requirements for signs along the perimeter of the site, restrictions on shallow groundwater use, a

description of the land use controls in the Base Master Plan, periodic inspection and re-evaluation of land use controls, annual certification that land use controls are in place, notification to the EPA and state regulators whenever the Navy anticipates any major changes in land use restrictions, public notice, and a deed notification.

The Navy shall institute the land use controls within 90 days of completion of each remedy at IR 3, IR 7, and AOC B, respectively. The Base Master Plan shall note the areas as ones in which residential development cannot occur, shallow groundwater cannot be used, and site access shall be limited. A notation shall be filed in the real property file maintained at SouthDiv indicating the extent of the areas and the fact that solid wastes are present. Within 90 days after completion of each remedy, the Navy shall produce a survey plat prepared by a professional land surveyor registered by the State of Florida, indicating the location and dimensions of each site. The plat shall contain a note, prominently displayed, which states the owner's future obligation to restrict disturbance (excavation or construction) of the property. In addition, post-closure use of the property shall prohibit residential use.

Performance Standards

The selected remedy for each site shall manage residuals within the site boundaries and shall meet the majority of ARARs and all remedial goal options (RGOs).

Sound Engineering Controls (Asphalt Cap)

The asphalt cap for IR 3 will be designed to meet sound engineering controls requirements in accordance with Section 62-785.680(2)(b) 4 of the F.A.C. which is a portion of the Brownfield Cleanup Criteria Rule.

Landfill Monitoring

The groundwater monitoring plan for IR 7 will meet the groundwater monitoring requirement in accordance with Section 62-785.680(2)(c)1.d. of the F.A.C. which is a portion of the Brownfield Cleanup Criteria Rule.

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 NAS Key West is a non-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 (NCP) the two threshold criteria must be met by the remedial action. Those two criteria include overall protection of human health and the environment, and compliance with ARARs in both Federal and state laws and regulations. Once the threshold criteria is met five primary balancing criteria are utilized to compare and evaluate the elements of alternative remedial actions. Those five criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. Lastly, following the receipt of public comments on the RI and Proposed Plans for these sites, two modifying criteria are used by the Navy to perform a final evaluation of the remedial alternatives. These two 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. This includes permanent notification of groundwater use restrictions in local land records in order to control exposure of humans to possible residual contamination in groundwater at each site.

IR 3

The asphalt cap would protect human health and the environment by preventing direct exposure to contaminated soil and minimizing the potential of contaminant migration to groundwater. Land use controls will ensure that the site will not be used in the future for any purpose that could damage the asphalt cap and potentially expose human and ecological receptors to the remaining soil contamination.

IR 7

Implementation of the groundwater monitoring plan would protect human health and the environment by the early detection of chemicals that could potentially pose an unacceptable risk, thereby preventing future direct exposure to possibly contaminated soil, sediment or surface water. Land use controls will ensure that the site will not be used for any purpose in the future which could damage the soil cap and potentially expose human and ecological receptors to the remaining soil contamination.

AOC B

Land use controls will ensure that the site will not be used for any purpose in the future which could disturb the excavated area and potentially expose human and ecological receptors to the remaining soil/sediment contamination.

2.7.2 Compliance with ARARs

Measures to control sources of contamination and the exposure of humans or the environment to residual contamination may be implemented provided the following criteria are met:

- Groundwater protection standard cannot be practically achieved
- Groundwater is not currently or reasonably expected to be a source of drinking water and is not hydraulically connected with waters to which contaminants may migrate in concentrations that would exceed applicable standards
- Measures to control sources of contamination are consistent with the overall objective of the remedy to control the sources of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of solid waste constituents into the environment that may pose a threat to human health or the environment [62-785.680(2)(c) 1.d F.A.C. Brownfield Cleanup Criteria Rule, Alternative Groundwater Cleanup Levels]

The selected remedy for each site will satisfy these criteria. The IR 3 asphalt cap, IR 7 groundwater monitoring plan and AOC B land use controls would meet all relevant and appropriate regulations and federal and state law. Capping and groundwater monitoring would be in compliance with applicable Florida regulations.

2.7.3 Long-Term Effectiveness and Permanence

Capping is a permanent solution and is an appropriate remedy for soils contaminated with pesticides and metals. The selected remedy for IR 3 is a cap. Capping is common and appropriate for a site of this type. IR 7 has a soil cap as a permanent solution although it was constructed in 1977 and upgraded by the IRA performed in 1995. The selected remedy of groundwater monitoring and land-use controls will support the contaminant containment offered by the earlier cap into the future. The Supplemental RI concluded the IRAs performed at IR 7 and AOC B were adequate long-term and permanent remedies. Future use of any of the sites will be limited by land-use controls

2.7.4 Reduction of Toxicity, Mobility or Volume through Treatment

The selected remedial actions for IR 3, IR 7, and AOC B do not use treatment technologies because treatment is not practicable for sites of this size.

2.7.5 Short-Term Effectiveness

The asphalt capping of IR 3 is the only additional remedial action that will be performed on any of the three sites addressed by this document. Site conditions will be monitored at IR 3 by a Navy contractor, as they were during the IRA activities, when capping activities are underway. Monitoring will insure worker and nearby residential protection during capping activities. Given the small size of the site and the common practice of asphalt paving, the site will be quickly capped limiting any possible exposure to the remaining contaminants in soil. The Supplemental RI concluded the IRAs performed at IR 7 and AOC B were adequate long-term remedies. The groundwater in IR 7 will be sampled to monitor short-term effectiveness. Future use of any of the sites will be limited by land-use controls

2.7.6 Implementability

Asphalt capping (paving) is a readily available and common service in the Florida Keys. When the decision documentation is completed for IR 3, the Navy's contractor will be funded to implement the capping activities. The capping will meet all applicable state and local specifications for asphalt parking lots. IR 7 groundwater monitoring is also readily available and common service. Again, when the decision documentation is completed for IR 7, the Navy's contractor will be funded to implement the monitoring activities.

2.7.7 Cost-Effectiveness

The selected remedies are cost-effective because they would provide overall effectiveness proportional to the cost. Specifically, the selected remedies would achieve remediation goals more quickly and efficiently than other alternatives, provide greater long-term protection of human health and the environment, and meet all identified ARARs.

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 NAS Key West Partnering Team to implement the environmental investigation, public awareness (NAS Key West

Restoration Advisory Board) and final decision for closure of these sites. In addition, the Navy and FDEP have entered into a memorandum-of-agreement (MOA) on land-use control that is an integral part of this decision documents Declaration Statement found in Section 1.0.

2.7.9 Community Acceptance

Although the community attended the public meeting on Proposed Plan for these three sites, no formal comments were received on the final remedies for the sites. Over one hundred key members of the Key West community were provided copies of the Proposed Plans and the general Key West community was notified via major newspaper of the 60-day comment period and public meeting. The selected remedies remain same as identified in the Proposed Plans (October 15, 1998) and those presented to the public at the public meeting held November 16, 1998. There were no significant changes to the recommended remedial actions in the Proposed Plans.

TABLE 2-1

**MAXIMUM DETECTED VALUES FOR PRIMARY COCS¹ BY SITE²
NAVAL AIR STATION KEY WEST, KEY WEST, FLORIDA**

Chemical of Concern	Maximum Detected Value
IR 3 SURFACE SOILS	
Organics (mg/kg)	
4,4'-DDD	7.5
4,4'-DDE	19
4,4'-DDT	21
Inorganics (mg/kg)	
Arsenic	5.3
Beryllium	0.17
Iron	10,700
IR 7 SURFACE SOILS	
Inorganics (mg/kg)	
Antimony	4.8
IR 7 SURFACE WATER	
Inorganics (µg/L)	
Antimony	229
AOC B SEDIMENT	
Inorganics (mg/kg)	
Arsenic	27.1
Iron	116,000
AOC B SURFACE WATER	
Inorganics (µg/L)	
Antimony	268

1 Chemicals of concern are identified as a result of the risk assessment screening of contaminants. The screening ruled out other contaminants listed in Section 2.4.2 as drivers to risk assessment.

