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NAS KEY WEST  
5090.3a

FINAL RESOURCE CONSERVATION AND RECOVERY ACT FACILITY  
INVESTIGATION/REMEDIAL INVESTIGATION WORK PLAN AT TWELVE SITES NAS KEY  
WEST FL  
3/1/1993  
IT CORPORATION

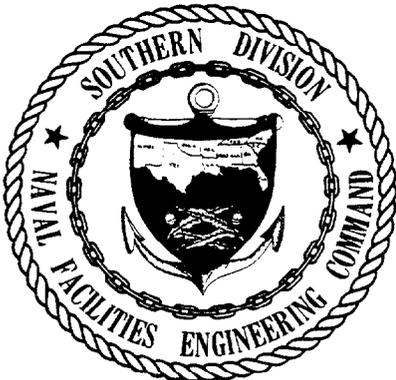


**FINAL**

**RFI/RI  
WORK PLAN  
12 SITES  
MARCH, 1993**

**NAVAL AIR STATION - KEY WEST  
KEY WEST, FLORIDA  
CONTRACT NO. N62467-88-C-0196**

Prepared by:  
IT CORPORATION  
8600 HIDDEN RIVER PARKWAY  
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TAMPA, FLORIDA 33637



Southern Division  
Naval Facilities Engineering  
Command, Charleston, S.C.  
29411-0068

# Memorandum

To: Mike Jones/Shari Bartolloti Date: April 14, 1993

From: *MS* *MS*  
Mike Sturdevant/Melissa Smith

Subject: **Health and Safety Plan Addendum No. 2, IT Project No. 422028**

This memo serves as an addendum to the Health & Safety Plan for NAS Key West. This addendum provides the safety guidelines for personnel that will remain onsite without a buddy, conducting the tidal monitoring activities.

There are no known chemical hazards associated with this activity and physical hazards are limited to the slip, trip and fall hazards. A tailgate safety meeting will be conducted each morning via telephone with the FOC in the Tampa office.

The field personnel assigned to perform this activity will be supplied with a mobile phone in their rental vehicle and will be in communication a minimum of twice a day with the Tampa office. In addition daily contact will be made with Ms. Diane Lancaster, PWC NAS-Key West at 293-2911 or her designee.

cc: Duane Truitt  
Cliff Vaughan  
Central Files

*FAT*  
*to*

*305 293-2542*

*during week - call Doreen Hathaway at 293-2194  
on weekends, call OOD. State you are mustering (per  
conversation between Diane Lancaster and Chief Reeves  
on 15 Apr 93.) Phone 293-2268.*

**WORK PLANS  
RCRA FACILITY INVESTIGATION  
REMEDIAL INVESTIGATION  
NAVAL AIR STATION - KEY WEST  
KEY WEST, FLORIDA**

**PREPARED FOR**

**SOUTHERN DIVISION  
NAVAL FACILITIES ENGINEERING COMMAND  
CHARLESTON, SOUTH CAROLINA  
CONTRACT NO. N62467-88-C-0196**

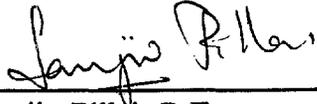
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**IT PROJECT NO. 595392  
MARCH 1993  
REVISION 1**

This document was prepared on behalf of Naval Air Station-Key West by IT Corporation, Tampa, Florida.

Prepared by:



Sanjiv Pillai, P.E.  
Project Engineer

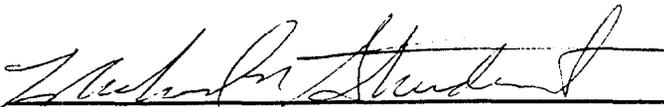
Date: 3/10/93

Reviewed by:



Michael J. Jones, P.E.  
Task Manager

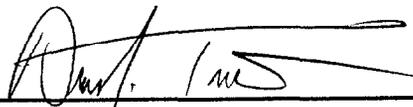
Date: 3/10/93



Michael Sturdevant  
Project Manager

Date: 3/10/93

Approved:



Duane J. Truitt, P.E.  
General Manager

Date: 3/10/93

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## **1.0 Introduction**

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This Work Plan is prepared by IT Corporation (IT) to present site background and investigative methods for the Resource Conservation and Recovery Act (RCRA) Facilities Investigation (RFI) and Remedial Investigation (RI) to be conducted at the Naval Air Station (NAS) Key West. This plan was developed based on site visits, meetings and discussions with Environmental Protection Agency (EPA), the Southern Division Naval Facility Engineering Command (SouthDiv), NAS-Key West personnel, along with the information gathered from the Phase I work conducted at several Installation Restoration (IR) sites by IT.

### **1.1 Historical Perspective**

The Hazardous and Solid Waste Amendments (HSWA) permit (No. H044-144053) issued to NAS-Key West on August 30, 1990 identified six Solid Waste Management Units (SWMUs) requiring a RFI. Three of these SWMUs were also identified as IR sites at that time. The three IR/SWMUs and five other IR sites were investigated under a Phase I Remedial Investigation performed at NAS-Key West from May 1990 to December 1990 by IT.

This work plan has been developed for the six SWMUs with the understanding that three of the six SWMUs have already undergone extensive investigation as part of the IR Phase I Remedial Investigation effort. Hence, the stages of work required to characterize the two sets of SWMUs will be different. In addition, IR sites not identified as SWMUs will require Phase II work and are included in this Work Plan. Finally, two additional sites (Big Coppitt Key and Demolition Key) are also included for initial Phase I Remedial Investigation work. A total of 12 sites that are in various stages of investigation are included in this Work Plan.

### **1.2 Work Plan Approach**

IT's approach for the work plan is to differentiate the 12 sites (SWMU, IR, and new sites) into groups that represent the stage of work required for the sites to be investigated. The following represents the categorization of the sites.

- Stage 1 - Sites requiring an RFI
  - SWMU No. 4 - AIMD Building A-980

- SWMU No. 5 - AIMD Building A-990
- SWMU No. 7 - Building A-824
- Stage 2 - Sites requiring additional RFI work
  - SWMU No. 1 - Boca Chica Open Disposal Area
  - SWMU No. 2 - Boca Chica DDT Mixing Area
  - SWMU No. 3 - Boca Chica Fire Fighting Training Area
- Stage 3 - Sites requiring Phase II Remedial Investigations
  - IR Site No. 1 - Truman Annex Refuse Disposal Area
  - IR Site No. 3 - Truman Annex DDT Mixing Area
  - IR Site No. 7 - Fleming Key North Landfill
  - IR Site No. 8 - Fleming Key South Landfill
- Stage 4 - Sites requiring Phase I Remedial Investigations
  - Big Coppitt Key - Abandoned Civilian Disposal Area
  - Demolition Key - Open Disposal Area

The following sections describe the approaches, and the techniques to be used to conduct the various investigations for the 12 sites in question. These Work Plans present site background, environmental setting, existing data, scope of work for the RFI, RI, project management plans, and data management plans. The Health and Safety Plan (HSP, under separate cover) identifies aspects of IT's Health and Safety Program relating to the NAS-Key West sites, and identifies the specific hazards expected to be encountered at NAS-Key West. The Sampling and Analysis Plan (SAP, under separate cover) presents the Quality Assurance Project Plan (QAPP) for ITAS-Knoxville, which is the laboratory performing the analytical work, and the field sampling procedures to be utilized by IT personnel performing the NAS-Key West field work.

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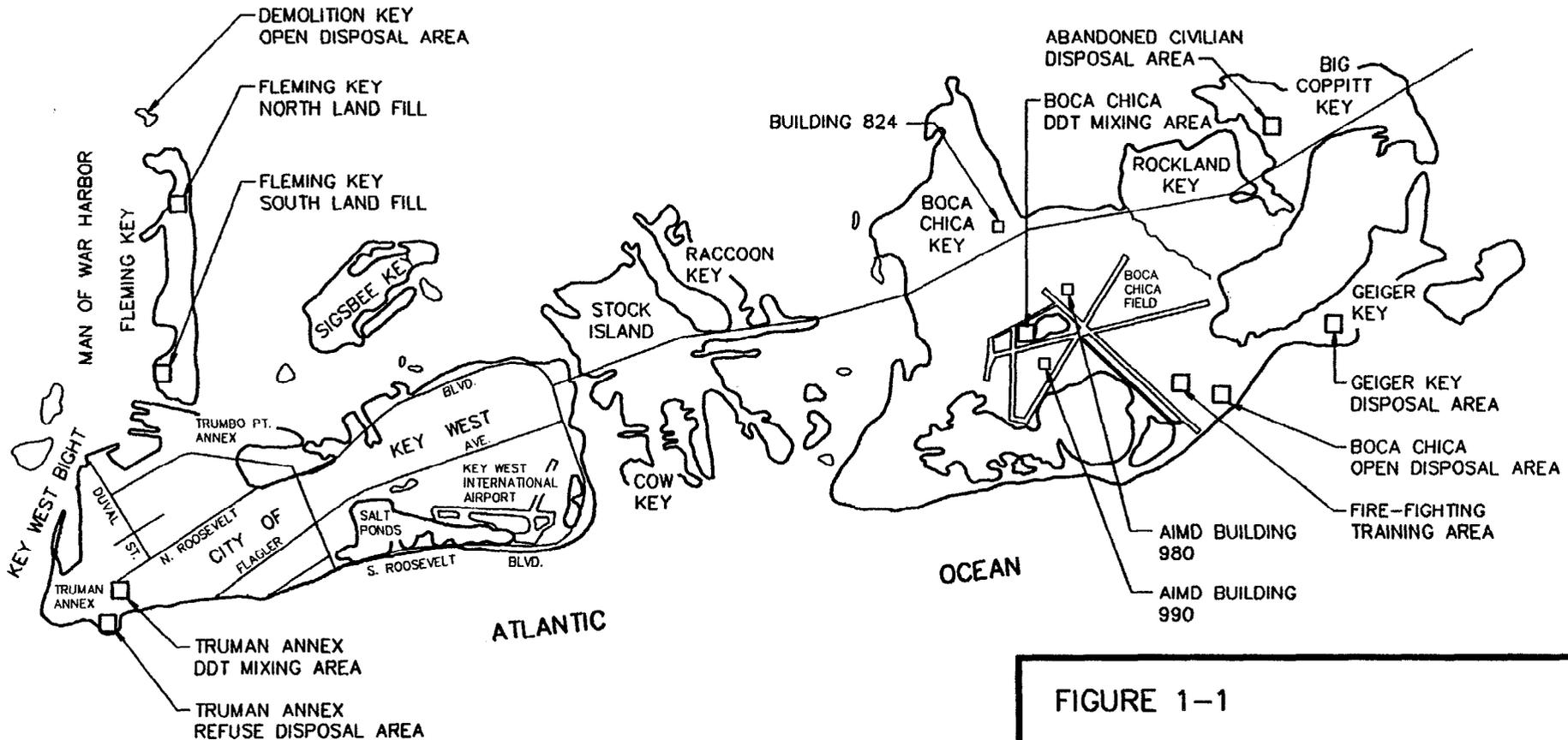


FIGURE 1-1  
 LOCATION OF NAVAL ACTIVITIES  
 AND STUDY SITES  
 NAS - KEY WEST  
 KEY WEST, FLORIDA  
 Prepared for:  
 NAS - KEY WEST  
 KEY WEST, FLORIDA



NOT TO SCALE

SOURCES: 1) FREDERICK H. HILDERBRANDT, INC.  
 ENGINEERS-SURVEYORS-PLANNERS  
 15321 S. DIXIE HWY., SUITE 202  
 MIAMI, FLORIDA 33157  
 2) GERAGHTY AND MILLER, INC.



## **2.0 Regional Physical Setting**

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This section summarizes the regional physical setting of geology, hydrogeology, and biology at Key West, Florida. Information was obtained from a review of available data, the results of the on-site visits, interviews with current and retired NAS-Key West employees, military personnel, past contractors, and work IT conducted during the Phase I Remedial Investigation study.

### **2.1 Location**

NAS-Key West is located approximately 150 miles southwest of Miami on the second to last and last major islands of the Florida Keys. It is connected to the mainland by the Overseas Highway (US Highway No. 1). A regional map showing the Florida Keys is presented in Figure 2-1. Tourism is currently the primary industry in the Key West area. Visitors are attracted by the tropical climate and island setting. Fishing is the second most important industry with shrimping accounting for half the total catch recorded.

### **2.2 Climate**

Key West has an average annual temperature of 77°F. The temperature difference between summer and winter is 14°F. The nearness of the Gulf Stream combined with the effects of the Gulf of Mexico tend to mitigate advancing cold fronts. Easterly tradewinds and sea breezes suppress the summer heat during the months of June through September.

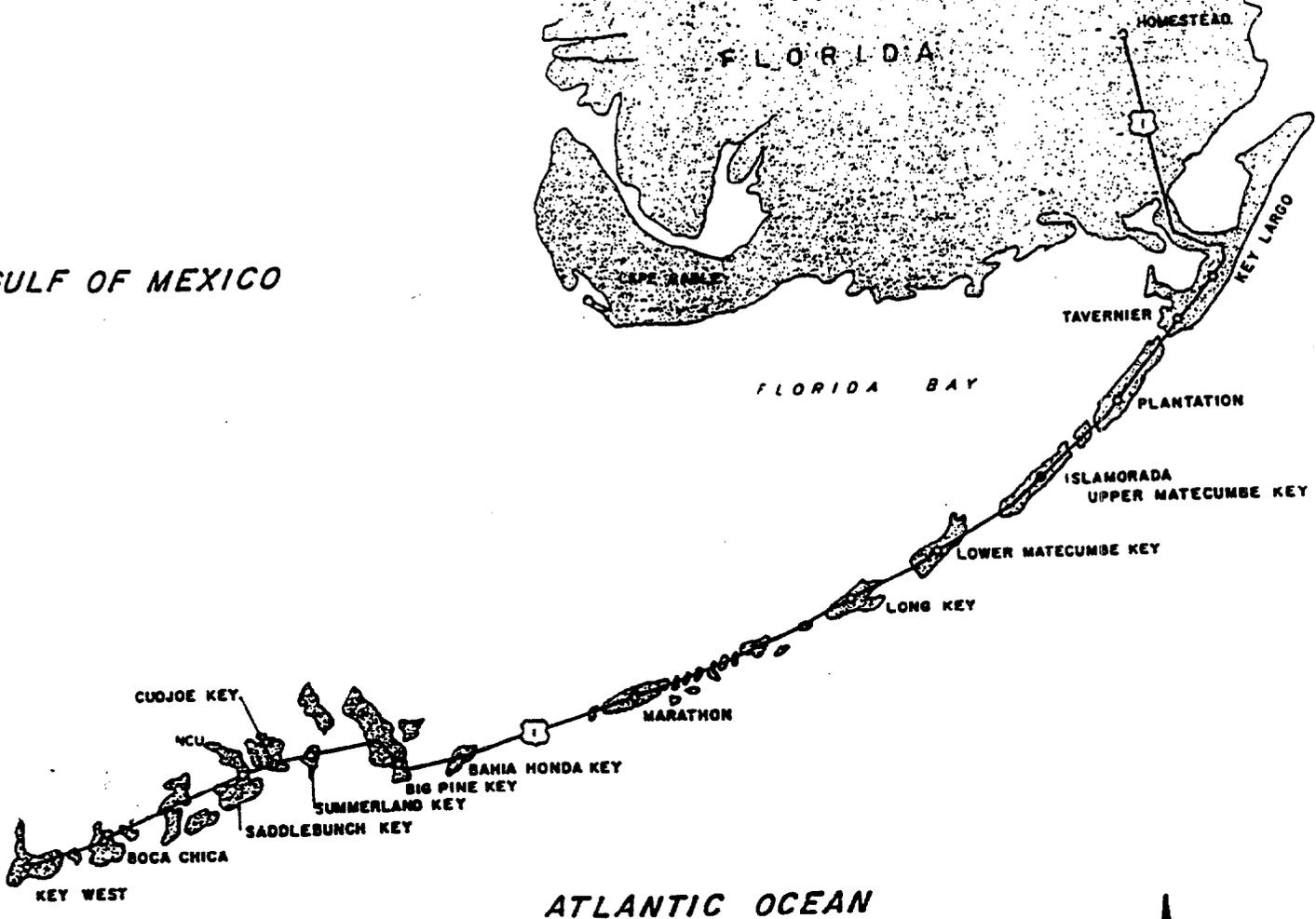
Hurricanes normally form in the warm moist air over the tropical sea areas around the Lesser Antilles and occasionally in the Caribbean. They tend to move in a westerly to north-westerly direction gradually turning northward and eastward. The majority of hurricanes approach Key West from the south and east with their effects being felt on the south, east and west sides of the island; however, severe hurricanes have struck Key West from all directions. It is estimated that 75 percent of all damage that occurs during a hurricane is from tidal flooding.