2 All maximum values are post-IRA.

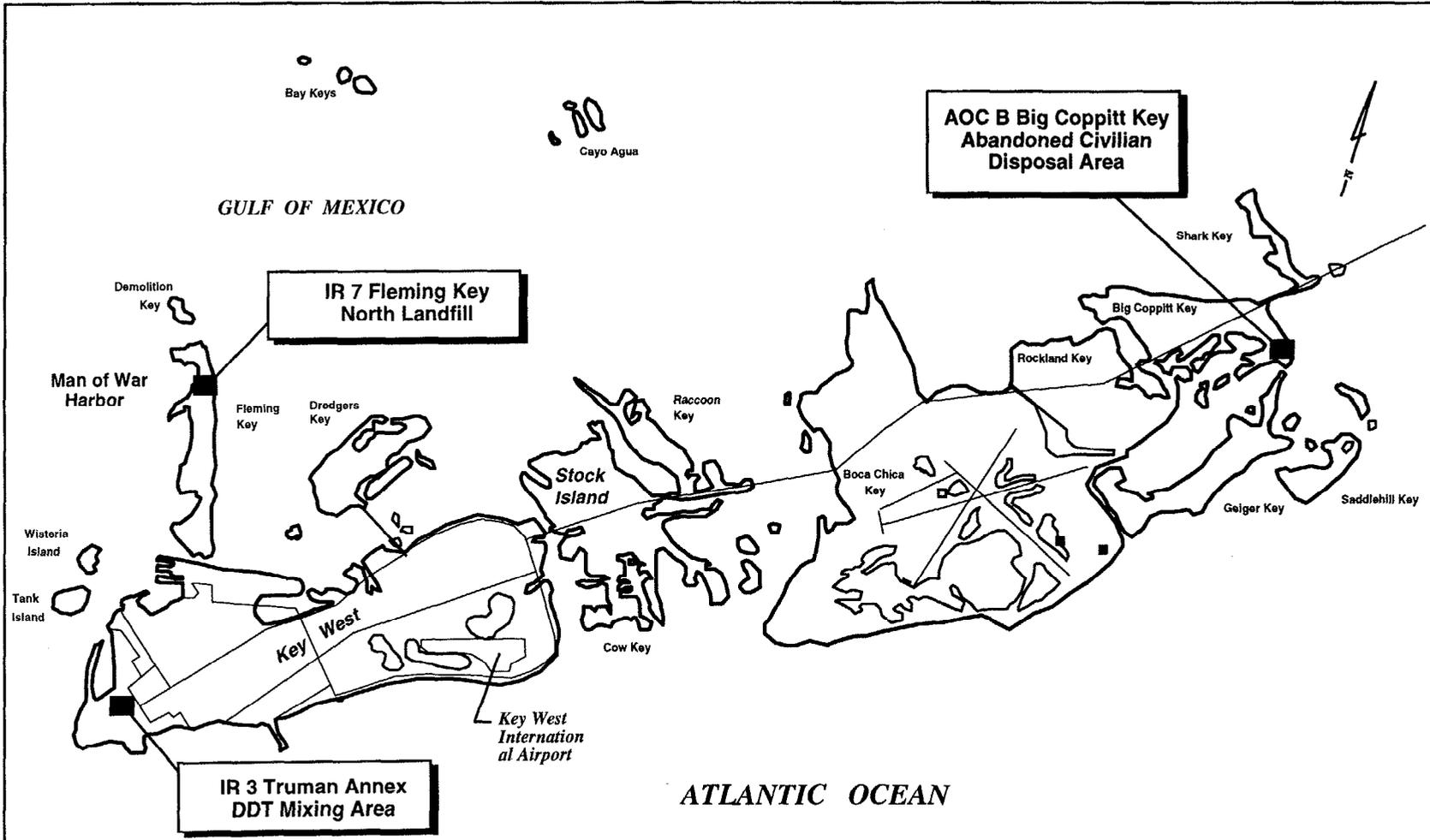
TABLE 2-2
HUMAN HEALTH
CHEMICALS OF CONCERN AND REPRESENTATIVE CONCENTRATIONS⁽¹⁾
BY SITE
NAVAL AIR STATION KEY WEST, FLORIDA

Medium	Organics		Inorganics	
	Chemical	Representative Concentration ⁽²⁾	Chemical	Representative Concentration ⁽²⁾
IR 3				
Surface/Subsurface Soil	4,4'-DDD	7.5	Arsenic	3.46
	4,4'-DDE	15.2	Beryllium	0.17
	4,4'-DDT	21.0	Iron	4,120
IR 7				
Surface/Subsurface Soil	NA	NA	Antimony	4.8
Surface Water	NA	NA	Antimony	229
AOC B				
Sediment	NA	NA	Arsenic	6.36
			Iron	16,400
Surface Water	NA	NA	Antimony	268

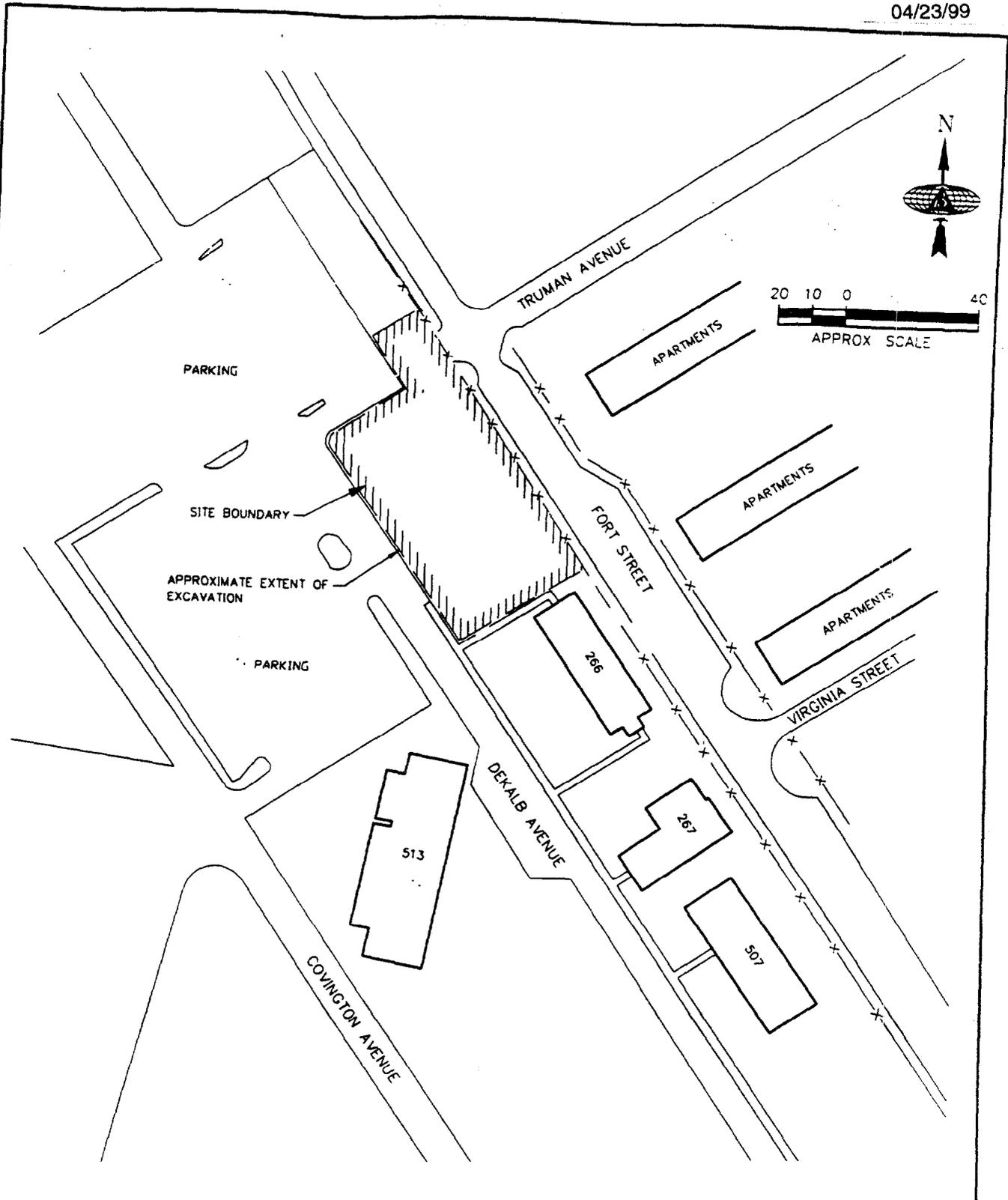
1 Ninety five percent upper confidence limits (UCLs) were used as representative concentrations for reasonable maximum exposure (RME) and central tendency evaluation, unless otherwise noted.

2 Units are mg/kg for soil and sediment organics and inorganics, and µg/l for all surface water.

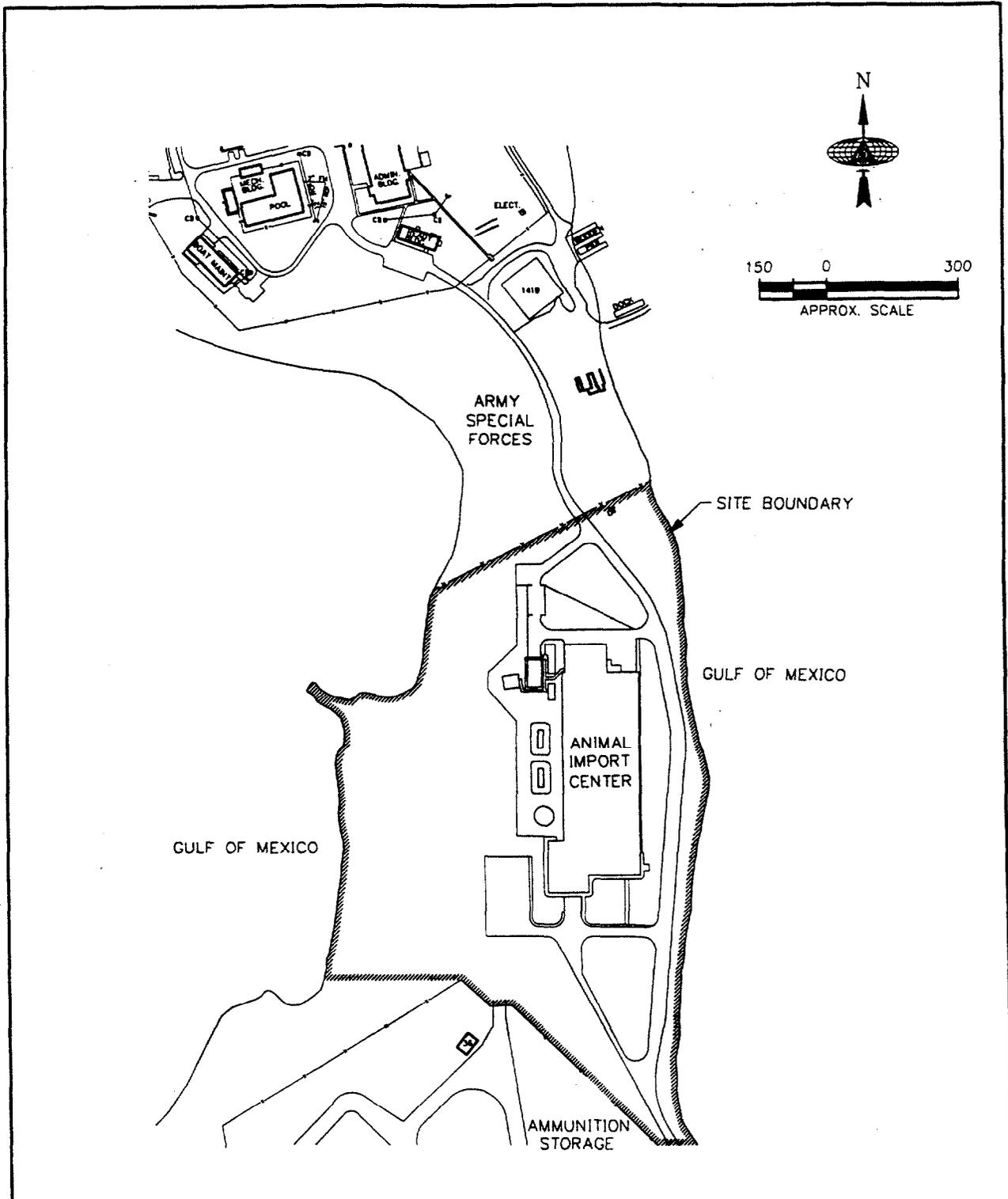
NA = Not applicable.