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ATLANTIC OCEAN

FIGURE 2-1  
REGIONAL MAP  
FLORIDA KEYS

Prepared for:  
NAS—KEY WEST  
KEY WEST, FL

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During the period of December through April, the Keys receive approximately 25 percent of the total annual precipitation, which, over the years, have averaged approximately 40 inches. The bulk of the annual rainfall, approximately 53 percent, falls in the period of June through October.

Rainfall runoff from Key West is carried to the tidal waters by overland flow or storm drains that cover approximately 50 percent of the island; however, much of the rainfall percolates directly into the subsurface.

### ***2.3 Biological Factors***

The Key West Naval Complex includes some areas that are completely developed while other areas such as portions of Boca Chica, Saddlebunch, and Demolition Island are mostly cleared land. Around the periphery of these islands are mangrove communities and salt marshes in intertidal areas, grading into marine grass flats in sub-tidal areas. Areas cleared and left fallow have typically come back with an Australian Pine monoculture or thick cover of other early successional (i.e., Brazilian Pepper Trees).

In Florida there are 68 animal species considered endangered or threatened by either the United States Fish and Wildlife Service (US FWS) or the Florida Game and Freshwater Fish Commission (FGFFC). Sixteen of these species have ranges that potentially overlap NAS-Key West. The list includes: the Key Silverside Fish, American Crocodile, Leatherback Turtles, Key Mud Turtles, Green Turtles, Kemp's Ridley Turtles, Hawksbill Turtles, Loggerhead Turtles, Eastern Brown Pelican, Bald Eagle, Least Tern, White-Crowned Pigeons, West Indian Manatee, Silver Rice Rat, Stock Island Tree Snail, and the Keys Rabbit.

There are approximately 325 plants listed as either endangered or threatened by the Florida Department of Agriculture. Of these, only seven now occur in the Key West area. The list includes: the Golden Leather Fern, Tree Cactus, Silver Thatch and Coconut Palms, Manchineel Tree, Florida Thatch Palm, and the Brittle Thatch Palm. The tree cactus was recently designated an endangered species by the US FWS.

## **2.4 Hydrogeology/Geology**

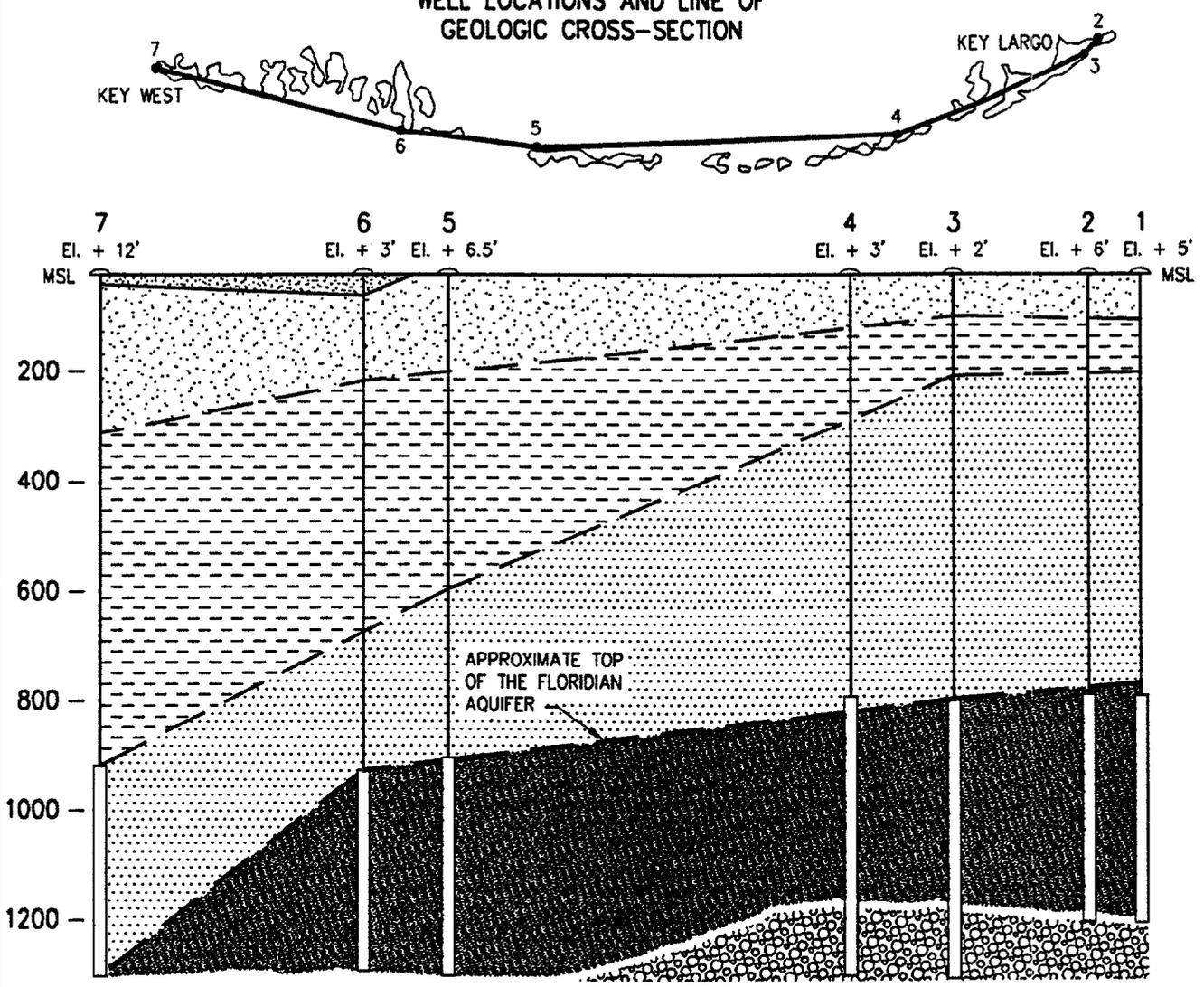
The Florida Keys were created through eustatic elevation of limestone rock units. All of the Lower Keys are composed of Miami Oolite, which consists of calcium carbonate and tiny ooloids or spherical calcareous grains. Key Largo Limestone underlies the Miami Oolite on all the Lower Keys. It consists of cemented remains of ancient coral reefs, fossils, and shells. The Miami Oolite is approximately 20 feet thick at Key West. It is a porous formation of little use as a groundwater aquifer because of its poor water quality. The underlying Key Largo Limestone is also permeable and yields water but the quality is poor, being close to that of seawater. The Key Largo Limestone is approximately 180 feet thick at Key West. Hydraulic conductivity values obtained from the Phase I RFI Report range from 72 gpd/sq.ft. to 1,024 gpd/sq.ft. Figure 2-2 depicts a geologic cross section of the Florida Keys.

Although the Keys are underlain by highly transmissive limestone aquifers, most groundwater is brackish, saline, or hypersaline. As a result, potable water wells do not exist in the Key West area at the present time. Potable water is obtained by rainwater catchment or imported via the Florida Keys Aqueduct Authority via a 150 mile pipeline from Miami. There are no freshwater public or domestic wells at the NAS-Key West facility. In an earlier investigation conducted by consultants Geraghty and Miller during the summer of 1986, groundwater samples were collected from the various sites at NAS-Key West and analyzed for concentrations of total dissolved solids. Table 2-1 lists the range of total dissolved solids found in groundwater samples collected from the surficial aquifer at the various sites. The samples indicate average concentrations of total dissolved solids in excess of 10,000 mg/l. The State of Florida classifies groundwater in unconfined aquifers which have a total dissolved solids content of 10,000 mg/l or greater as Class G-III, which is non-potable. Hence, the groundwater found at the various sites will be classified as Class G-III.

The areas under investigation in the lower keys are primarily low lying coastal areas. Key West is largely at an elevation of less than 5 feet MSL with sections of the island as high as 15 feet MSL, as shown on the flood zone map, Figure 2-3. The elevations of Boca Chica are less than five feet MSL except for filled areas which underlie the Overseas Highway as depicted in Figure 2-4. Due to the low elevation, the lower keys are subject to major tidal effects.

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 INITIATOR: S. PILLAI PROJ. MGR.: M. HAMPTON  
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WELL LOCATIONS AND LINE OF GEOLOGIC CROSS-SECTION



LEGEND

-  MIAMI OOLITE (PLEISTOCENE)
-  KEY LARGO LIMESTONE (PLEISTOCENE)
-  TAMIAMI LIMESTONE (MIOCENE)
-  HAWTHORNE FORMATION/TAMPA LIMESTONE (MIOCENE)
-  SUWANNEE/AVON PARK LIMESTONE (OLIGOCENE/EOCENE)
-  BOULDER ZONE

FIGURE 2-2

GEOLOGIC CROSS SECTION OF FLORIDA KEYS

Prepared for:  
 NAS - KEY WEST  
 KEY WEST, FLORIDA



SOURCE: DEPARTMENT OF HEALTH, EDUCATION AND WELFARE (1975)

**Table 2-1**  
**Range of Concentrations of Total Dissolved Solids**  
**NAS-Key West**  
**Key West, Florida**

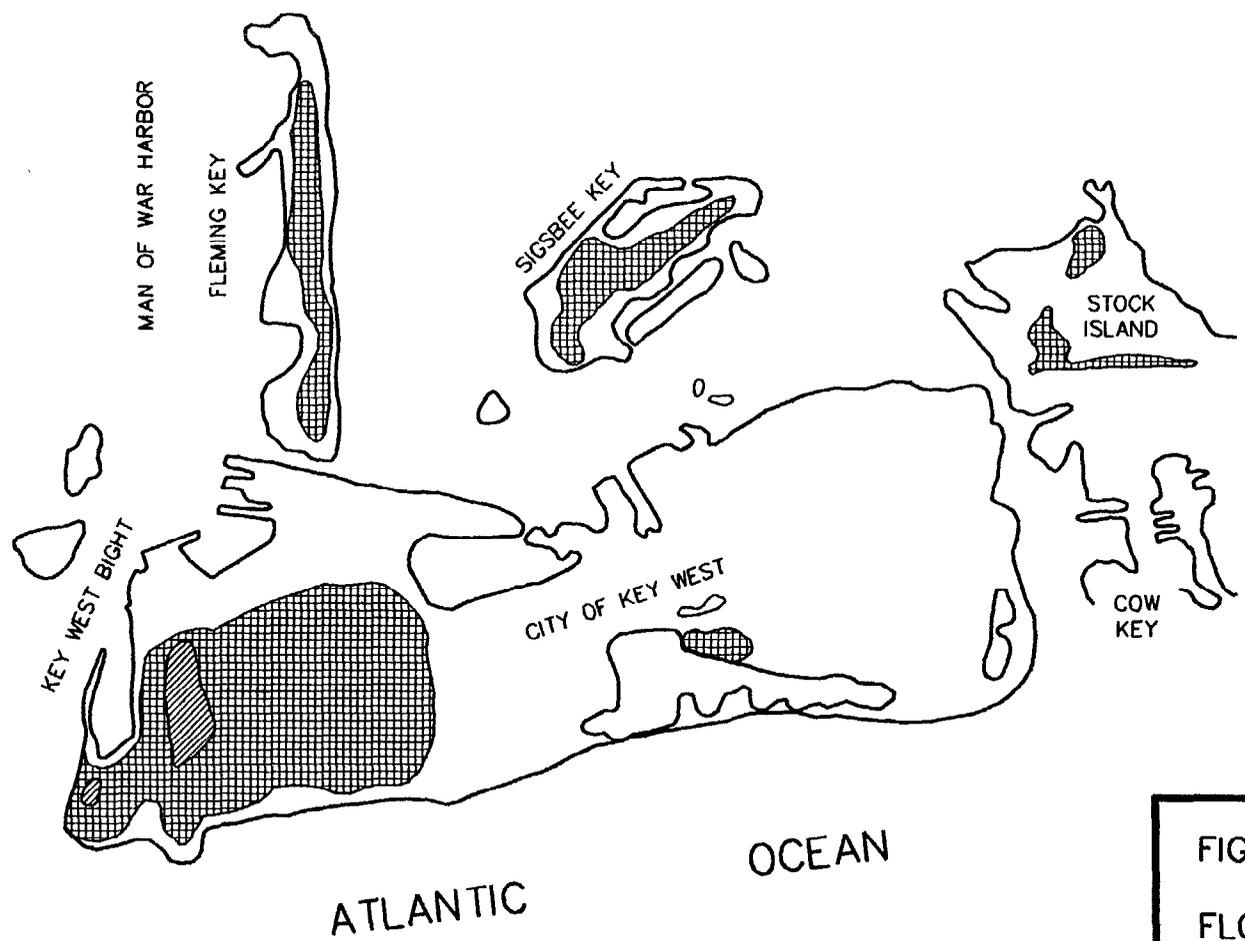
SITE	TDS (mg/l)
Truman Annex Refuse Disposal Area	7,000 - 30,000
Truman Annex DDT Mixing Area	NA
Boca Chica Open Disposal Area	24,000 - 42,000
Fleming Key South Landfill	36,000 - 54,000
Fleming Key South Landfill	15,000 - 43,000
Boca Chica Fire Fighting Training Area	2,200 - 38,000
Boca Chica DDT Mixing Area	NA