DRAWN BY MDB CHECKED BY COST/SCHED-AREA SCALE N.T.S.	DATE 11/12/98 DATE DATE	 <p> DECISION DOCUMENT AND RESPONSIVENESS SUMMARY FIGURE 2-1. IR 3, IR 7, AOC B General Location Map NAVY SOUTHERN DIVISION NAS KEY WEST, FLORIDA </p>	CONTRACT NO. 7593
			APPROVED BY _____ DATE _____
			APPROVED BY _____ DATE _____
			DRAWING NO. _____ REV. 0



<table border="1"> <tr> <td>DRAWN BY</td> <td>DATE</td> </tr> <tr> <td>RBP</td> <td>----</td> </tr> <tr> <td>CHECKED BY</td> <td>DATE</td> </tr> <tr> <td>COST/SCHED-AREA</td> <td></td> </tr> <tr> <td>SCALE</td> <td></td> </tr> </table>	DRAWN BY	DATE	RBP	----	CHECKED BY	DATE	COST/SCHED-AREA		SCALE			<p>DECISION DOCUMENT AND RESPONSIVENESS SUMMARY FIGURE 2-2. SITE LOCATION MAP - IR 3 NAVY SOUTHERN DIVISION NAS KEY WEST, FLORIDA</p>	<table border="1"> <tr> <td colspan="2">CONTRACT NO.</td> </tr> <tr> <td colspan="2">7593</td> </tr> <tr> <td>APPROVED BY</td> <td>DATE</td> </tr> <tr> <td>APPROVED BY</td> <td>DATE</td> </tr> <tr> <td>DRAWING NO.</td> <td>REV. 0</td> </tr> </table>	CONTRACT NO.		7593		APPROVED BY	DATE	APPROVED BY	DATE	DRAWING NO.	REV. 0
DRAWN BY	DATE																						
RBP	----																						
CHECKED BY	DATE																						
COST/SCHED-AREA																							
SCALE																							
CONTRACT NO.																							
7593																							
APPROVED BY	DATE																						
APPROVED BY	DATE																						
DRAWING NO.	REV. 0																						



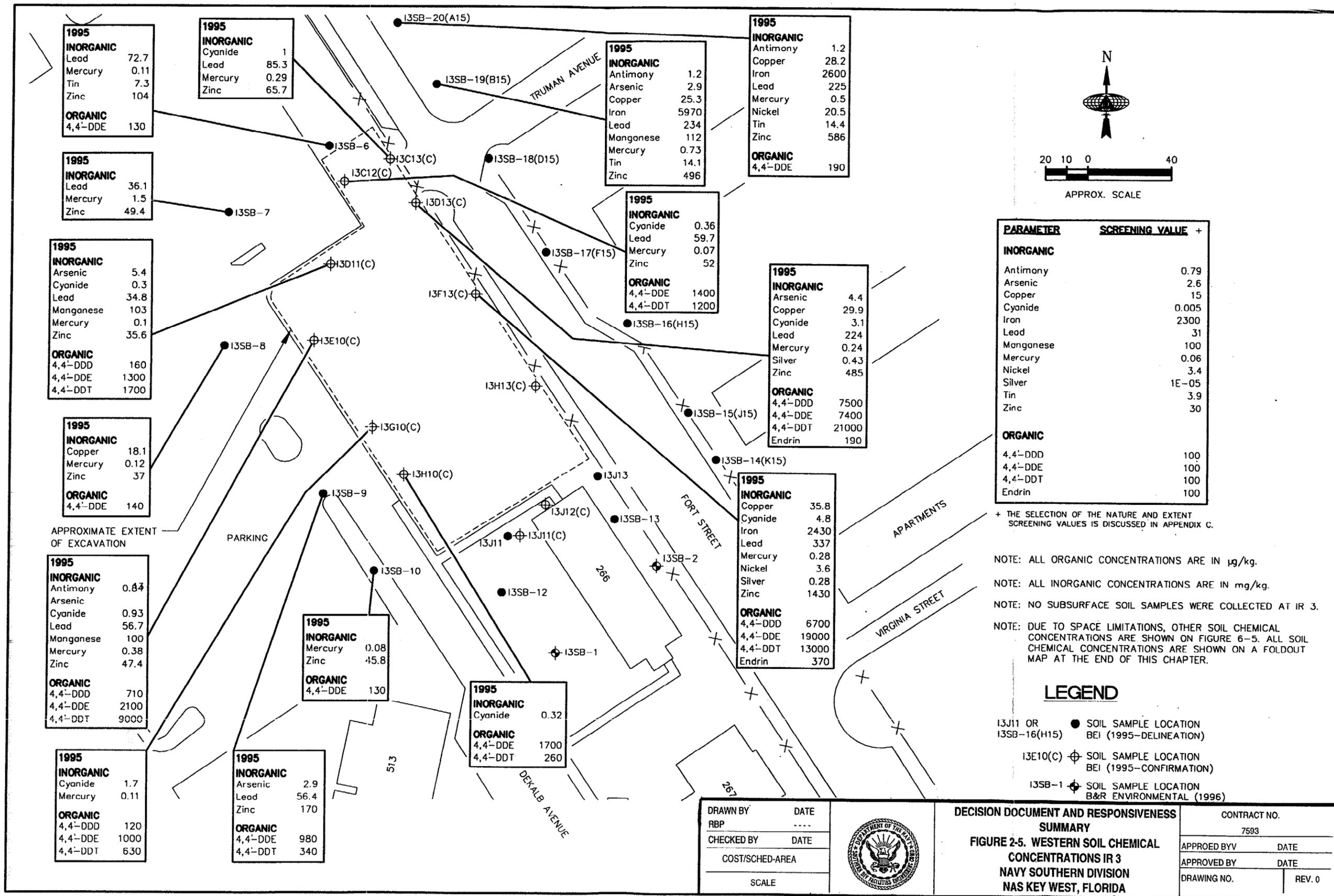
DRAWN BY RBP	DATE ----
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	



**DECISION DOCUMENT AND RESPONSIVENESS
SUMMARY**
FIGURE 2-3. SITE LOCATION MAP - IR 7
NAVY SOUTHERN DIVISION
NAS KEY WEST, FLORIDA

CONTRACT NO. 7593	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	REV. 0

This page intentionally left blank.



PARAMETER	SCREENING VALUE +
INORGANIC	
Antimony	0.79
Arsenic	2.6
Copper	15
Cyanide	0.005
Iron	2300
Lead	31
Manganese	100
Mercury	0.06
Nickel	3.4
Silver	1E-05
Tin	3.9
Zinc	30
ORGANIC	
4,4'-DDD	100
4,4'-DDE	100
4,4'-DDT	100
Endrin	100

+ THE SELECTION OF THE NATURE AND EXTENT SCREENING VALUES IS DISCUSSED IN APPENDIX C.

NOTE: ALL ORGANIC CONCENTRATIONS ARE IN µg/kg.

NOTE: ALL INORGANIC CONCENTRATIONS ARE IN mg/kg.

NOTE: NO SUBSURFACE SOIL SAMPLES WERE COLLECTED AT IR 3.

NOTE: DUE TO SPACE LIMITATIONS, OTHER SOIL CHEMICAL CONCENTRATIONS ARE SHOWN ON FIGURE 6-5. ALL SOIL CHEMICAL CONCENTRATIONS ARE SHOWN ON A FOLDOUT MAP AT THE END OF THIS CHAPTER.

LEGEND

- I3J11 OR ● SOIL SAMPLE LOCATION
- I3SB-16(H15) BEI (1995-DELINEATION)
- I3E10(C) ⊕ SOIL SAMPLE LOCATION
- BEI (1995-CONFIRMATION)
- I3SB-1 ⊕ SOIL SAMPLE LOCATION
- B&R ENVIRONMENTAL (1996)

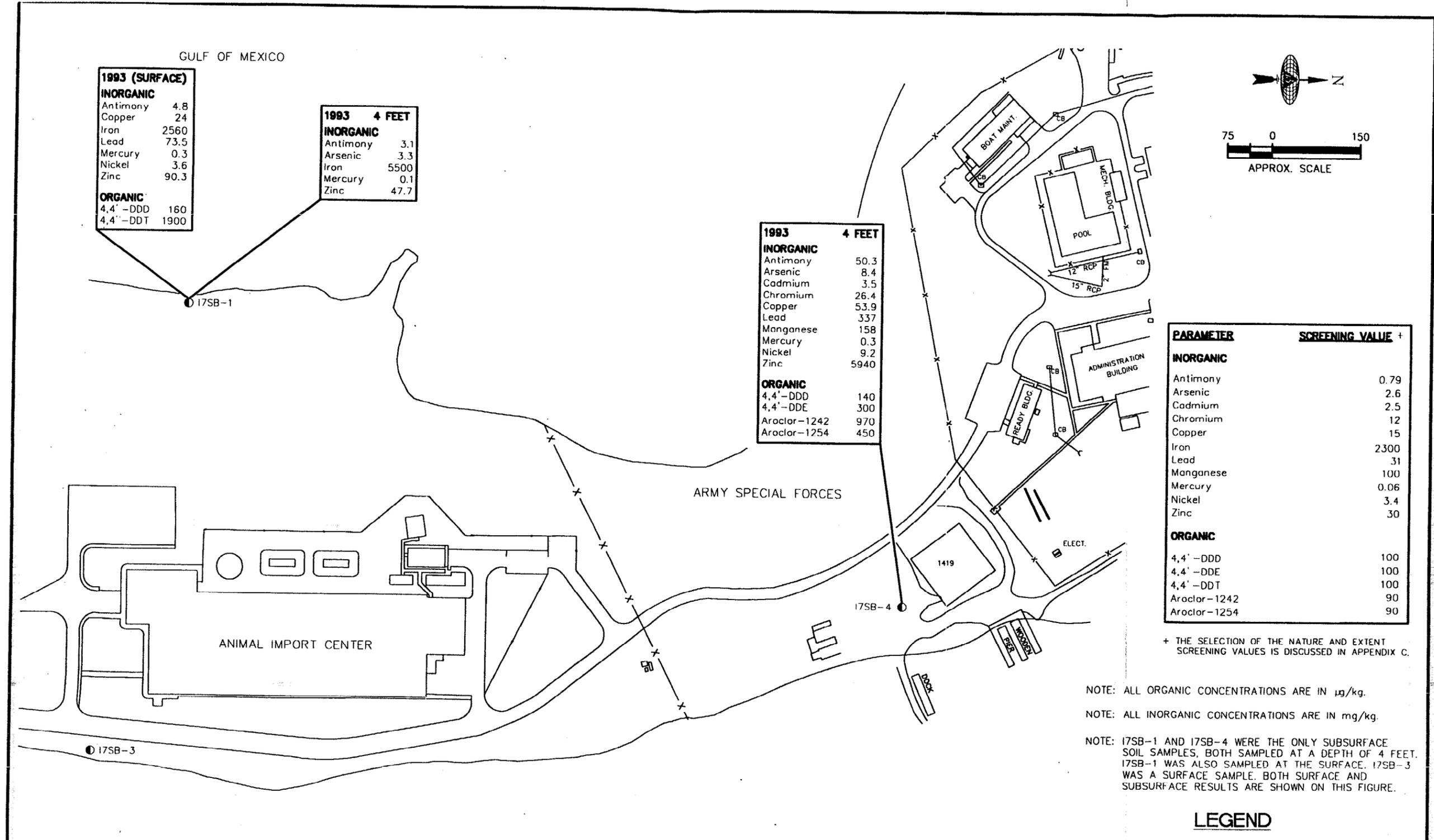
DRAWN BY	DATE
RBP	----
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	



DECISION DOCUMENT AND RESPONSIVENESS SUMMARY
FIGURE 2-5. WESTERN SOIL CHEMICAL CONCENTRATIONS IR 3
NAVY SOUTHERN DIVISION
NAS KEY WEST, FLORIDA

CONTRACT NO.	
7593	
APPROVED BYV	DATE
APPROVED BY	DATE
DRAWING NO.	REV. 0

0125AR17



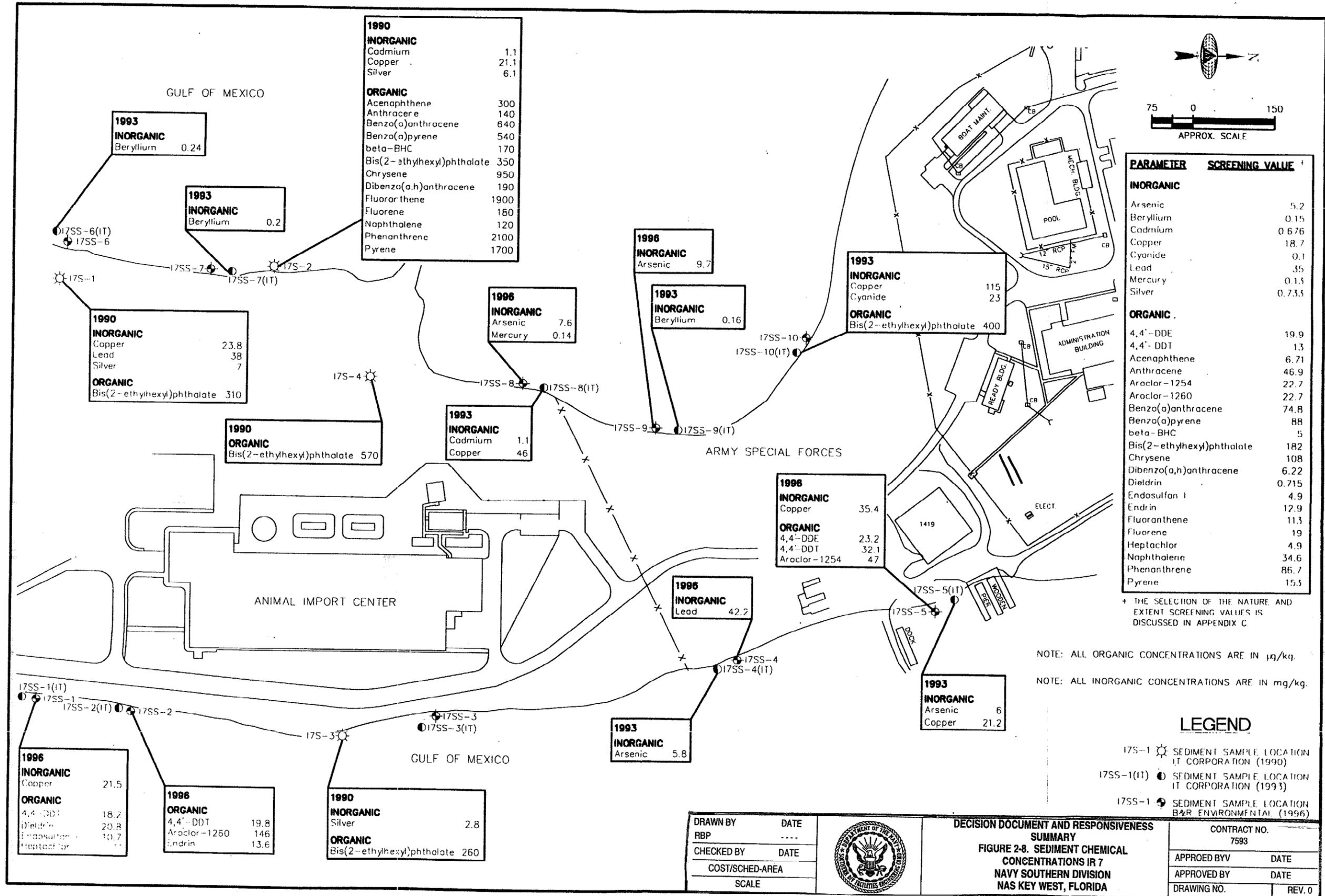
+ THE SELECTION OF THE NATURE AND EXTENT SCREENING VALUES IS DISCUSSED IN APPENDIX C.

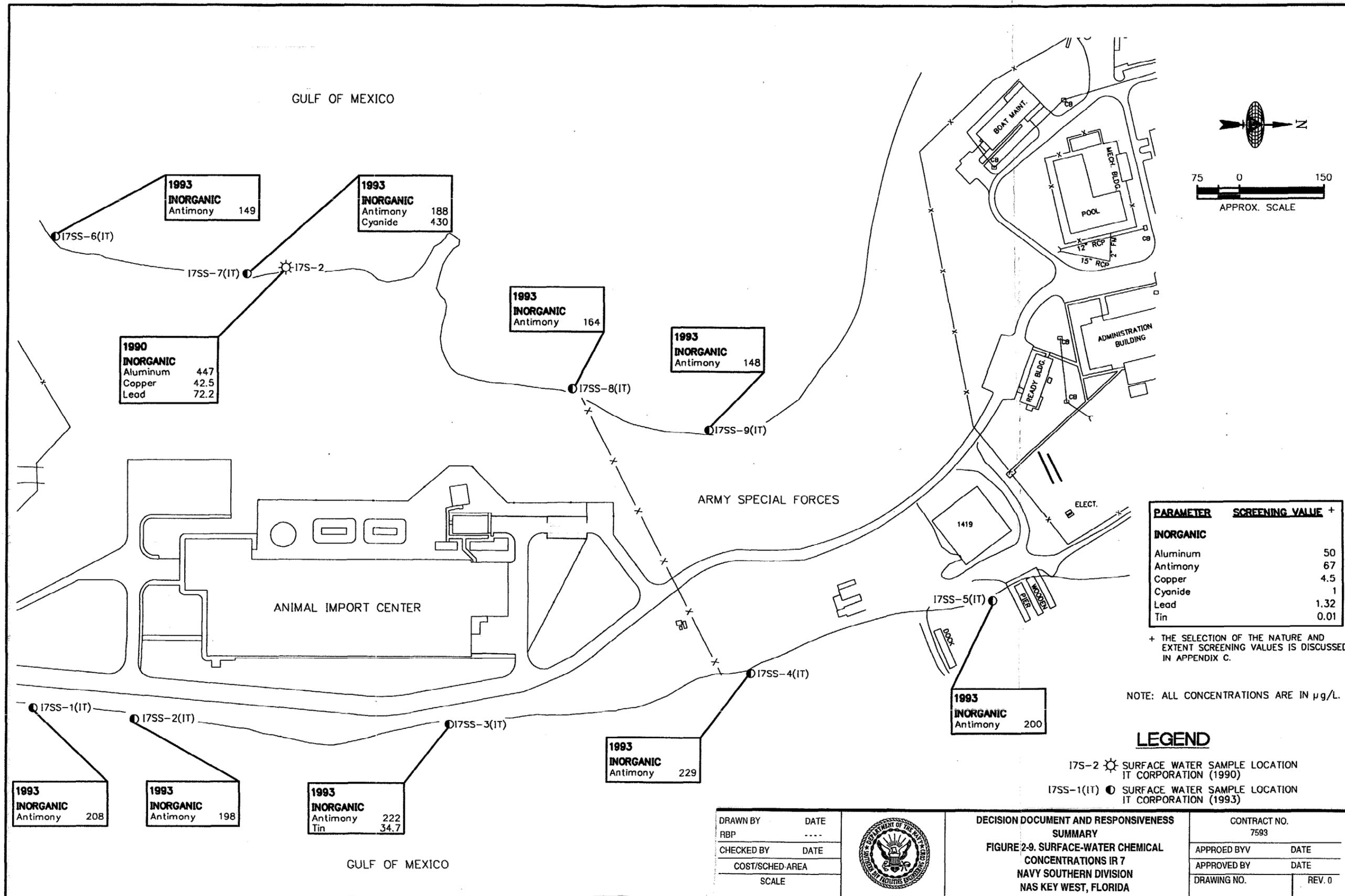
NOTE: ALL ORGANIC CONCENTRATIONS ARE IN µg/kg.
 NOTE: ALL INORGANIC CONCENTRATIONS ARE IN mg/kg.
 NOTE: 17SB-1 AND 17SB-4 WERE THE ONLY SURFACE SOIL SAMPLES, BOTH SAMPLED AT A DEPTH OF 4 FEET. 17SB-1 WAS ALSO SAMPLED AT THE SURFACE. 17SB-3 WAS A SURFACE SAMPLE. BOTH SURFACE AND SUBSURFACE RESULTS ARE SHOWN ON THIS FIGURE.