**NOTE:**

NA = Not Available

Source: Geraghty & Miller, "Handout for Technical Review Committee Meeting," October 2, 1986, NAS-Key West

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**LEGEND**

-  5' ABOVE MEAN SEA LEVEL
-  10' ABOVE MEAN SEA LEVEL

ALL OTHER AREAS ARE LESS THAN 5 FT. MSL  
 THE 100 YEAR FLOOD PLAIN IS 8 FT. MSL  
 THE 500 YEAR FLOOD PLAIN IS 9 FT. MSL



NOT TO SCALE  
 SOURCE: U.S. NAVY

**FIGURE 2-3**  
**FLOOD ZONE MAP**  
**KEY WEST, FL. & VICINITY**  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**

*Prepared for:*  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**



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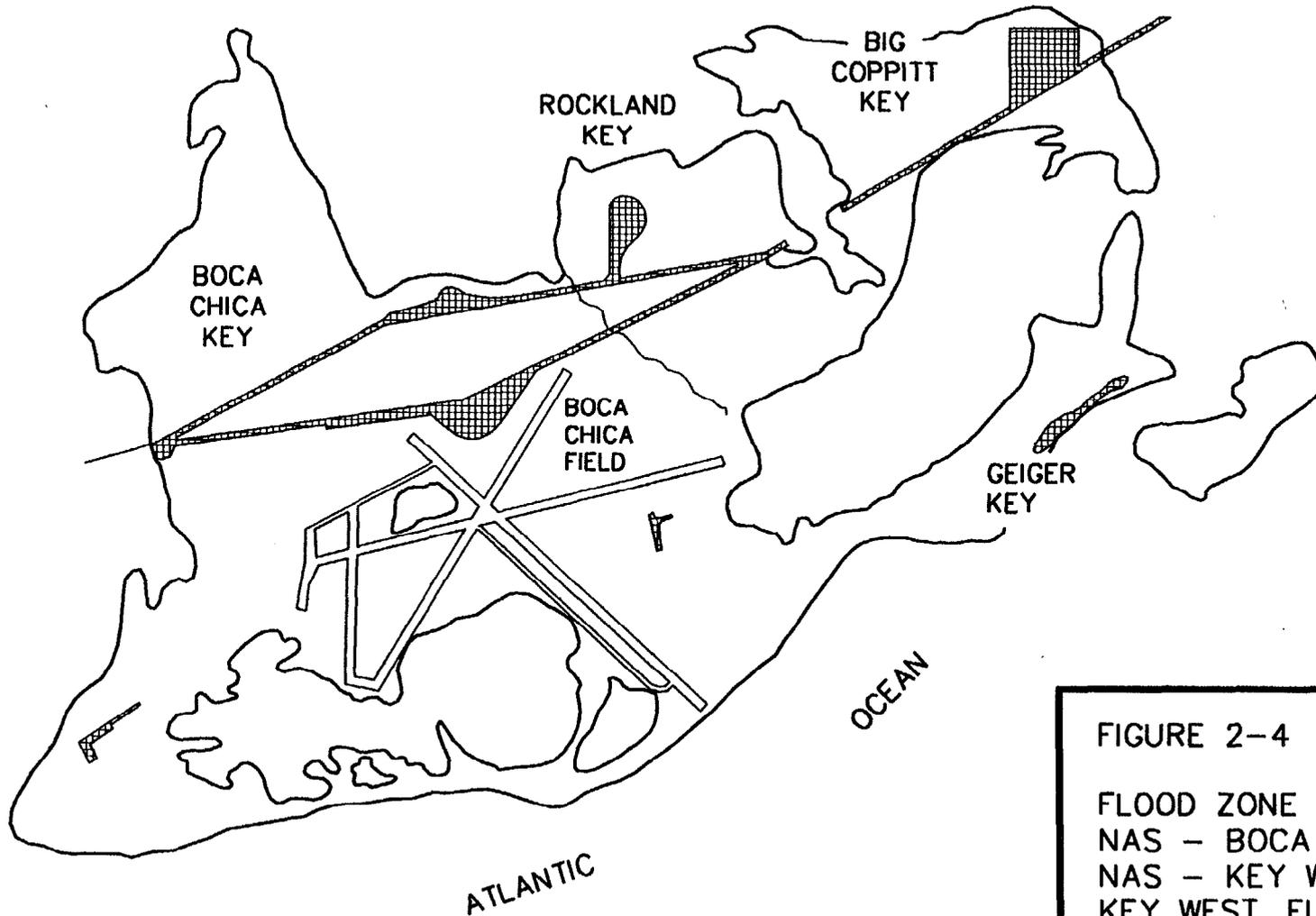


FIGURE 2-4

FLOOD ZONE MAP  
 NAS - BOCA CHICA  
 NAS - KEY WEST  
 KEY WEST, FLORIDA

*Prepared for:*

NAS - KEY WEST  
 KEY WEST, FLORIDA

**LEGEND**



5' ABOVE MEAN SEA LEVEL

ALL OTHER AREAS ARE LESS  
 THAN 5 FT. MSL



NOT TO SCALE

SOURCE: U.S. NAVY



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Soils in Key West are primarily rockland, with some filled areas and mangroves, as shown on the soils map, Figure 2-5. The soils at Boca Chica are also primarily rockland with some filled areas and mangrove swamps as shown in Figure 2-6. Figure 2-7 depicts the land use map of the City of Key West which consists primarily of commercial and residential areas. Boca Chica is used mainly as a military base.

### ***2.5 Surface Water Hydrology***

The surface water regime in the Florida Keys is dominated by the surrounding saltwater bodies, the Atlantic Ocean and the Gulf of Mexico. The Florida Department of Environmental Regulation (FDER) classifies surface water in the Keys as Class III Waters-Recreational-Propagation and Management of Fish and Wildlife. In the immediate area of NAS-Key West are the Great White Heron National Wildlife Refuge and the Key West National Wildlife Refuge, which are classified by FDER as Outstanding Florida Waters and are afforded the highest protection by the State. These waters are considered to be of exceptional recreational and ecological significance to the residents of Florida.

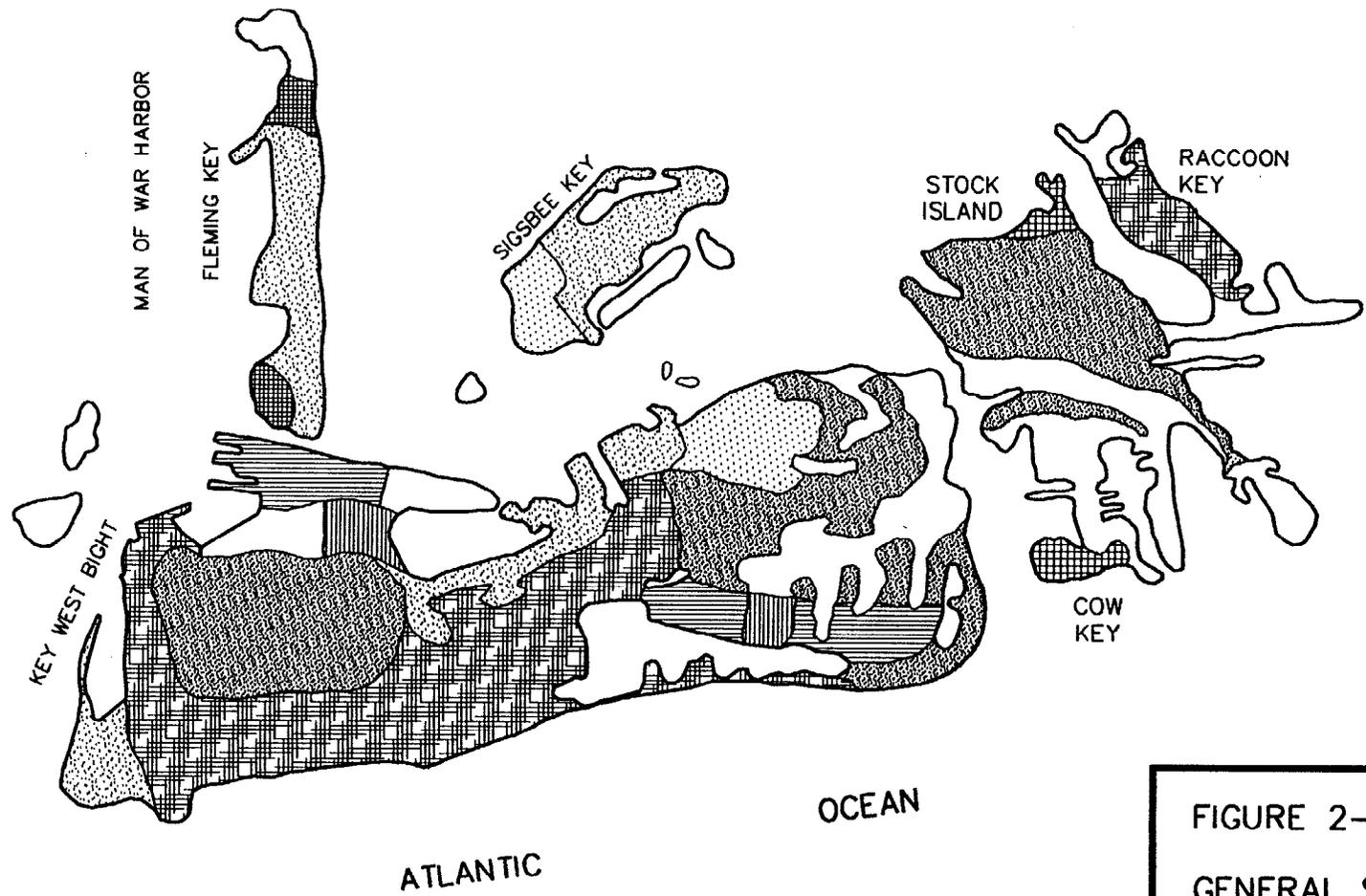
### ***2.6 Migration Potential***

There is a potential for solute migration to surface waters in the Key West area due to the porous nature of Miami Oolite and the underlying Key Largo Limestone. Groundwater under tidal influence flows with relative ease in and out of the aquifer, creating a flushing action for potential solute dispersal into the large volume of tidal waters.

### ***2.7 Potential Contaminant Receiving Body***

The major potential contaminant receiving body of concern is the surface water regime. Common activities in the Key West area waters include commercial and recreational fishing, shell fishing, boating, and swimming. These waters support the richest coral reefs in the continental United States. Any pollution migrating into the surface water could potentially impact activities and marine life in the Key West area waters.

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**LEGEND**

- |  |              |  |                |
|--|--------------|--|----------------|
|  | ROCKLAND     |  | FINE FILL      |
|  | BEACH        |  | SANITARY FILL  |
|  | DEEP FILL    |  | TIDAL FILL     |
|  | MANGROVE     |  | SHALLOW FILL   |
|  | COASTAL DUNE |  | COMPACTED FILL |

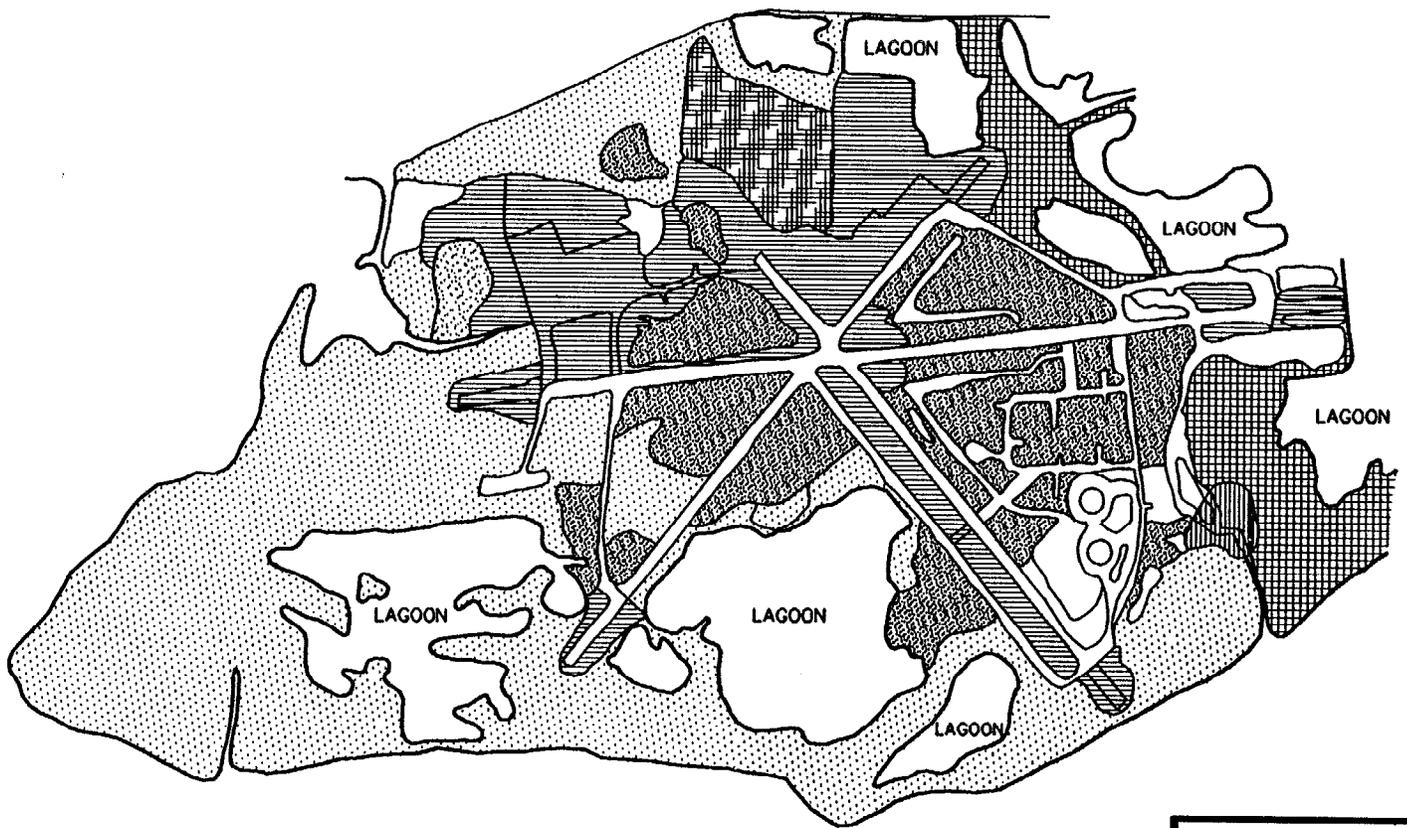


NOT TO SCALE  
SOURCE: (MILO 1967)

**FIGURE 2-5**  
GENERAL SOILS MAP  
KEY WEST, FL. & VICINITY  
NAS - KEY WEST  
KEY WEST, FLORIDA  
*Prepared for:*  
NAS - KEY WEST  
KEY WEST, FLORIDA



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**LEGEND**

-  ROCKLAND
-  MADE LAND, COARSE, DEP
-  COASTAL BEACH, DUNES, WATER
-  SANITARY FILL
-  MANGROVE SWAMP
-  ROCKLAND, TIDAL FLATS
-  MADE LAND, COARSE, OVER ROCK
-  MADE LAND, COMPACTED



NOT TO SCALE  
SOURCE: U.S. NAVY

**FIGURE 2-6**

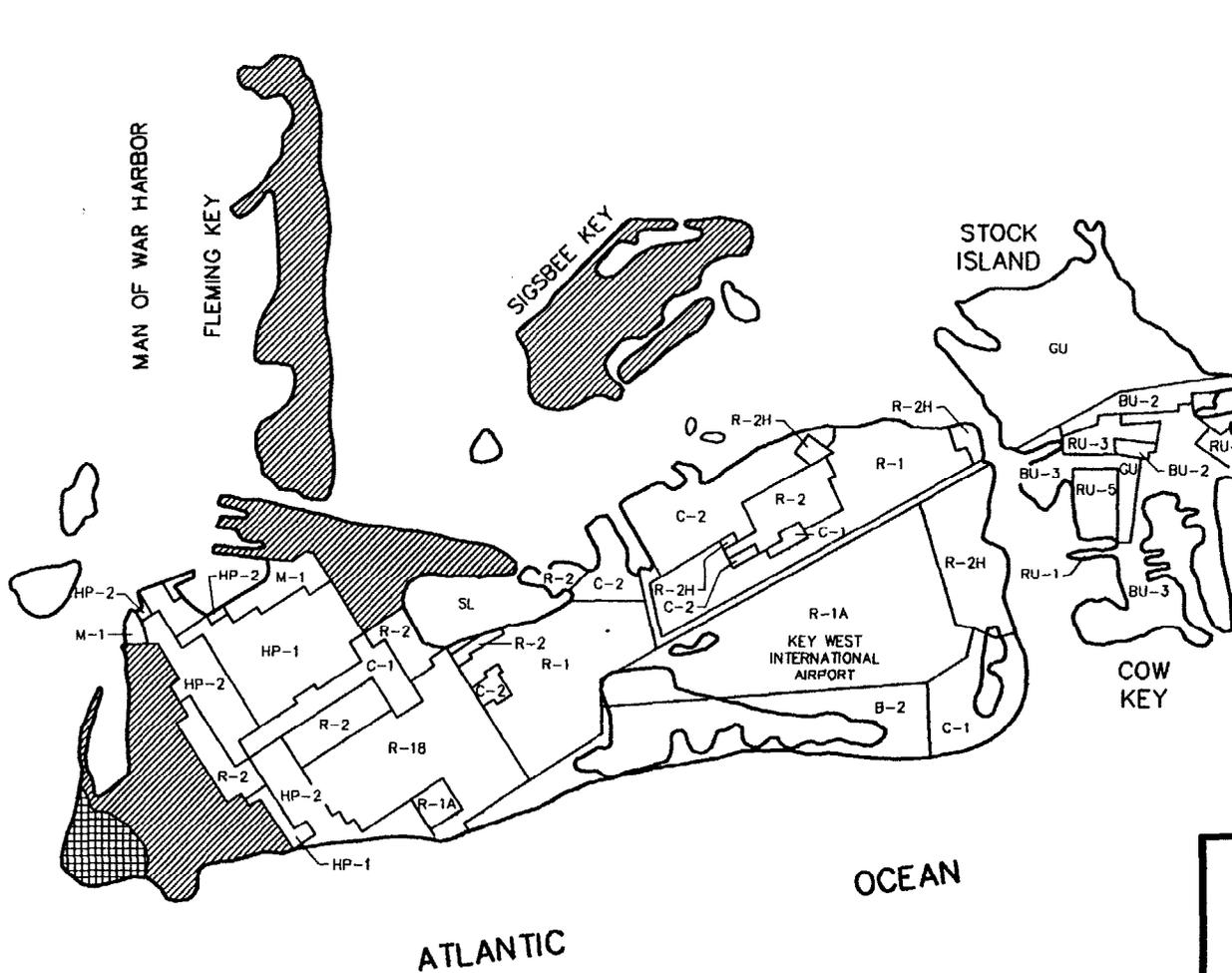
GENERAL SOILS MAP  
NAS - BOCA CHICA  
NAS - KEY WEST  
KEY WEST, FLORIDA

*Prepared for:*

NAS - KEY WEST  
KEY WEST, FLORIDA



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**LEGEND**

- C-1 Neighborhood Commercial District
- C-2 General Commercial Parkway District
- HP-1 Single Two-Family and Multi-Family Structures not to exceed four dwelling units. Restricted historic preservation district
- HP-2 As in HP-1 and in addition commercial historic preservation district
- M-1 Light industrial and warehousing district
- M-2 General industrial district
- R-1A Single family residential district (low density)
- R-1 Single family residential district (medium)
- R-1B Single family residential district (medium)
- R-2 One, two and multiple family dwelling district
- R-2H Large hotel, motel and multiple family district
- SL Submerged Land
- BU-2 Medium business district
- BU-3 Heavy business district
- GU General Use
- RU-1 Single family residential 8,000 square feet minimum lot size
- RU-3 Multiple family residence
- RU-4 Townhouses
- RU-5 Mobile home residential district
-  Navy property
-  State property

FIGURE 2-7

LAND USE MAP  
 CITY OF KEY WEST, FL.  
 NAS - KEY WEST  
 KEY WEST, FLORIDA

Prepared for:  
 NAS - KEY WEST  
 KEY WEST, FLORIDA



NOT TO SCALE  
 SOURCE: U.S. NAVY



### **3.0 Characterization of Solid Waste Management Units**

---

NAS-Key West currently has 12 sites that are in various stages of investigation. The sites contained in Section 3.0 are the Solid Waste Management Units (SWMUs) requiring a RFI or additional RFI work. This section presents the rationale used to separate the sites into stages of work. Stage 1 sites are composed of SWMUs that require a complete RFI in accordance with the HSWA permit (No. H044-144053). Evaluation of information developed during the investigation at these SWMUs will determine future actions.

Stage 2 sites are SWMUs that have already been investigated and conclusions/recommendations for these SWMUs are provided as part of the Phase I - RFI study. However, Stage 2 sites are being investigated further to obtain a more complete delineation of contamination at these sites. The SWMUs are grouped accordingly:

- Stage 1 - Sites requiring a RFI
  - SWMU No. 4 - Aircraft Intermediate Maintenance Department (AIMD) Building A-980
  - SWMU No. 5 - Aircraft Intermediate Maintenance Department (AIMD) Building A-990
  - SWMU No. 7 - Building A-824
- Stage 2 - Sites requiring additional RFI work
  - SWMU No. 1 - Boca Chica Open Disposal Area
  - SWMU No. 2 - Boca Chica DDT Mixing Area
  - SWMU No. 3 - Boca Chica Fire Fighting Training Area

The 6 SWMU sites are identified in the vicinity map shown in Figure 3-1. A description of investigation techniques to be used for this study are discussed in Section 3.1. The specific investigative approaches to be implemented at each of the 6 SWMUs at NAS-Key West are described in Sections 3.2 through 3.3. Conditions encountered in the field may necessitate changes to the specific investigation approaches. The field methods and analytical techniques

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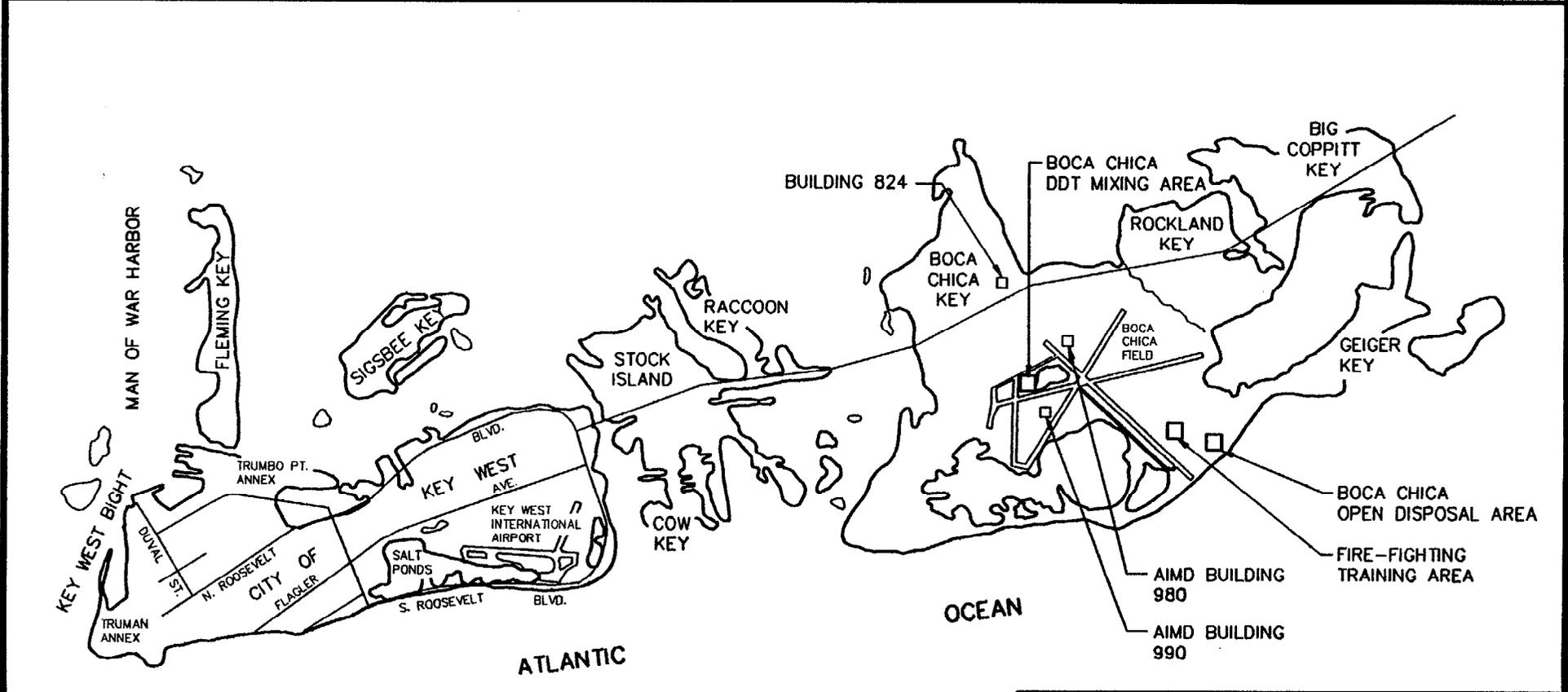


FIGURE 3-1

LOCATION OF NAVAL ACTIVITIES  
AND STUDY SITES  
NAS - KEY WEST  
KEY WEST, FLORIDA

Prepared for:  
NAS - KEY WEST  
KEY WEST, FLORIDA



NOT TO SCALE

SOURCES: 1) FREDERICK H. HILDERBRANDT, INC.  
ENGINEERS-SURVEYORS-PLANNERS  
15321 S. DIXIE HWY., SUITE 202  
MIAMI, FLORIDA 33157  
2) GERAGHTY AND MILLER, INC.



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to be utilized are discussed in more detail in the Sampling and Analysis Plan (SAP) which is submitted under separate cover.

### ***3.1 Methods of Investigation***

In an effort to develop an accurate and comprehensive understanding of actual site conditions the following investigative methods are listed as potential tools to be utilized depending on the site's stage of work.

- Utility survey
- Ambient air monitoring
- Waste characterization
- Soils investigation
- Hydrogeologic investigation
- Surface water and sediment investigation
- Background characterization
- Preliminary biological hazard assessment
- Baseline risk assessment
- Sample analysis.

Each of the above referenced areas are addressed in the following sections.

#### ***3.1.1 Utility Survey***

NAS-Key West personnel will identify and mark the locations of all known utilities at all sites prior to work. This information will be provided to IT field personnel and is necessary to ensure that the locations selected for drilling and/or other investigative techniques are free of obstructions that would otherwise endanger site investigation personnel or interfere with station operations. Alternate locations will be selected where data indicates the presence of utilities. Authorization for drilling will be obtained from NAS-Key West prior to commencement of drilling activities.

#### ***3.1.2 Ambient Air Monitoring***

During all subsurface activities, ambient air conditions will be monitored using an organic vapor analyzer (OVA) equipped with either a photoionization or flame ionization detector as described in Section 6.0 of the Health and Safety Plan (HSP).

### **3.1.3 Waste Characterization**

Waste characterization will be performed at the Stage 1 sites in conjunction with the soil boring program. The waste has been characterized during the Phase I RI study for the Stage 2 sites.

### **3.1.4 Soils Investigation**

Activities to assess contamination in surface soils will include collection of soil samples and their subsequent laboratory analyses. Headspace analysis of surface soil samples will be performed in the field to detect the presence of organic vapors and to help in selecting appropriate samples for laboratory analysis if organics are suspected.

To confirm and further delineate the chemical characteristics of the soils underlying the waste units, a soil boring program will be implemented. For the sites at which RFI work has already been performed, sampling will be carried out with the aim of further delineating the extent of soil contamination. Surface soil samples will be collected using a trowel and a pan. Subsurface soil samples will be collected using a split spoon sampler, hand auger, or similar device. A geologic log will be prepared for each borehole. Headspace analyses of soil borings will be performed in the field to detect the presence of organic vapors for selection of appropriate samples for analysis. Soil sampling and boring techniques are described in Section 2.4 of the SAP. Soil samples will be submitted for laboratory analyses for chemical characterization.

### **3.1.5 Hydrogeologic Investigation**

The hydrogeologic system at each site influences the horizontal and vertical extent of groundwater contamination. Specifically, the permeability of the sediments and the boundaries of the groundwater flow system will determine the flow path along which contaminants, if any, will travel.

As approved by EPA, the monitoring wells that are to be installed for this investigation will be constructed of 2-inch diameter PVC casing and screen enveloped by a sand pack, bentonite seal and neat cement grout as shown in Figure 3-2. All monitoring wells will have locking protective steel casings that can be locked. Well completion logs will be prepared for each monitoring well. Monitoring well installation and construction is described in detail in Section 2.4.3.1 of the SAP.