LEGEND

17SB-1 ● SOIL SAMPLE LOCATION
IT CORPORATION (1993)

DRAWN BY RBP	DATE ----		DECISION DOCUMENT AND RESPONSIVENESS SUMMARY	CONTRACT NO. 7593
CHECKED BY	DATE		FIGURE 2-7. SOIL CHEMICAL CONCENTRATIONS IN 7 NAVY SOUTHERN DIVISION NAS KEY WEST, FLORIDA	APPROVED BY _____ DATE _____
COST/SCHED-AREA				APPROVED BY _____ DATE _____
SCALE				DRAWING NO. _____ REV. 0





DRAWN BY	DATE
RBP	----
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	



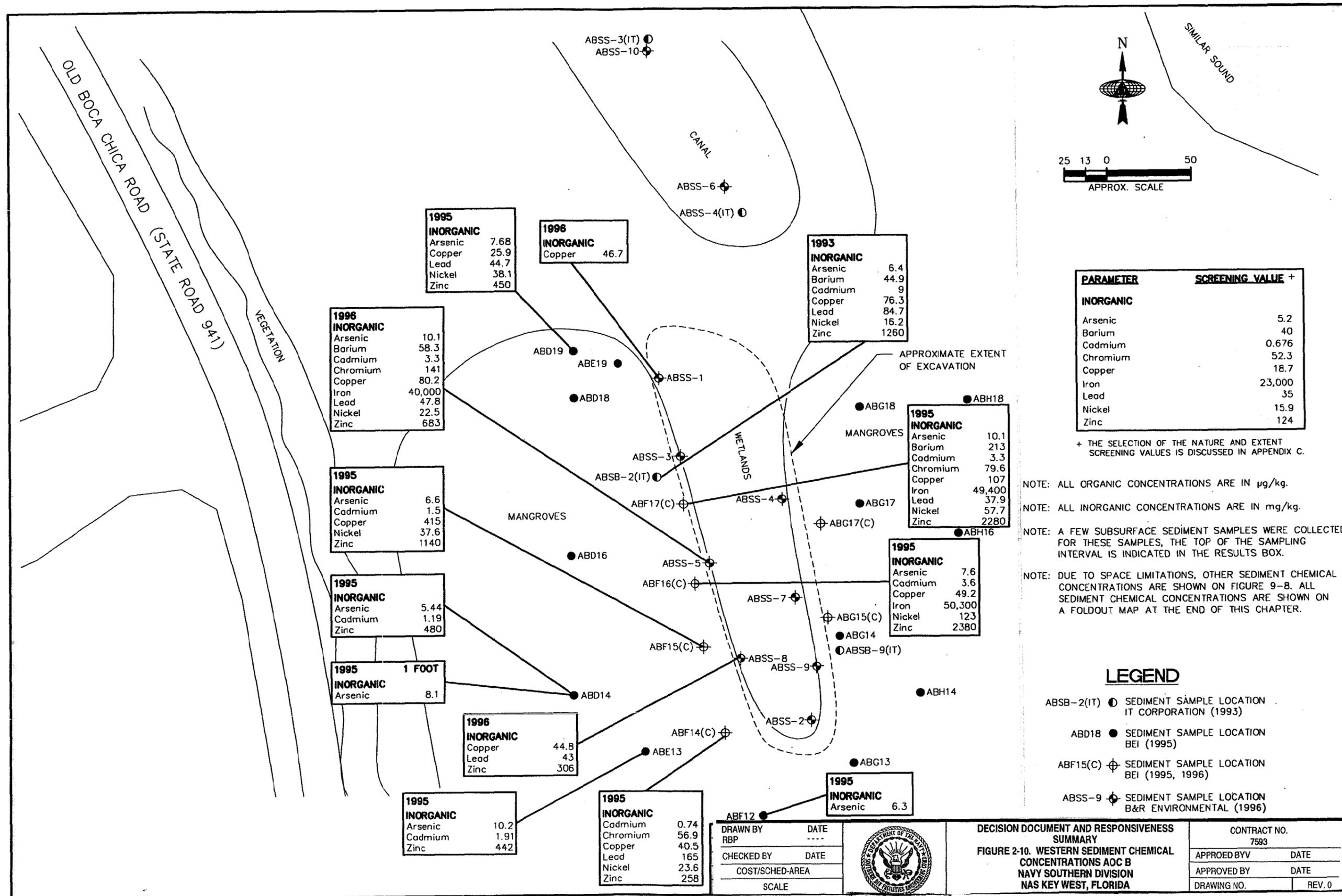
DECISION DOCUMENT AND RESPONSIVENESS SUMMARY

FIGURE 2-9. SURFACE-WATER CHEMICAL CONCENTRATIONS IR 7

NAVY SOUTHERN DIVISION

NAS KEY WEST, FLORIDA

CONTRACT NO. 7593	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	REV. 0



PARAMETER	SCREENING VALUE +
INORGANIC	
Arsenic	5.2
Barium	40
Cadmium	0.676
Chromium	52.3
Copper	18.7
Iron	23,000
Lead	35
Nickel	15.9
Zinc	124

+ THE SELECTION OF THE NATURE AND EXTENT SCREENING VALUES IS DISCUSSED IN APPENDIX C.

NOTE: ALL ORGANIC CONCENTRATIONS ARE IN µg/kg.

NOTE: ALL INORGANIC CONCENTRATIONS ARE IN mg/kg.

NOTE: A FEW SUBSURFACE SEDIMENT SAMPLES WERE COLLECTED FOR THESE SAMPLES, THE TOP OF THE SAMPLING INTERVAL IS INDICATED IN THE RESULTS BOX.

NOTE: DUE TO SPACE LIMITATIONS, OTHER SEDIMENT CHEMICAL CONCENTRATIONS ARE SHOWN ON FIGURE 9-8. ALL SEDIMENT CHEMICAL CONCENTRATIONS ARE SHOWN ON A FOLDOUT MAP AT THE END OF THIS CHAPTER.

LEGEND

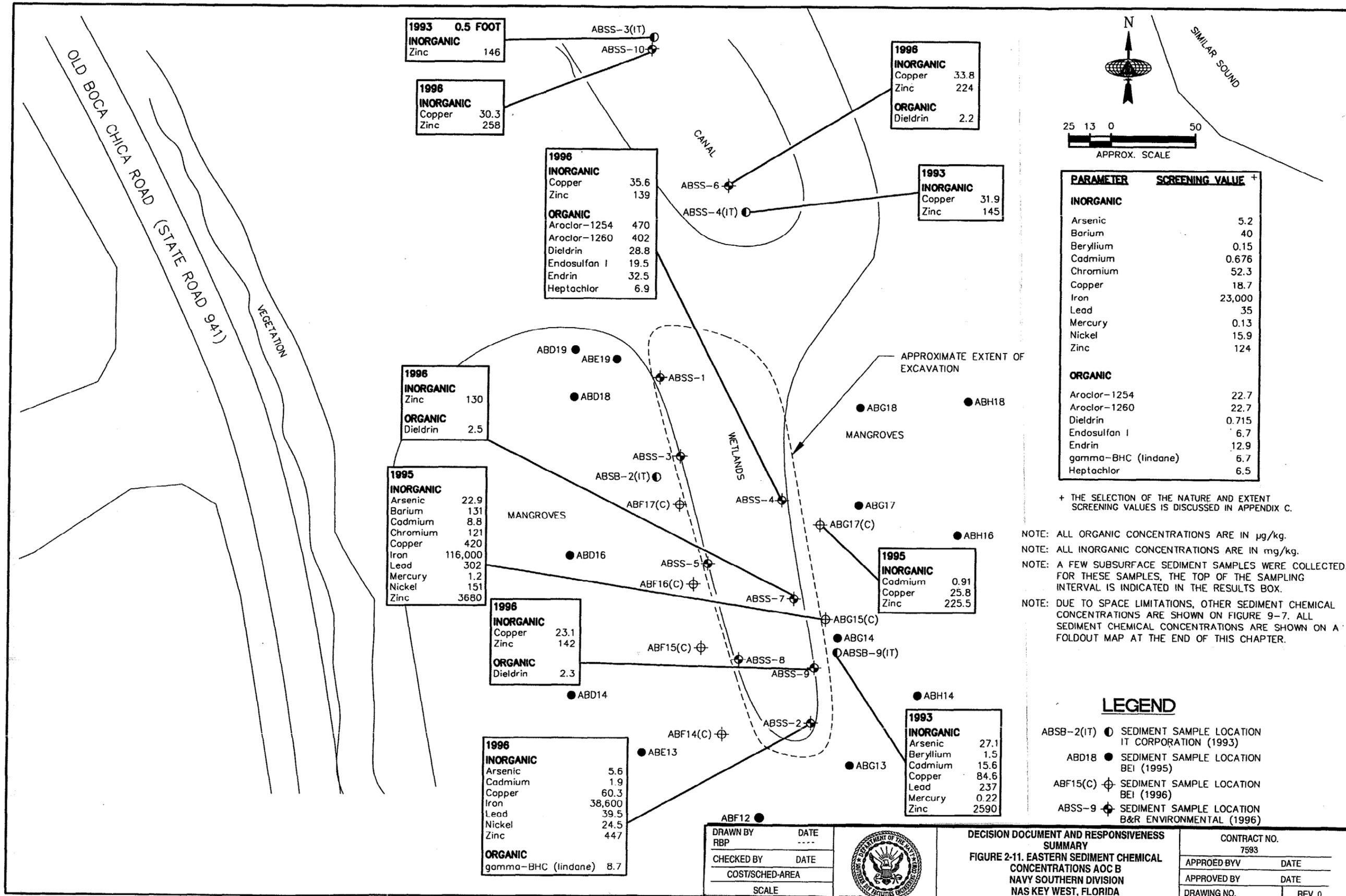
- ABSS-2(IT) ⊕ SEDIMENT SAMPLE LOCATION IT CORPORATION (1993)
- ABD18 ● SEDIMENT SAMPLE LOCATION BEI (1995)
- ABF15(C) ⊕ SEDIMENT SAMPLE LOCATION BEI (1995, 1996)
- ABSS-9 ⊕ SEDIMENT SAMPLE LOCATION B&R ENVIRONMENTAL (1996)