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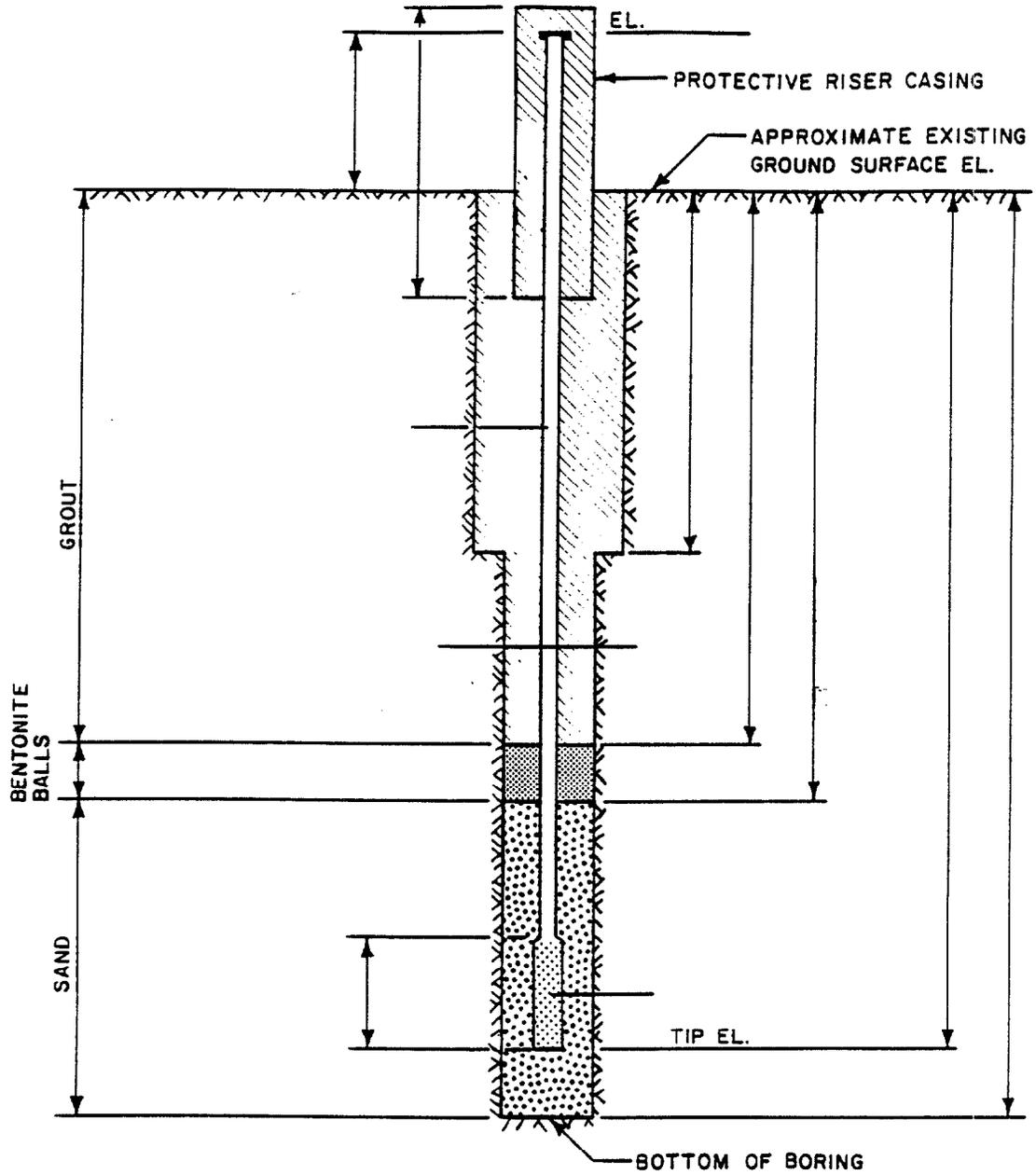


FIGURE 3-2  
WELL SCHEMATIC

NAS-KEY WEST  
KEY WEST, FL  
*Prepared for:*

NAS-KEY WEST  
KEY WEST, FL

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Groundwater levels will be measured once a week for four weeks at all existing and new monitoring wells at each site. Water level measurement techniques are described in more detail in Section 2.4.5 of the SAP. Based on the measured groundwater levels, groundwater elevation maps will be prepared for each site in order to better understand the flow patterns. At SWMU 1 (Boca Chica Open Disposal Area) and SWMU 3 (Boca Chica Firefighting Area), where groundwater flow could be significantly affected by tidal influences, one water level recorder will be placed in the well closest to the ocean and a second water level recorder will be placed in the well farthest from the ocean. The water level recorders will be set to record groundwater levels at hourly intervals for a duration of approximately 30 days. Water levels in all other wells at the sites will be measured once a week and these water levels will be correlated to the water levels in the recorder wells.

All existing wells at the various sites will be sampled based on the criterion that the wells produce a sand free discharge and be within 0.5 feet of their reported installed depth.

### ***3.1.6 Surface Water and Sediment Investigation***

An inspection of the sites at NAS-Key West determined the lack of permanent, intermittent, or ephemeral streams at all of the sites. Several sites however did contain man-made drainage ways for runoff control. Runoff from precipitation either evaporates or percolates into the ground. Surface water samples will be collected if present at the site during the sampling event.

Ocean water samples will be collected as part of this investigation. Because of the turbulent nature of the shoreline, extreme care will be taken during collection to ensure a representative sample. The Environmental Compliance Branch Standard Operating Procedures and Quality Assurance (ECB SOP and QA) Manual does not specifically address sampling of ocean waters. In order to ensure a representative sample, sampling will be conducted during low tide (and ebb tide) and during calm ocean conditions with the guidelines established for surface water sampling. A limitation exists in that concentrations of contaminants leaching into the beach and surf zone would be quickly diluted and could potentially go undetected by chemical analysis. However, where sites are along the shoreline, contaminants are more likely to adsorb onto sediments. In such cases, sediment samples will also be collected to gain an accurate account of existing conditions.

Sediment and surface water sampling procedures are described in detail in Sections 2.4.2 and 2.4.8, respectively of the SAP.

### ***3.1.7 Background Characterization***

Background samples are scheduled to be obtained for all SWMU sites at NAS-Key West. The background samples will consist of groundwater, surface water, ocean water, soil and sediment media. All background samples will be analyzed for Appendix IX parameters (excluding dioxins and furans). The performance of this task will aid in the establishment of actual background concentration standards representative of those areas. These concentration standards will be used in the risk and exposure assessment work to be conducted at the sites. Actual site locations for sampling will be based on field judgement and conditions as encountered by the Field Operations Coordinator during the field activities event.

### ***3.1.8 Preliminary Biological Hazard Assessment***

A preliminary biological hazard assessment will be performed at SWMUs 3, 4, 5 and 7 to evaluate the potential risk that may exist at a site. The assessment will compare the chemical concentrations for chemicals of biological potential concern in soils or waters to biological ARARs or, in the absence of biological ARARs, conservative environmentally protective screening values. Data received from the Preliminary Biological Hazard Assessment can be applied towards a potential receptor analysis. Thus a potential receptor analysis will also be performed at SWMUs 3, 4, 5, and 7 to identify potentially significant environmental receptors that may be exposed to chemicals onsite or offsite. Potential biological ARARs for aquatic organisms include the Florida Surface Water Quality Standards and the U.S. Environmental Protection Agency's Water Quality Criteria for chronic exposure of aquatic and marine organisms. At present there are no published biological ARARs for wildlife.

Screening values for wildlife will be determined based upon exposure scenarios for different types of terrestrial environmental receptors (e.g., a picivoric bird or mammal, a mammalian herbivore, or a raptor) and acceptable daily intakes for birds or mammals. Exposure scenarios will be developed to estimate the potential daily intake from either water or soil for a generic environmental receptor. The exposure scenarios used in calculating these screening values will be designed to characterize the potential exposure for those organisms at greatest risk from exposure to chemicals in either water or soils. Acceptable daily intake for birds and mammals

will be based upon toxicological data from the available published literature. The screening value for a chemical is the maximum concentration of a chemical in either water or soils which will not result in an unacceptable intake for a defined generic environmental receptor (given the assumptions used in the exposure models).

Screening values for water will be determined based on the potential exposure of a piscivorous bird and piscivorous mammal. These organisms would have greater potential intake relative to other environmental receptors as a result of exposure via drinking water and bioaccumulation of site-related chemicals in their food. Potential water consumption and food ingestion rates for a generic receptor will be estimated based on allometric or other physiological models. Potential concentrations in water will be estimated from water sampling data and chemical concentrations in food will be estimated using appropriate bioaccumulation models.

Screening values for soils will be determined based on the potential exposure of a mammalian herbivore, an avian herbivore, a mammalian predator and a raptor. Herbivores represent those populations at greatest risk from chemicals which are bioaccumulated into plants, i.e., metals and hydrophilic organics. A mammalian herbivore is considered to be a burrowing organism. Therefore the receptor would be exposed via ingestion of both food and soil. The food consumption rate for this generic receptor will be estimated based on allometric or physiological models. Soils consumption will be estimated based on allometric or physiological models. Soils consumption will be estimated based on a defined percentage of the food consumption and will be based on soil ingestion studies published in the available scientific literature. For the purposes of this preliminary biological hazard assessment, it will be assumed that avian herbivores are exposed only via consumption of food. Some avians such as turkeys may be exposed via ingestion of soils. However it is unlikely that these organisms are found in the Florida Keys. Food consumption rates for generic avian herbivores will be estimated based on allometric or other physiological models.

Mammalian predators and raptors are at greatest risk from exposure to chemicals which biomagnify in the food chain. For the purposes of this assessment, it is assumed that the prey is represented by a burrowing mammal which is a herbivore, thus maximizing the potential exposure of the prey. Potential concentration of site-related chemicals in the prey will be estimated using the appropriate bioaccumulation models and estimated intakes as described

above for mammalian herbivores. Food consumption rates for both mammals and birds will be estimated using allometric equations or other physiological models. For the purpose of this assessment it will be assumed that mammalian predator is a burrowing organism. Therefore this receptor may be exposed to site-related chemicals via ingestion of soils as well as in prey. The soil ingestion rate will be estimated based on published soil ingestion studies in the available literature.

Acceptable daily intakes for mammals and birds will be based upon the toxicological studies in the available published literature. Appropriate uncertainty factors will be used in the extrapolation of toxicological values from scientific studies to acceptable daily intake values for either mammals or birds.

Exceeding these screening values does not in itself imply a potential hazard. It does suggest that a given type of biological receptor should be more closely scrutinized. These screening values will be used to determine if a potential risk to biological receptors exists at a site and which biological receptors should be further evaluated.

### ***3.1.9 Baseline Risk Assessment***

An environmental risk assessment will be performed at SWMU 1 and SWMU 2 to evaluate the potential impact of site-related chemicals upon environmental receptors. Baseline risk assessments are not proposed at this time for the remaining SWMUs because the limited existing database of the SWMUs do not indicate the need for a risk assessment.

At sites where a risk assessment will be performed, potential impacts will be evaluated by comparing estimated daily intake for identified environmental receptors relative to a maximum acceptable daily intake. The risk assessment will include the following:

- Selection of chemicals of potential concern
- Exposure assessment
- Toxicity assessment
- Hazard characterization

Each of these selections are discussed below.

Chemicals of potential concern will be selected from site-related chemicals following the guidance as given in the Risk Assessment Guidance for Superfund, Vol I: Human Health Evaluation Manual (USEPA, 1989).

The purpose of the exposure assessment is to describe site-specific pathways related to the potential exposure of environmental receptors and to provide estimates of these exposures. The three components of an exposure assessment are:

- Receptor survey
- Exposure pathway analysis
- Exposure estimation

Each of these elements is addressed separately below.

The receptor survey identifies the significant environmental receptors which potentially may be exposed to chemicals either onsite or as a result of chemical migration to off-site areas.

Significant environmental receptors would include listed endangered or threatened species and economically important species.

Endangered or threatened species include any organism listed as endangered by either the United States Fish and Wildlife Service or the Florida Game and Freshwater Fish Commission. Economically important species include all species which are hunted or utilized as a food source for humans. Both on-site and off-site potential receptors at each site will be determined based on a review of the available published literature concerning endangered species, published government or scientific studies of the area and information maintained by government agencies.

The exposure pathway analysis will characterize the exposure setting, identify potential exposure pathways and select the site-specific exposure pathways to be quantitatively evaluated in the risk assessment. Potential exposure pathways to be evaluated include ingestion of soils and water and potential exposure via food chain bioaccumulation. Potential exposure pathways will be determined based on behavioral characteristics of the identified receptors (e.g.

burrowing, food preferences, home range size, etc.) and the environmental matrix in which site-related chemicals are found, i.e., site-related chemicals at a site may be limited to either soil, groundwater or surface waters.

The potential intakes via each identified exposure pathway will be estimated utilizing species specific data. In the absence of species specific data, i.e., specific feeding or water consumption rates, allometric models will be used to estimate potential intake rates. Estimated concentrations in food sources, e.g. fish, plants, or prey organisms, will be estimated using either chemical specific bioaccumulation factors (BCF) or BCFs estimated using an appropriate model. Exposure pathways to fish and other aquatic populations will be limited to exposure via water and sediments.

The purpose of the toxicity assessment is to estimate acceptable daily intakes for each chemical of potential concern. Acceptable daily intakes will be estimated based on toxicological data published in the available scientific literature. Appropriate uncertainty factors will be used in the extrapolation of toxicological values from scientific studies to acceptable daily intake values for the identified environmental receptors. Acceptable exposure concentrations for aquatic populations will also be estimated based on published toxicological data in the available scientific literature.

Characterization of potential impacts upon environmental receptors will be determined by using a hazard quotient (HQ). An HQ may be defined as the ratio between the estimated daily intake of a chemical and the estimated acceptable daily intake for that chemical. The HQ does not define dose-response relationships and its numerical value should not be construed to be a direct estimate of risk. The HQ is only a numerical indication of the nearness to acceptable limits of exposure or the degree to which acceptable exposure levels are exceeded. As this index approaches unity, concern for the potential hazard of the chemical increases. Exceeding unity does not in itself imply a potential hazard, it does suggest that a given situation should be more closely scrutinized. Potential impacts upon aquatic communities will be evaluated in a similar manner by comparing measured water concentrations with acceptable exposure concentrations.

A conservative approach will be maintained throughout the risk assessment. Environmentally protective assumptions will be used that are designed to overestimate any potential hazards. This biased approach is designed to overestimate rather than underestimate potential hazards to environmental receptors. This approach compensates for risk assessment uncertainties and provides a safety margin when determining potential impacts upon environmental receptor populations.