DRAWN BY RBP	DATE ----
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	



DECISION DOCUMENT AND RESPONSIVENESS SUMMARY
FIGURE 2-10. WESTERN SEDIMENT CHEMICAL CONCENTRATIONS AOC B
NAVY SOUTHERN DIVISION
NAS KEY WEST, FLORIDA

CONTRACT NO. 7593	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	REV. 0



PARAMETER	SCREENING VALUE +
INORGANIC	
Arsenic	5.2
Barium	40
Beryllium	0.15
Cadmium	0.676
Chromium	52.3
Copper	18.7
Iron	23,000
Lead	35
Mercury	0.13
Nickel	15.9
Zinc	124
ORGANIC	
Aroclor-1254	22.7
Aroclor-1260	22.7
Dieldrin	0.715
Endosulfan I	6.7
Endrin	12.9
gamma-BHC (lindane)	6.7
Heptachlor	6.5

+ THE SELECTION OF THE NATURE AND EXTENT SCREENING VALUES IS DISCUSSED IN APPENDIX C.

NOTE: ALL ORGANIC CONCENTRATIONS ARE IN µg/kg.
 NOTE: ALL INORGANIC CONCENTRATIONS ARE IN mg/kg.
 NOTE: A FEW SUBSURFACE SEDIMENT SAMPLES WERE COLLECTED. FOR THESE SAMPLES, THE TOP OF THE SAMPLING INTERVAL IS INDICATED IN THE RESULTS BOX.
 NOTE: DUE TO SPACE LIMITATIONS, OTHER SEDIMENT CHEMICAL CONCENTRATIONS ARE SHOWN ON FIGURE 9-7. ALL SEDIMENT CHEMICAL CONCENTRATIONS ARE SHOWN ON A FOLDOUT MAP AT THE END OF THIS CHAPTER.

LEGEND

- ABSB-2(IT) ● SEDIMENT SAMPLE LOCATION IT CORPORATION (1993)
- ABD18 ● SEDIMENT SAMPLE LOCATION BEI (1995)
- ABF15(C) ⊕ SEDIMENT SAMPLE LOCATION BEI (1996)
- ABSS-9 ⊕ SEDIMENT SAMPLE LOCATION B&R ENVIRONMENTAL (1996)

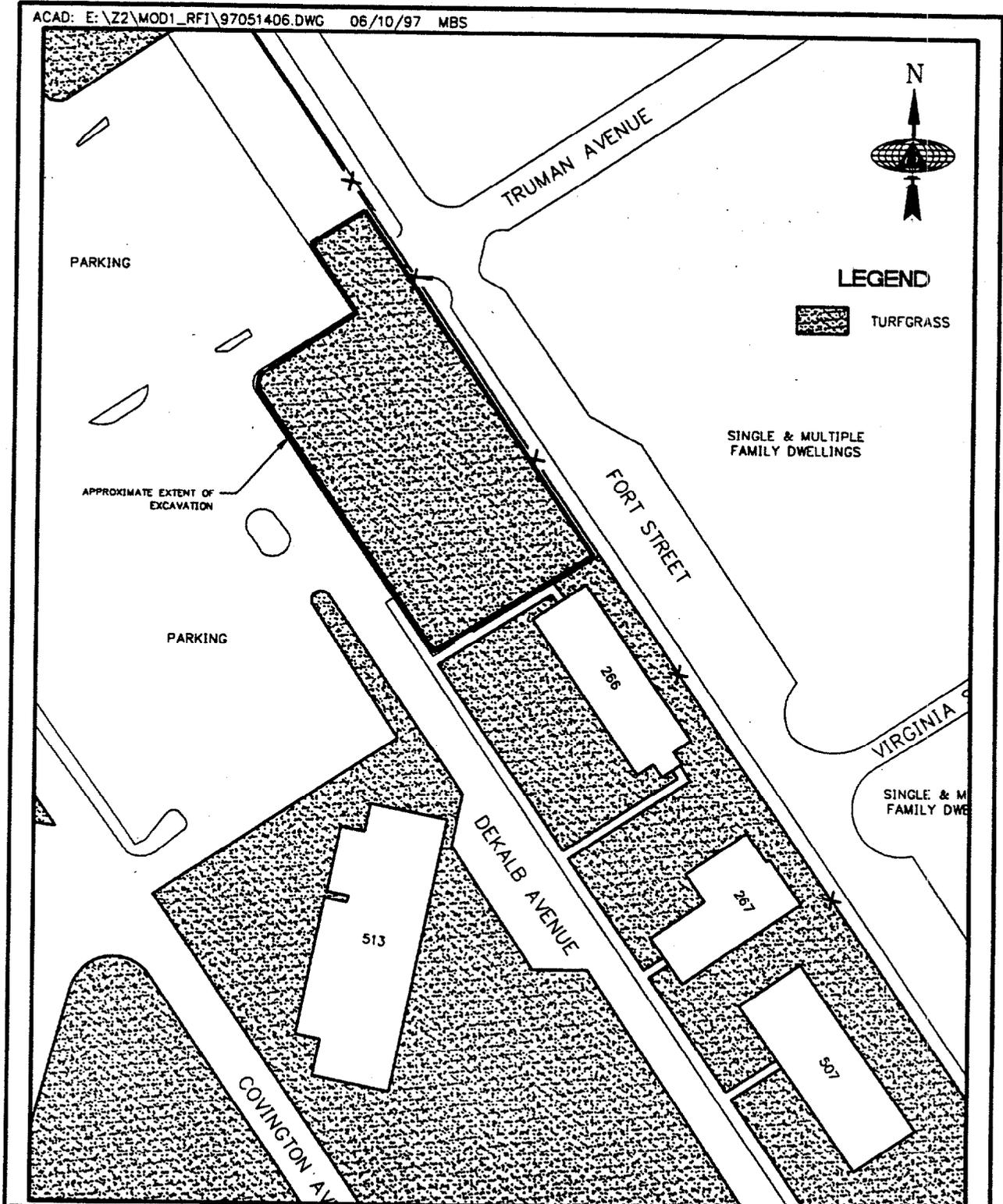
DRAWN BY RBP	DATE ----
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	



DECISION DOCUMENT AND RESPONSIVENESS SUMMARY
 FIGURE 2-11. EASTERN SEDIMENT CHEMICAL CONCENTRATIONS AOC B
 NAVY SOUTHERN DIVISION
 NAS KEY WEST, FLORIDA

CONTRACT NO. 7593	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	REV. 0

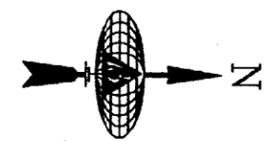
ACAD: E:\Z2\MOD1_RFI\97051406.DWG 06/10/97 MBS



<table border="1"> <tr> <td>DRAWN BY</td> <td>DATE</td> </tr> <tr> <td>RBP</td> <td>----</td> </tr> <tr> <td>CHECKED BY</td> <td>DATE</td> </tr> <tr> <td>COST/SCHED-AREA</td> <td></td> </tr> <tr> <td>SCALE</td> <td></td> </tr> </table>	DRAWN BY	DATE	RBP	----	CHECKED BY	DATE	COST/SCHED-AREA		SCALE			<p align="center">DECISION DOCUMENT AND RESPONSIVENESS SUMMARY</p> <p align="center">FIGURE 2-12. HABITATS AT IR 3 NAVY SOUTHERN DIVISION NAS KEY WEST, FLORIDA</p>	<table border="1"> <tr> <td colspan="2">CONTRACT NO.</td> </tr> <tr> <td colspan="2">7593</td> </tr> <tr> <td>APPROVED BY</td> <td>DATE</td> </tr> <tr> <td>APPROVED BY</td> <td>DATE</td> </tr> <tr> <td>DRAWING NO.</td> <td>REV. 0</td> </tr> </table>	CONTRACT NO.		7593		APPROVED BY	DATE	APPROVED BY	DATE	DRAWING NO.	REV. 0
DRAWN BY	DATE																						
RBP	----																						
CHECKED BY	DATE																						
COST/SCHED-AREA																							
SCALE																							
CONTRACT NO.																							
7593																							
APPROVED BY	DATE																						
APPROVED BY	DATE																						
DRAWING NO.	REV. 0																						