### **3.1.10 Sample Analysis**

All samples collected for laboratory analyses will be submitted to IT Analytical Services Laboratory (ITAS) in Knoxville, Tennessee. This laboratory is approved by the Naval Energy and Environmental Support Activity (NEESA) and also has an approved Comprehensive Quality Assurance Plan on file with the Florida Department of Environmental Regulation (FDER). All analytical methods will be in conformance with applicable Federal and State procedures. The laboratory will perform analyses using United States Environmental Protection Agency (US EPA) approved methods in accordance with NEESA Level C Quality Control as specified in the Scope of Work.

The Appendix IX analytical data will be at Data Quality Objective (DQO) Level IV. In addition, the analysis for Appendix IX parameters does not include dioxin/furan compounds except at SWMU #2. Volatile organic compounds, polynuclear aromatic hydrocarbons, pesticides/PCBs and metals will be analyzed according to Contract Laboratory Protocols (CLP) as specified in Statement of Work (SOW) 288. Almost all Appendix IX parameters are amenable to CLP methodology except for chlorinated herbicides and organophosphorus pesticides. Analysis of Appendix IX parameters can be performed by CLP methodology and the exceptions can be analyzed within the CLP QA/QC requirements using SW846 methods. This approach will provide DQO Level IV data of Appendix IX parameters. CLP data packages will only be generated for the analysis of samples collected from SWMU 1 and 2.

One sample per media from each SWMU will be analyzed for the complete list of Appendix IX parameters. Volatile organic compounds will be analyzed according to EPA Method 8010/8020. Polynuclear aromatic hydrocarbons will be analyzed according to EPA Method 8310, phenol and pentachlorophenol will be analyzed according to EPA Method 8040, pesticides/PCBs by EPA Method 8080 and Methods ICAP, Graphic Furnaces, Cold Vapor,

Direct Aspiration (Flame) for metals. Section 3.2 of the SAP contains a detailed explanation of the laboratory analytical procedures.

Table A-1 in Appendix A lists sample media, numbers, and recommended analysis methods for each site.

### **3.2 Stage 1 - Sites Requiring a RFI**

Sites requiring an RFI are as follows:

- SWMU No. 4 - AIMD Building A-980
- SWMU No. 5 - AIMD Building A-990
- SWMU No. 7 - Building A-824

Based on an assessment of the needed data, the RFI process has been reduced to a specific set of objectives for the three sites to be studied during the NAS-Key West RFI:

- Review the existing site data and relevant regulatory guidance
- Determine the vertical and horizontal extent of the suspected organic and metals contamination at the three sites
- Identify other contaminants which may be migrating from the sites
- Background sampling of groundwater, surface water, soil and sediment to establish background levels.
- Delineate the potential contaminant migration pathways at the three sites
- Perform baseline risk assessments on each of the sites when enough data has been compiled to characterize a release, if any.

Evaluation of information developed in the RFI will determine future actions under the current permit. Following collection and analysis of data, the investigation may proceed to a Corrective Measures Study (CMS), or may require "no further action" and decisions will be made to collect additional data, to screen and evaluate remedial alternatives, or to recommend appropriate remedial actions.

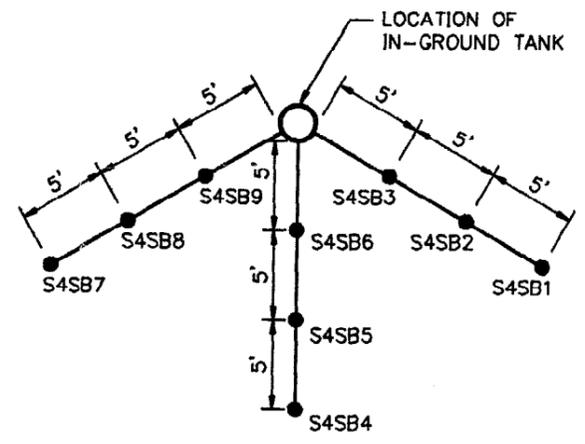
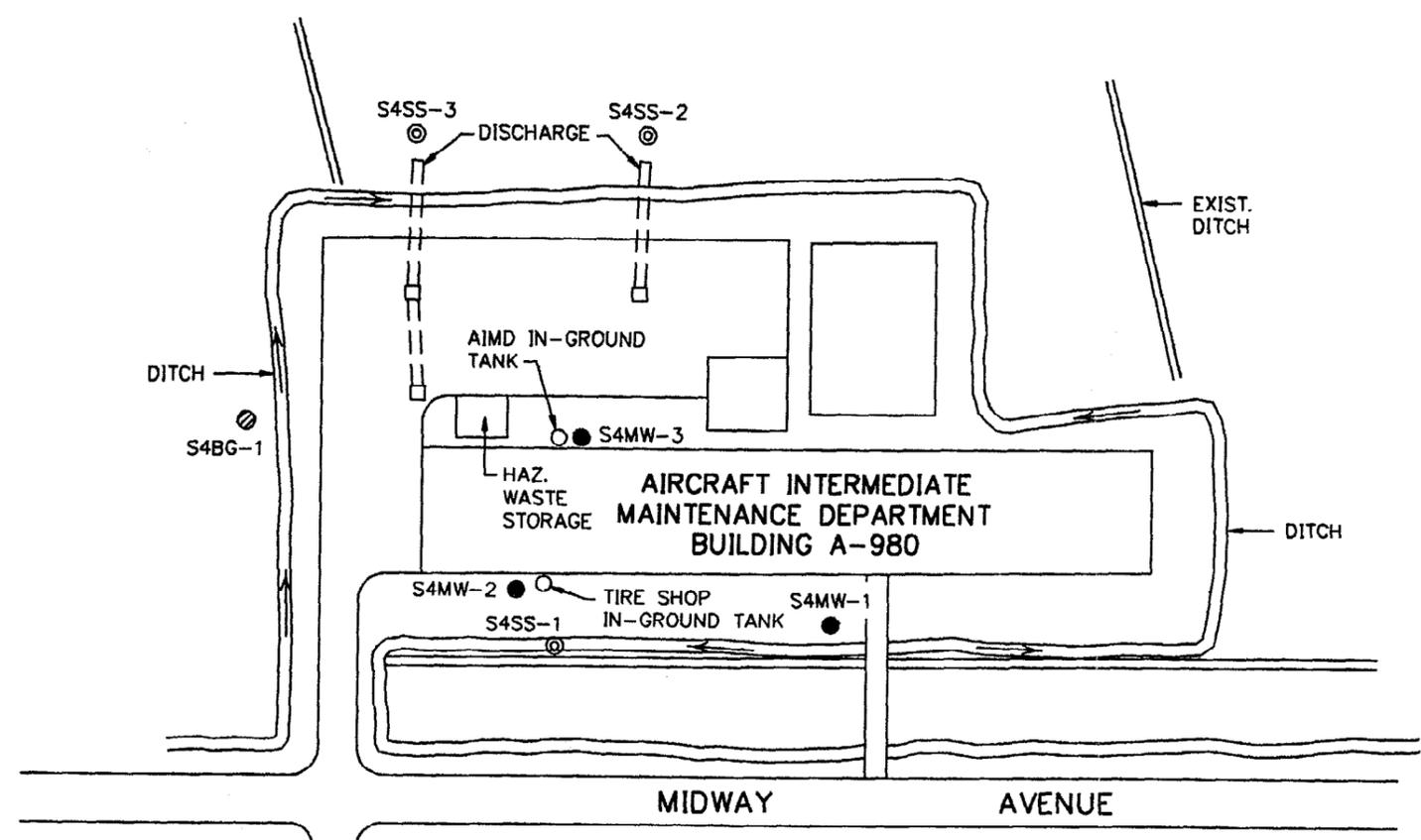
### **3.2.1 SWMU No. 4 - AIMD Building A-980**

#### **3.2.1.1 Site Description**

The site is located at the Aircraft Intermediate Maintenance Department (AIMD) at the Naval Air Station, Key West which is located on the island of Boca Chica Key as shown on the vicinity map, Figure 3-1. The area is shown in detail in Figure 3-3. In the late 1960s, the area was filled with six feet of crushed limerock, compacted, and building A-980 was constructed. In August 1981, a 55-gallon plastic tank was installed, in-ground on the north side of Building A-980 (Figure 3-3) and was used to collect approximately 3 gallons a month of hazardous waste from the spillage of a 70-percent freon 113 (trichlorotrifluoromethane) and 30-percent electrical insulating oil (coolanol-35R) mixture. This facility was operated by the Defensive and Passive Electronic Counter Measure (DECM/PECM) and abandoned in May 1987. Another similar facility was being operated at the AIMD during the same time period by the Tire Shop. This facility received a mixture of 96 percent water, 2 percent PD680 (solvent), 2 percent Turco (a phenolic based aircraft cleaner), and a residue of a PCA 44 Type C (emulsifier cleaner). The Navy ceased using this facility as well. The contents of the tanks at the two facilities were routinely pumped out every 60 to 90 days and properly disposed of by NAS-Key West personnel. MSDS sheets for the chemicals PD680, Turco, and PCA 44 are included in Appendix B.

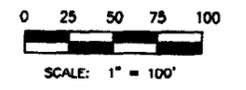
These tanks were gravity fed, by a piping system, which drained the various mixtures from the interior of the building through the walls and into the tanks. The north tank was connected to a floor trench drain with grate inside Building A-980. This drain was designed for the collection of incidental spillage from the work area operations. The drain pipe was made of 2-inch PVC pipe and was encased in cement mortar. Hence, the drain carried the spillage directly into the in-ground tanks and there appears to have been no leaks in the drain. The south tank was connected to a dip tank via a similar floor trench drain. The dip tank was used by the tire shop for the rinsing of aircraft wheel rims during routine maintenance. Upon receipt of a Notice of Violation (NOV) dated May 11, 1987, NAS-Key West cut and plugged the connecting piping and ceased operating the in-ground tanks. The NOV was issued because some soil around one in-ground collection tank appeared to be contaminated with solvents and TF freon during an inspection tour of the building. The two tanks were removed and properly disposed of in December 1989.

STARTING DATE: 9/27/91  
 DRAWN BY: L. NIST  
 LAST REV DATE: 10/24/92  
 CHECKED BY: L. NIST  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
 DRAWING NO.: AB201837  
 PROJ. NO.: 595392  
 CAD FILE: AB201837.DWG  
 ARCHIVED:



**RADIAL SOIL SAMPLE LOCATIONS  
 AT AIMD & TIRE SHOP  
 IN-GROUND TANKS**

N.T.S.



**LEGEND**

- S4MW-1 PROPOSED SOIL BORING/  
MONITORING WELL
- ⊙ S4SS-1 PROPOSED SEDIMENT/  
SURFACE WATER SAMPLE
- ⊙ S4BG-1 PROPOSED BACKGROUND  
SURFACE WATER SAMPLE

**FIGURE 3-3**  
**INVESTIGATION & SAMPLING  
 LOCATIONS  
 AIMD BUILDING A-980**

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**NAS - KEY WEST  
 KEY WEST, FLORIDA**



### **3.2.1.2 Existing Data**

In December of 1989 both tanks were removed and soil (6 inches thick) from around and under each tank was excavated and drummed. Figure 3-3 depicts the previous locations of the tanks relative to the exterior walls of Building A-980. Additional soil was removed and the excavated holes were covered with plywood. The three soil samples were collected from each excavation from depths of 0 to 1 foot, 1 to 2 feet, and 2 to 3 feet and analyzed for various parameters. Table 3-1 presents the analytical results for the samples. Elevated levels of cadmium, chromium, lead, and mercury were reported in the soil samples from both pits. No groundwater or surface water samples were collected from the site.

### **3.2.1.3 Utility Survey**

All utilities in the areas of the proposed sampling locations will be identified by NAS-Key West personnel prior to the commencement of field activities. If necessary, proposed sampling locations will be relocated to avoid interference with the identified utilities.

### **3.2.1.4 Ambient Air Monitoring**

For health and safety reasons, an OVA will be used during all subsurface work as required by the Health and Safety Plan (HSP).

### **3.2.1.5 Waste Characterization**

Results of the initial soil sampling (Table 3-1) indicate that soil contamination from metals and petroleum hydrocarbons exists in the areas of the two in-ground storage tanks. The investigation to determine the extent and magnitude of contamination will be conducted under the soil, hydrogeologic, surface water and sediment investigation phases. The waste characterization will be carried out in conjunction with the soil boring program.

### **3.2.1.6 Soil Investigation**

The data obtained from the results of the initial soil sampling (Table 3-1) indicate surface and subsurface soils are impacted. To verify these data and to further evaluate the extent of contamination, soil samples will be collected at each tank location at 1-foot intervals until the top of water table is reached. The investigation will use a radial arm approach with sampling locations approximately every 5 feet. The soil sampling locations are shown in Figure 3-3. A maximum of nine soil borings per tank location will be installed. The OVA will be used

**Table 3-1**  
**Soil Sample Data from Building A-980**  
**NAS-Key West**  
**Key West, Florida**

TEST	SOUTH <sup>1</sup> 1-2 ft.	S-TOP <sup>1</sup> 0-1 ft.	S-BOTTOM <sup>1</sup> 2-3 ft.	NORTH <sup>2</sup> 1-2 ft.	N-TOP <sup>2</sup> 0-1 ft.	N-BOTTOM <sup>2</sup> 2-3 ft.
Ignitability	No Flash	> 400° F	> 400°F	135°F	> 400°F	> 400°F
Corrosivity	5.56	7.54	7.4	2.93	7.68	7.28
Reactivity						
Air	None	None	None	None	None	None
H <sub>2</sub> O	None	None	None	None	None	None
CN	Slight	None	None	None	None	None
EP Tox						
As	<.01	<.01	<.01	<.01	<.01	<.01
Ba	4.0	10.1	7.7	.4	4.8	3.0
Cd	8.3	10.2	10.0	.5	3.0	2.4
Cr	6.2	18.6	9.6	<.01	3.0	2.0
Pb	21.7	10.4	8.2	2.7	3.4	4.16
Hg	1.33	1.55	1.5	7.72	4.8	1.8
Se	<.01	<.01	<.01	<.01	<.01	<.01
Ag	.05	<.01	<.01	.4	<.01	<.01
TOX	2.0	0	10.0	250	5.0	15.0
Oil/grease	3000	0		550,000		
Trichloroethane	0	0	5.0	125	2.0	10.0
PCBs	0	0	0.0	25	0	2.0
% H <sub>2</sub> O	99			30		
Xylene	2	2	2	20,000	0	5.0
TOC	2400	20	30	400,000	90	65
MEK	0	0	0	500	0	0
Methylene chloride	0	0	0	10	0	0
Toluene	5.0	5.0	2.0	50	5.0	8.0
Conductivity	18,000			2800		

**NOTE:**

<sup>1</sup> Sample collected from south excavation

<sup>2</sup> Sample collected from north excavation

All values in mg/l unless otherwise indicated

Refer to Figure 3-3 for sample locations

for a headspace scan of the collected materials. The nine highest readings per tank location will be submitted for laboratory analysis (total of 18 samples). The initial soil sampling indicated the presence of metals, halogenated volatiles, non-halogenated volatiles, and PCBs. As a result of these detections, the following analyses are prescribed for the soil samples: one surficial sample (0-1 foot) and one subsurface soil sample (> 1 ft depth) will be analyzed for Appendix IX parameters. The samples to be analyzed for Appendix IX parameters will be collected from the area appearing to have the most contamination (based on OVA readings). The remaining soil samples will be analyzed for the following categories of parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenyls
- Metals

#### ***3.2.1.7 Hydrogeologic Investigation***

Two monitoring wells will be installed in or near the areas of suspected contamination as shown in Figure 3-3. Well construction details are presented in Section 2.4.3.1 of the Sampling and Analysis Plan. The wells will be screened to intercept the water table.

Groundwater levels will be measured in all monitoring wells once a week for four weeks. Four groundwater elevation maps will be prepared to better understand groundwater flow patterns at the site.

A groundwater sample will be collected from each well and submitted for laboratory analysis. One groundwater sample (S4MW2) will be analyzed for Appendix IX parameters and the other groundwater sample will be analyzed for the following:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenyls
- Metals

#### ***3.2.1.8 Surface Water and Sediment Investigation***

A ditch which acts as a conveyance for surface water is present along the perimeter of the building (Figure 3-3). Three surface water and three sediment samples are proposed to be collected for laboratory analysis (surface water will be collected only if present at the time of

sampling). The proposed sample locations are indicated in Figure 3-3. One surface water and one sediment sample collected from sample location S4SS1 will each be analyzed for Appendix IX parameters. The remaining two surface water and sediment samples will be analyzed for the following:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenyls
- Metals

### ***3.2.1.9 Background Sampling***

A background sampling and analyses program will obtain analytical data for surface soil, subsurface soil, groundwater, surface water and sediments. The background samples for surface (0-1 ft.), subsurface soil, and groundwater will be collected from the location of S4MU-1. The background samples for surface water/sediment will be collected from location S4BG1. All background samples will be analyzed for Appendix IX parameters (excluding dioxin/furan compounds).

Analysis of the background samples should offer site specific standards of comparison for media impact studies.

### ***3.2.1.10 Preliminary Biological Hazard Assessment***

A preliminary biological hazard assessment will be performed at this SWMU as described in Section 3.1.8.

### ***3.2.1.11 Baseline Risk Assessment***

A baseline risk assessment is not proposed to be performed at this time.

### ***3.2.1.12 Topographic Mapping and Site Surveying***

A field survey will establish the horizontal and vertical control of the monitoring wells, ground elevations, all soil borings, and other pertinent features. The top of well casing of each monitoring well will be surveyed also to determine elevation of the water table from water level measurements.

A base map will be prepared for the site from the field survey. The map will have an appropriate horizontal scale to show pertinent site features and all elevations will be referenced to mean sea level (MSL).

### **3.2.1.13 Sample Analysis Summary**

At the AIMD Building A-980 the following media and number of samples will be submitted for laboratory analysis.

- Soil - 20
- Groundwater - 3
- Surface water - 4
- Sediment - 4

Table A-1 in Appendix A lists the number of samples, media, and recommended analysis methods.

### **3.2.2 SWMU No. 5 AIMD Sand Blasting Area by Building A-990**

#### **3.2.2.1 Site Description**

The sand blasting area is located between Buildings A-990 and A-989, and is shown in detail in Figure 3-4. The area has historically been used to sand blast "yellow gear," (yellow gear is the ground handling/ground support equipment for aircraft, i.e., moving vehicles and refueling tankers) aircraft parts and various metal objects as needed by the facility since the early 1970s. This area is approximately 65 ft by 90 ft. There exists a surface drainage ditch that collects surface runoff waters running behind the AIMD buildings. This drainage ditch directs rain water to a culvert which empties into a tidal area containing mangrove trees.

#### **3.2.2.2 Existing Data**

In June of 1984 the Navy collected soil and groundwater samples from the locations shown in Figure 3-4. The samples were submitted for a laboratory analysis and the results of the analysis are presented in Table 3-2. The results indicate the presence of phenol in the soil.

In April 1988, the Navy requested that consultants Geraghty and Miller, Inc., (G&M) coordinate the analysis of two samples of "Black Beauty" (used as blasting material for equipment). According to Reed Materials Division of Tampa, Florida, the manufacturers of

**Table 3-2**  
**Soil Sample Data from Building A-990**  
**June 25, 1984**  
**NAS-Key West**  
**Key West, Florida**

SAMPLE NO. SAMPLE TYPE	1A SOIL	2A SOIL	3A SOIL	4A SOIL	5A SOIL	6A BACKGROUND SOIL	8A LIQUID	8B LIQUID
<b>EP Toxicity:</b>								
Chromium, mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Lead, mg/L	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium, mg/L	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
pH	8.41	7.98	7.76	8.90	8.16	8.36	7.78	6.84
Methylene Chloride, ppm	<40	<40	<40	<40	<40	<40	<1.0	<1.0
<b>Phenols:</b>								
Phenol, ppb	<250	640	820	<500	<500	<500	<25	--
2-chlorophenol, ppb	<250	<500	<500	<500	<500	<500	<25	--
2-nitrophenol, ppb	<250	<500	<500	<500	<500	<500	<25	--
2,4-dimethylphenol, ppb	<250	<500	<500	<500	<500	<500	<25	--
2,4-dichlorophenol, ppb	<250	<500	<500	<500	<500	<500	<25	--
P-chloro-m-cresol, ppb	<250	<500	<500	<500	<500	<500	<25	--
2,4,6-trichlorophenol, ppb	<250	<500	<500	<500	<500	<500	<25	--
2,4-dinitrophenol, ppb	<2500	<5000	<5000	<5000	<5000	<5000	<250	--
4-nitrophenol, ppb	<250	<500	<500	<500	<500	<500	<25	--
4,6-dinitro-o-cresol, ppb	<2500	<5000	<5000	<5000	<5000	<5000	<250	--
Pentachlorophenol, ppb	<250	<500	<500	<500	<500	<500	<25	--

"Black Beauty," this material is a compound of coal slag obtained from an electrical power company.

Samples of the blasting material were collected by the Florida Department of Environmental Regulation (FDER) during a RCRA Facility Assessment in April 1988. One sample was unused "Black Beauty" and the other was "Black Beauty" after it had been used as a blasting material for equipment. The two samples were sent for analysis by EP Toxicity metals procedures (arsenic, silver, barium, cadmium, chromium, mercury, lead, and selenium). The results showed both of the samples did not have any metals present above the maximum concentration limits of contaminants characteristic of EP Toxicity (40 CFR 261).

#### ***3.2.2.3 Utility Survey***

All utilities in the areas of the proposed sampling locations will be identified by NAS-Key West personnel prior to commencement of field activities. If necessary, proposed sampling locations will be relocated to avoid interference with the identified utilities.

#### ***3.2.2.4 Ambient Air Monitoring***

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

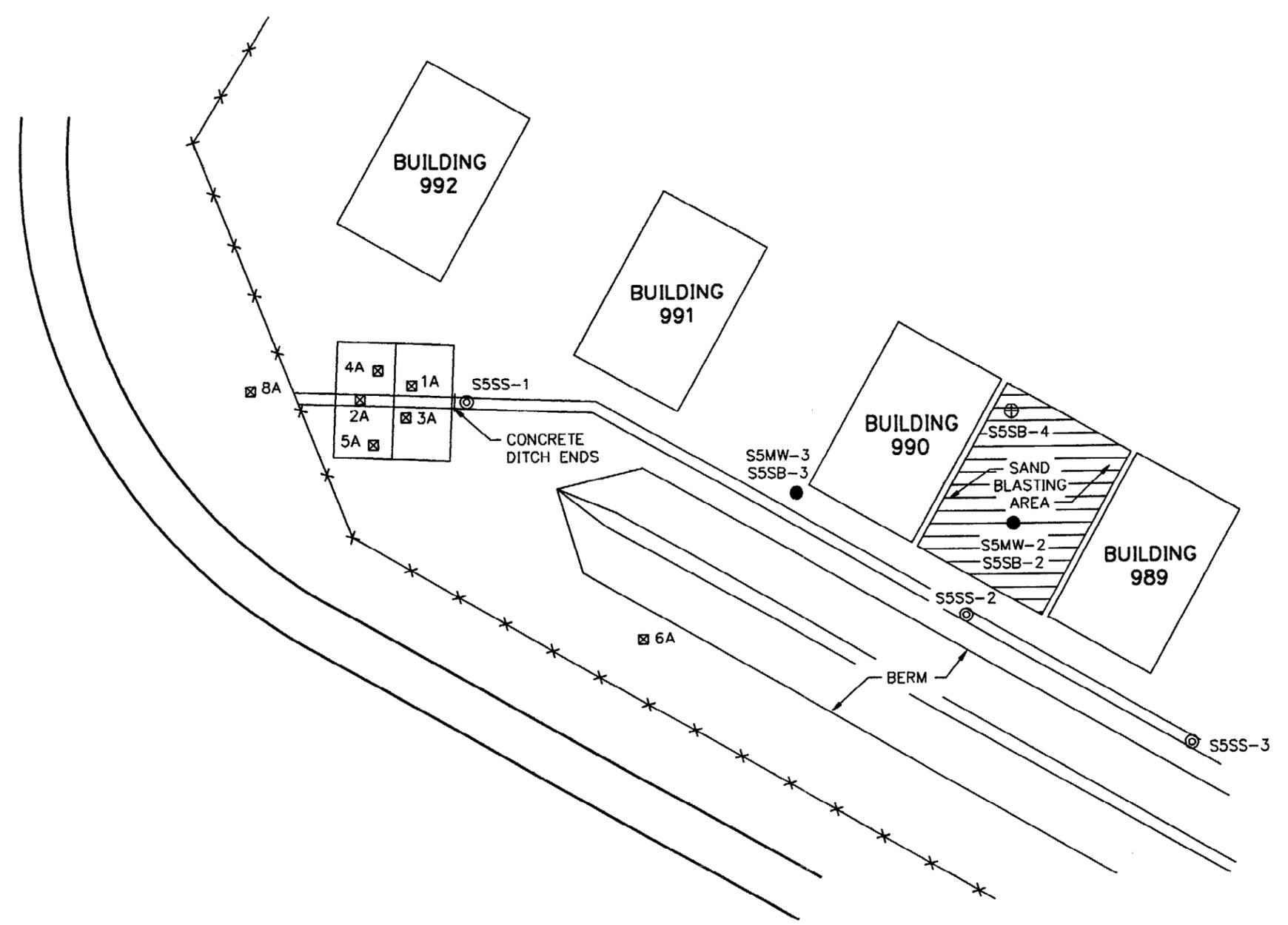
#### ***3.2.2.5 Waste Characterization***

Existing information indicates presence of phenol at the site. Also, due to the blasting materials used, the metal objects being cleaned, and the resulting residue, a potential contaminant of concern is the metals fraction. Accordingly, the investigation will focus on determining if in fact metals and phenol are present at the site and their concentrations in the soil, groundwater, sediment, and surface water. The waste characterization will be carried out in conjunction with the soil boring program.

#### ***3.2.2.6 Soil Investigation***

In order to evaluate the subject area, three soil borings will be installed in the vicinity of the blasting area as shown in Figure 3-4. Surface soil samples will be collected from the first 12 inches of soil. Subsurface samples will be collected using split spoon techniques and one sample will be collected for every foot of boring until the water table is encountered. A maximum of four samples will be collected for analysis from each boring. One surface soil

STARTING DATE: 9/27/91  
 DRAWING NO.: AB201839  
 CAD FILE: AB201839.DWG  
 PLOT: 1-1  
 DRAWN BY: L. NIST  
 CHECKED BY: S. PILLAI  
 INITIATOR: S. PILLAI  
 PROJECT NO.: 595392  
 ARCHIVED:  
 LAST REV DATE: 1/18/93  
 DRAWN BY: L. NIST  
 CHECKED BY: M. HAMPTON  
 PROJ. MGR.: M. HAMPTON  
 APPROVED BY:



- LEGEND**
- ☒ 1A EXISTING SOIL SAMPLE (NAVY, 1984)
  - S5MW-1 PROPOSED MONITORING WELL
  - ⊙ S5SS-1 PROPOSED SEDIMENT/SURFACE WATER SAMPLE
  - ⊕ S1SB-1 PROPOSED SOIL BORING

**FIGURE 3-4**  
**INVESTIGATION & SAMPLING**  
**LOCATIONS**  
**BUILDING A-990**

*Prepared for:*  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**



00270022

sample (0-1 ft.) and one subsurface soil sample selected by visual observation and field screening with an OVA will be analyzed for Appendix IX parameters and the remaining samples will be analyzed for the following:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Phenol
- Metals

### **3.2.2.7 Hydrogeologic Investigation**

Two of the soil borings will be converted into monitoring wells. Well construction details are presented in Section 2.4.3.1 of the SAP. The wells will be screened to intercept the water table. Groundwater samples will be collected from each monitoring well.

Groundwater levels will be measured in all monitoring wells once a week for four weeks. Four groundwater elevation maps will be prepared to better understand groundwater flow patterns at the site.

One groundwater sample (S5MW2) will be analyzed for Appendix IX parameters. The other sample will be analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Phenol
- Metals

### **3.2.2.8 Surface Water and Sediment Investigation**

A concrete ditch which acts as a conveyance for surface water is present at the site. Accordingly, three surface water and three sediment samples (surface water will be collected only if present at the time of sampling) will be collected from the locations shown in Figure 3-4. One surface water sample and one sediment sample from sample location S5SS2 will receive analysis for Appendix IX parameters, and the remaining surface water and sediment samples will be analyzed for the following:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons

- Phenol
- Metals

### ***3.2.2.9 Background Sampling***

A background sampling and analyses program will obtain analytical data for surface soil, subsurface soil, groundwater, surface water and sediments. The background samples for surface (0-1 ft.), subsurface soil and groundwater will be collected from locations at SWMU 2 (refer to Section 3.3.2.9 for detail). The background samples for surface water/sediment will be collected from location S5SS3. All background samples will be analyzed for Appendix IX parameters (excluding dioxin/furan compounds).

Analysis of the background samples should offer site specific standards of comparison for media impact studies.

### ***3.2.2.10 Preliminary Biological Hazard Assessment***

A preliminary biological hazard assessment will be performed for this SWMU as described in Section 3.1.8.

### ***3.2.2.11 Baseline Risk Assessment***

A baseline risk assessment is not proposed at this time.

### ***3.2.2.12 Topographic Mapping and Site Surveying***

A field survey will establish the horizontal and vertical control of the soil borings, monitoring well locations, and other pertinent features. The top of well casing will also be surveyed to determine elevations of the water table from water level measurements.