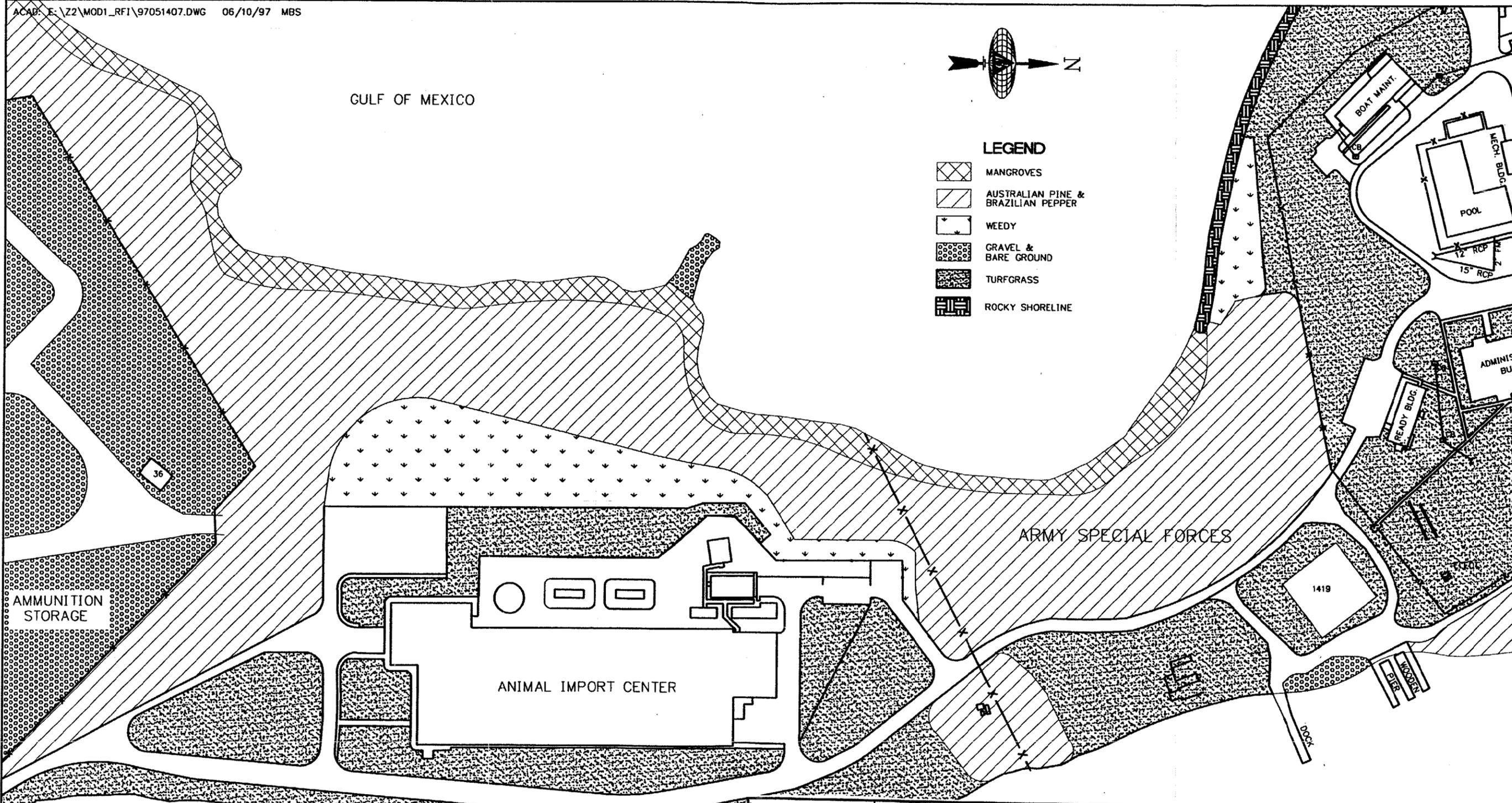
This page intentionally left blank.

ACAD E:\Z2\MOD1_RF1\97051407.DWG 06/10/97 MBS



LEGEND

- MANGROVES
- AUSTRALIAN PINE & BRAZILIAN PEPPER
- WEEDY
- GRAVEL & BARE GROUND
- TURFGRASS
- ROCKY SHORELINE



AMMUNITION STORAGE

ANIMAL IMPORT CENTER

ARMY SPECIAL FORCES

1419

CONTRACT NO.
7593

APPROVED BY _____ DATE _____

APPROVED BY _____ DATE _____

DRAWING NO. _____ REV. 0

DRAWN BY
MDB

DATE
11/12/98

CHECKED BY _____ DATE _____

COST/SCHED-AREA _____

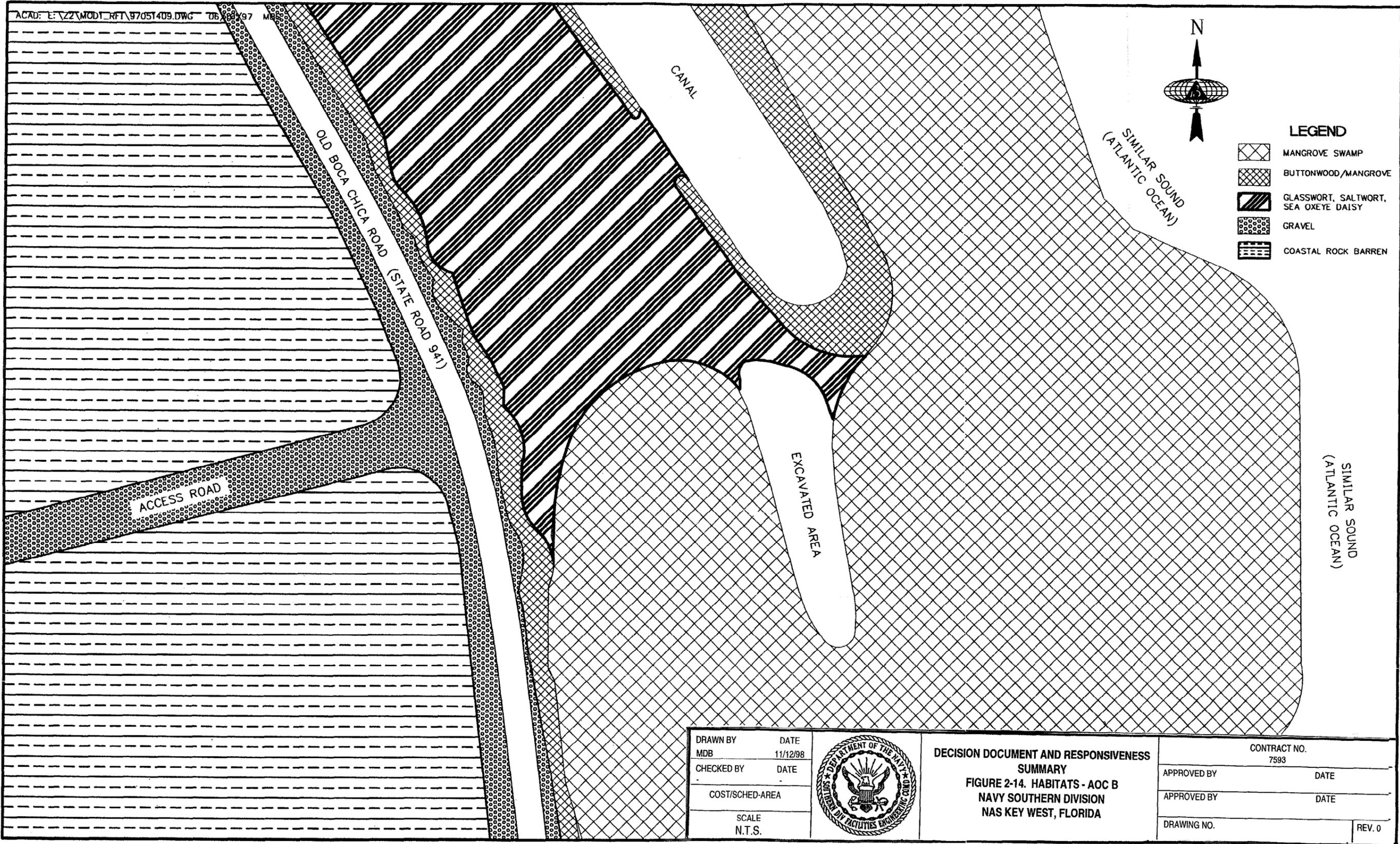
SCALE
N.T.S.



DECISION DOCUMENT AND RESPONSIVENESS SUMMARY
FIGURE 2-13. HABITATS - IR 7
NAVY SOUTHERN DIVISION
NAS KEY WEST, FLORIDA

GULF OF MEXICO

GULF OF MEXICO



DRAWN BY	DATE
MDB	11/12/98
CHECKED BY	DATE
COST/SCHED-AREA	
SCALE	
N.T.S.	



DECISION DOCUMENT AND RESPONSIVENESS SUMMARY
FIGURE 2-14. HABITATS - AOC B
NAVY SOUTHERN DIVISION
NAS KEY WEST, FLORIDA

CONTRACT NO. 7593	
APPROVED BY	DATE
APPROVED BY	DATE
DRAWING NO.	REV. 0

Response to Public Comment 2:

The Navy will consider using trees or other flora as long as it does not interfere with the goal of mitigating potential risks to human health.

Public Comment 3:

Do the remaining chemicals at site IR 3 pose a risk to nearby residents [at Bahama Village]?

Response to Public Comment 3:

The Navy's investigation did not find any evidence of migration for any of the chemicals of concern detected at IR 3. The pesticides were detected above levels of concern only in the soil on Navy property. An analysis of groundwater conditions at IR 3 and Bahama Village did not indicate any migration of chemicals from IR 3. Thus, the Navy's investigation did not find any evidence that site IR 3 has posed a risk to the nearby residents.

Public Comment 4:

Did the recent hurricane [Georges] damage these sites?

Response to Public Comment 4:

Navy personnel have visually inspected sites IR 3, IR 7, and AOC B after Hurricane Georges passed through Key West. The personnel observed no evidence of erosion, scouring, or any other damage to these sites caused by the hurricane.

Public Comment 5:

What will the monitoring entail?

Response to Public Comment 5:

Groundwater monitoring will be performed at site IR 7. A groundwater monitoring plan will be developed and implemented for this site. The monitoring plan will provide the details regarding the locations of the wells to be sampled and the sampling frequency. LUCIPs will be developed for all three sites. The

REFERENCES

BEI (Bechtel Environmental, Inc.), 1998. Project Completion Report, prepared for Department of the Navy, Southern Division, Naval Facilities Engineering Command, Oak Ridge, Tennessee.

B&R Environmental (Brown & Root Environmental), 1998. Supplemental RCRA Facility Investigation and Remedial Investigation Report for NAS Key West Eight States. Prepared for Department of Navy, Southern Division, Naval Facilities Engineering Command, Key West, Florida, Revision 2, January.

IT (IT Corporation), 1994. RCRA Facility Investigation/Remedial Investigation, Final Report, NAS Key West, Boca Raton, Florida, prepared for SOUTHNAVFACENGCOM, Tampa, Florida, June.

Tetra Tech NUS, Inc. (formerly B&R Environmental), 1998. Proposed Plan for IR 3 Truman Annex DDT Mixing Area. Prepared for Department of Navy, Southern Division, Naval Facilities Engineering Command, Key West, November.

Tetra Tech NUS, Inc. (formerly B&R Environmental), 1998. Proposed Plan for IR 7 Fleming Key North Landfill. Prepared for Department of Navy, Southern Division, Naval Facilities Engineering Command, Key West, November.

Tetra Tech NUS, Inc. (formerly B&R Environmental), 1998. Proposed Plan for AOC B Big Coppitt Key Abandoned Civilian Disposal Area. Prepared for Department of Navy, Southern Division, Naval Facilities Engineering Command, Key West, November.

REFERENCES

B&R Environmental (Brown & Root Environmental), 1998. Supplemental RCRA Facility Investigation and Remedial Investigation Report for NAS Key West Eight States. Prepared for Department of Navy, Southern Division, Naval Facilities Engineering Command, Key West, Florida, Revision 2, January.

Tetra Tech NUS, Inc. (formerly B&R Environmental), 1998. Proposed Plan for IR 3 Truman Annex DDT Mixing Area. Prepared for Department of Navy, Southern Division, Naval Facilities Engineering Command, Key West, November.

Tetra Tech NUS, Inc. (formerly B&R Environmental), 1998. Proposed Plan for IR 7 Fleming Key North Landfill. Prepared for Department of Navy, Southern Division, Naval Facilities Engineering Command, Key West, November.

Tetra Tech NUS, Inc. (formerly B&R Environmental), 1998. Proposed Plan for AOC B Big Coppitt Key Abandoned Civilian Disposal Area. Prepared for Department of Navy, Southern Division, Naval Facilities Engineering Command, Key West, November.

IT 1994 (RFI/RI Report)

BEI 1998 (Project Completion Report)

APPENDIX A

RESPONSIVENESS SUMMARY

APPENDIX A. RESPONSIVENESS SUMMARY

The selected remedies addressed by this decision document are:

Asphalt cap with land-use controls for IR 3

Groundwater monitoring with land-use controls for IR 7

Land-use controls for AOC B

No written comments, concerns, or questions were received by the Navy, EPA, or the State of Florida during the public comment period from October 18, 1998 to December 18, 1998. A public meeting was held on November 16, 1998 to present the Proposed Plans for IR 3, IR 7, and AOC B, and to answer any questions from the public on the Proposed Plans and on the documents in the Information Repository. A 30-minute presentation was provided during which informal questions were addressed. A period was set aside for formal questions. No formal questions were asked during the meeting. The following is a summary of the informal questions that were asked at the public meeting.

Public Comment 1:

Is there a better way to remediate site IR 3?

Response to Public Comment 1:

The NAS Key West Partnering Team (composed of decision-makers from EPA, FDEP and the Navy) considered several alternatives for this site. The Partnering Team chose an asphalt cap as the preferred remedy for many reasons, including the fact that a cap will effectively mitigate the potential human health risk concerns posed by the remaining chemicals detected in the soil. Analysis of the data obtained at site IR 3 indicate a potential risk only to personnel who work or trespass at the site. The asphalt cap can also provide the Navy with some much-needed parking as well.

Public Comment 2:

Can the Navy use a more aesthetically-pleasing cap, such as grass or trees at site IR 3?

Response to Public Comment 2:

The Navy will consider using trees or other flora as long as it does not interfere with the goal of mitigating potential risks to human health.

Public Comment 3:

Do the remaining chemicals at site IR 3 pose a risk to nearby residents [at Bahama Village]?

Response to Public Comment 3:

The Navy's investigation did not find any evidence of migration for any of the chemicals of concern detected at IR 3. The pesticides were detected above levels of concern only in the soil on Navy property. An analysis of groundwater conditions at IR 3 and Bahama Village did not indicate any migration of chemicals from IR 7. Thus, the Navy's investigation did not find any evidence that site IR 3 has posed a risk to the nearby residents.

Public Comment 4:

Did the recent hurricane [Georges] damage these sites?

Response to Public Comment 4:

Navy personnel have visually inspected sites IR 3, IR 7, and AOC B after Hurricane Georges passed through Key West. The personnel observed no evidence of erosion, scouring, or any other damage to these sites caused by the hurricane.

Public Comment 5:

What will the monitoring entail?

Response to Public Comment 5:

Groundwater monitoring will be performed at site IR 7. A groundwater monitoring plan will be developed and implemented for this site. The monitoring plan will provide the details regarding the locations of the wells to be sampled and the sampling frequency. LUCIPs will be developed for all three sites. The

LUCIPs will provide information regarding the implementation and follow-up activities that will occur to support the controls at each site.

APPENDIX B

**APPLICABLE OR RELEVANT AND
APPROPRIATE REQUIREMENTS**

|

TABLE B-1
POTENTIAL ARARs AND TBCs
SELECTED REMEDIES FOR IR 3, IR 7, AND AOC B
NAVAL AIR STATION KEY WEST
KEY WEST, FLORIDA
PAGE 1 OF 2

Chemical-Specific Requirements	Rationale
Clean Water Act (33 USC 1251-1376) Federal Ambient Water Quality Criteria (AWQCs) (40 CFR Part 50)	Surface-water and fish samples have shown contamination. Selected remedies may result in surface-water discharges that could further impact aquatic life.
Threshold Limit Values, American Conference of Government Industrial Hygienists	
Benchmark Toxicity Values (USEPA Region III, 1995b) Oak Ridge National Laboratory Benchmark Toxicity Values (Will and Suter, 1994)	The selected remedies may be driven by reducing chemical concentrations in the soils at each site to meet published levels.
FDEP Soil Cleanup Goals (FDEP, 1995a and 1996)	
FDEP Sediment Quality Guideline (FDEP, 1994)	
USEPA Region IV Sediment Screening Values (EPA, 1995c) Federal Sediment Quality Screening Criteria (EPA, 1996a) USEPA Sediment Quality Benchmark (EPA, 1996a)	The selected remedies may be driven by reducing chemical concentrations in the sediments at IR7 and AOC B to meet published levels.
Florida Surface Water Quality Standards (Chapter 62-302 F.A.C.) USEPA Region IV Chronic Surface Water Screening Values (EPA, 1995c) National Ambient Water Quality Standards USEPA Region III Marine Standards (EPA, 1995b) USEPA Region III Fresh Water Standards (EPA, 1995b)	
Location-Specific Requirements	Rationale
Federal Protection of Wetlands Executive Order (E.O. 11990)	Wetland areas at IR7 and AOC B may have chemical contamination and may be affected by the selected remedies.
Endangered Species Act of 1978 (16 USC 1531) (40 CFR 502)	There are endangered and threatened species at NAS Key West.
Fish and Wildlife Coordination Act of 1980 (16 USC 661) Fish and Wildlife Conservation Act (16 USC 2901) Fish and Wildlife Improvement Act of 1978 (16 USC 742a)	The selected remedies at IR7 and AOC B may affect fish and wildlife habitat.
Florida Surface Waters of the State (Chapter 62-301 F.A.C.)	
Florida Delineation of Landward extent of Wetlands and Surface Waters (Chapter 62-340 F.A.C.)	Provides designation of landward extent of surface waters in the state.
Florida Delineation of Landward extent of Wetlands and Surface Waters (Chapter 62-340 F.A.C.)	Provides the delineation methodology of the extent of wetlands.
Florida Ground Water Classes, Standards, and Exemptions (Chapter 62-520 F.A.C.)	Provides designation criteria for the groundwater classes in the state.

TABLE B-1
POTENTIAL ARARs AND TBCs
SELECTED REMEDIES FOR IR 3, IR 7, AND AOC B
NAVAL AIR STATION KEY WEST
KEY WEST, FLORIDA
PAGE 2 OF 2

Action-Specific Requirements	Rationale
Brownsfield Cleanup Criteria Rule (Chapter 62-785 F.A.C.)	The selected remedy at IR3 will involve the use of "engineering controls", such as permanent cover material that prevent human exposure and limit water infiltration. The selected remedy at IR7 will involve the use of groundwater monitoring to determine the effectiveness of a landfill cover.
National Environmental Policy Act	Requires consideration of environmental effects due to Federal actions.
Clean Water Act (40 CFR Part 122) National Pollutant Discharge Elimination System (NPDES)	The selected remedy may involve discharge to surface waters.
Clean Air Act (42 USC 7401), NAAQS (40 CFR Parts 50 and 53), NESHAPs (40 CFR Part 61) and NSPS (40 CFR Part 60)	Treatment technologies for emissions to air (incineration, surface impoundments, waste piles landfills, and sources of fugitive emissions).
Occupational Safety and Health Act (29 USC 651-678)	Regulates worker health and safety.
Florida Hazardous Waste (Chapter 62-730 F.A.C.)	Applicable to additional remedial actions that may handle and/or transport hazardous waste.
Land Use Restrictions at Environmental Remediation Sites on Board U.S. Navy Installations (CNBJAXINST 5090.2N4)	Establishes a systematic program to govern land use at environmental remediation sites at U.S. Navy Installations.