From the field survey, a base map will be prepared for the site. The map will have an appropriate horizontal scale to show pertinent site features and all elevations will be referenced to MSL.

### ***3.2.2.13 Sample Analysis Summary***

At the AIMD Building A-990, the following media and number of samples will be submitted for laboratory analysis.

- Soil - 12
- Groundwater - 2
- Surface water - 3
- Sediment - 3

Table A-1 lists the number of samples, media, and recommended analysis methods.

### **3.2.3 SWMU NO. 7 - Former Hazardous Waste Storage Building A-824**

#### **3.2.3.1 Site Description**

Building A-824 is located to the west of US 1 on Boca Chica Key as shown in Figure 3-1. The building is shown in detail in Figure 3-5. Navy records and interviews indicate that the structure historically had been used to store supplies, small electrical transformers, and a temporary (under 90 days) staging of 55-gallon drums. No reported releases of contaminants have been recorded at the site.

#### **3.2.3.2 Existing Data**

The consulting firm of Blasland, Bouck, and Lee (BB&L) performed a final series of clean-up activities of the structure and surrounding area culminating on March 29, 1991. Based on the information contained in the BB&L report, decontamination of the building has been completed in accordance with the FDER approved closure permit. Navy sources have indicated the building is to be retrofitted or "re-skinned" and updated for future use. Samples were collected from various locations such as from sandbags stacked near Building 824 and from the soils around the building. Rinse samples from the floor of the building were also collected.

Figure 3-5 shows the locations from where BB&L collected samples. The samples were analyzed in the following manner: 1) sandbags were analyzed for evaluation of required disposal methods; 2) soils around Building A-824 were analyzed for possible impact by the storage operations; and 3) final floor rinse was analyzed to confirm closure requirements.

Table 3-3 lists the results of the sampling. Soil samples SS-01 and SS-03 contained 1,1-dichloroethene and sample SS-03 contained 6,400 ug/kg of pentachlorophenol. The BB&L report concludes that the 1,1-dichloroethene present was as a result of pipe doping compounds commonly used in the mid to late 1970s. Pentachlorophenol was commonly used for treatment of wood poles and pilings and could have been present in the material stored at Building A-824. The analysis of the final rinse water did not indicate any purgeable halocarbons or purgeable aromatics.

### ***3.2.3.3 Utility Survey***

All utilities in the areas of the proposed sampling locations will be identified by NAS-Key West personnel prior to commencement of field activities. If necessary, proposed sampling locations will be moved to avoid interference with identified utilities.

### ***3.2.3.4 Ambient Air Monitoring***

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

### ***3.2.3.5 Waste Characterization***

Existing information indicates presence of volatiles and polynuclear aromatic hydrocarbons. Due to the various materials used and/or stored at the site the potential areas of concern are the hydrocarbon groups. Accordingly, the investigation will focus on determining whether any contaminants are present at the site and the contaminant concentrations in the soil, sediment, surface and groundwaters. The waste characterization will be carried out in conjunction with the soil boring programs.

### ***3.2.3.6 Soil Investigation***

In order to evaluate the subject area, 20 soil borings will be installed around Building A-824. The soil boring locations are illustrated in Figure 3-5. The borings will extend to the top of the water table. Discrete split spoon samples will be collected for every one foot of boring until the water table is reached. An organic vapor analyzer (OVA) will be used for a headspace scan of the materials. The sample with the highest reading per boring location will be submitted for laboratory analysis (a total of 20 samples).

**Table 3-3**  
**Results of Laboratory Analysis of Samples**  
**February 20, 1991**  
**Source: Certification of Closure Former Hazardous Waste Storage Building A-824**  
**NAS-Key West**  
**Key West, Florida**  
**Page 1 of 2**

PARAMETER	SAND BAGS	SS01	SS02	SS03	SS04	SS05	SS06	RINSE WATER
Purgeable Halocarbons (601/8010)	ND		ND		ND	ND	ND	ND
1,1-Dichloroethene (Vinylidene Chloride U078)	-	8.4 ug/kg	-	18.2 ug/kg	-	-	-	-
Purgeable Aromatics (602/8020)	ND							
Semi-Vol (BNA) GC/MS (8270)	NA	ND	ND		ND	ND	ND	NA
Pentachlorophenol (U242)				6400 ug/kg				
Hazardous Waste Characteristics								
EP Tox Metals (mg/L)								
• Barium (0.100*)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
• Cadmium (0.005*)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.007
• Chromium (0.010*)	0.018	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.130
• Silver (0.010*)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
• Arsenic (0.010*)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
• Lead (0.010*)	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
• Selenium (0.005*)	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
• Mercury (0.0005*)	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005
• Ignitability (flashpoint)	> 65°C							
• Corrosivity	NA							
• Reactivity (releasable H <sub>2</sub> S)	<0.20 mg/kg	<0.24 mg/kg	<0.24 mg/kg	<0.24 mg/kg	<0.25 mg/kg	<0.24 mg/kg	<0.26 mg/kg	<0.01 mg/kg

**Table 3-3**  
**Results of Laboratory Analysis of Samples**  
**February 20, 1991**  
**Source: Certification of Closure Former Hazardous Waste Storage Building A-824**  
**NAS-Key West**  
**Key West, Florida**  
**Page 2 of 2**

PARAMETER	SAND BAGS	SS01	SS02	SS03	SS04	SS05	SS06	RINSE WATER
• Reactivity (releasable cyanide)	<0.02 mg/kg	<0.03 mg/kg	<0.001 mg/kg					
TOC (Total Organic Carbon) mg/kg	2200	4000	8500	5500	1300	9600	2700	NA
TOX (Total Organic Halogen) mg/kg	200	380	<100	<100	<100	<100	<100	NA

**NOTE:**

ND = Not Detected  
 NA = Not Analyzed  
 \* = Detection Limit

One surface soil sample (0-1 ft.) and one subsurface soil sample collected from the area which appears to have the most contamination (based on OVA readings) will be analyzed for Appendix IX parameters. The remaining samples will be analyzed for the following:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pentachlorophenol
- Polychlorinated Biphenyls
- Metals

### ***3.2.3.7 Hydrogeologic Investigation***

Three monitoring wells will be installed in the vicinity of Building A-824 so as to determine groundwater flow patterns and confirm the absence or presence of contamination. Well construction details are presented in Section 2.4.3.1 of the SAP. The wells will be installed at the same locations as soil borings S7SB-3, S7SB-14, and S7SB-6 and are shown in Figure 3-5.

Groundwater levels will be measured in all monitoring wells once a week for four weeks. Four groundwater elevation maps will be prepared to better understand flow patterns at the site.

A groundwater sample will be collected from each of the three monitoring wells and submitted for laboratory analysis. One sample (from monitoring well S7SB3) will be analyzed for Appendix IX parameters. The remaining samples will be analyzed for the following:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pentachlorophenol
- Polychlorinated Biphenyls
- Metals

### ***3.2.3.8 Surface Water and Sediment Investigation***

Surface water features are present at this site. Accordingly, four surface water and four sediment samples will be collected for laboratory analysis (surface water will be collected only if present at the time of sampling). The surface water and sediment sample collection locations are shown in Figure 3-5. Further, one surface water sample and one sediment sample from

location S7SS-1 will be analyzed for Appendix IX parameters. The remaining surface water and sediment samples will be analyzed for the following:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pentachlorophenol
- Polychlorinated Biphenyls
- Metals

### ***3.2.3.9 Background Sampling***

A background sampling and analyses program is recommended by IT to obtain analytical data for surface soil, subsurface soil, groundwater, surface water and sediments. The background samples for surface (0-1 ft.) and subsurface soil will be collected from the vicinity of sample location S7SB-13. The background for groundwater will be collected from S7MW-2 and for surface water/sediment from location S7SS-4. All background samples will be analyzed for Appendix IX parameters (excluding dioxin/furan compounds).

Analysis of the background samples should offer site specific standards of comparison for media impact studies.

### ***3.2.3.10 Preliminary Biological Hazard Assessment***

A preliminary biological hazard assessment will be performed for this SWMU as described in Section 3.1.8.

### ***3.2.3.11 Baseline Risk Assessment***

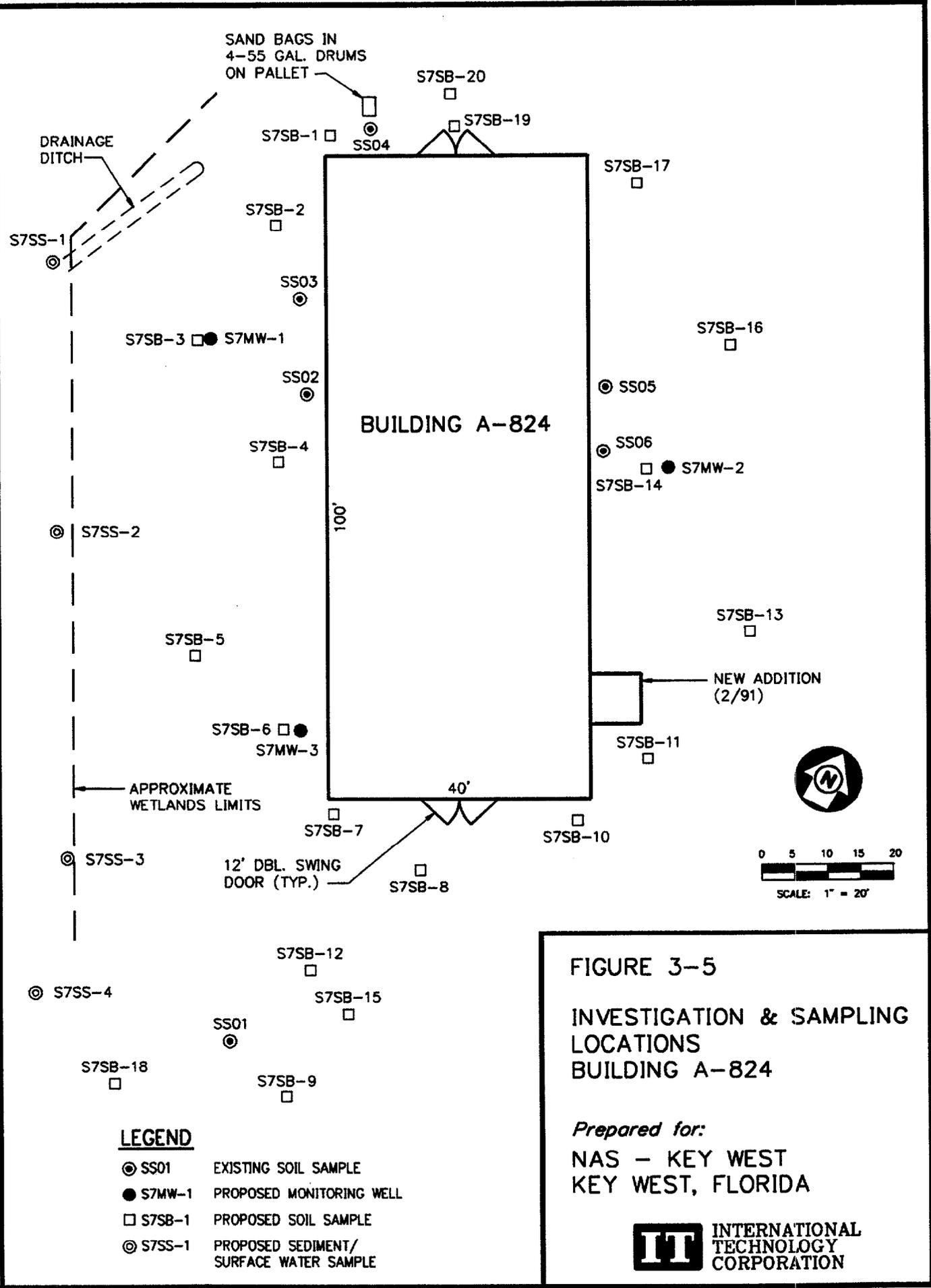
A baseline risk assessment is not proposed at this time.

### ***3.2.3.12 Topographic Mapping and Site Surveying***

A field survey will establish the horizontal and vertical control of the monitoring wells, ground elevations, all soil borings, and other pertinent features. The top of well casing of each monitoring well will also be surveyed to determine elevation of the water table.

From the field survey, a base map will be prepared for the site. The map will have an appropriate horizontal scale to show pertinent site features and all elevations will be referenced to mean sea level (MSL).

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 CAD FILE: AB201840.DWG  
 PLOT: 1-1  
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 PROJ. NO.: 595392  
 ARCHIVED:  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
 CHECKED BY:  
 APPROVED BY:  
 LAST REV DATE: 10/26/92  
 DRAWN BY: L. NIST  
 L. NIST



**FIGURE 3-5**  
**INVESTIGATION & SAMPLING LOCATIONS**  
**BUILDING A-824**  
 Prepared for:  
 NAS - KEY WEST  
 KEY WEST, FLORIDA  
**IT** INTERNATIONAL TECHNOLOGY CORPORATION

### **3.2.3.13 Sample Analysis Summary**

At the former hazardous waste storage Building A-824, the following media and number of samples will be submitted for laboratory analysis:

- Soil - 20
- Groundwater - 3
- Surface water - 4
- Sediment - 4

Table 3-1 lists the number of samples, media, and recommended analysis methods, while Figure 3-5 illustrates the proposed sampling locations.

### **3.3 Stage 2 - Sites Requiring Additional RFI Work**

A Phase I Remedial Investigation (Phase I-RI) has been performed by IT at various sites at NAS-Key West. Based on the results of the Phase I-RI study the following three sites were found to require additional investigation:

- SWMU No. 1 - Boca Chica Open Disposal Area
- SWMU No. 2 - Boca Chica DDT Mixing Area
- SWMU No. 3 - Boca Chica Fire Fighting Training Area

Based on an assessment of the data acquired from the Phase I RI, the RFI process has been reduced to a specific set of objectives for the three sites to be studied:

- Background sampling of groundwater, surface water, ocean water, soil, surficial soil, and sediment to establish background levels.
- Additional sampling of selected media and analysis to add to the existing database so as to further delineate the extent of contamination.

Evaluation of information developed in this phase, will determine future actions under the current permit.

#### **3.3.1 SWMU No. 1 - Boca Chica Open Disposal Area**

##### **3.3.1.1 Site Description**

The Boca Chica Open Disposal Area is located in the southeastern part of Boca Chica Key, between the perimeter road and Geiger Creek as shown in Figure 3-1. The site was operated originally as an open disposal and burning area from 1942 to the mid 1960s and is shown in

detail in Figure 3-6. The site received general refuse and waste associated with the operation and maintenance of aircraft. These wastes may have included waste oils, hydraulic fluids, paint thinners, and solvents.

The open disposal area consists of two areas (Figure 3-6), the burn area and the debris zone. Approximately 2,600 tons of waste from NAS-Key West were disposed of and burned at this site annually. Whenever possible, this burning area was cleared of any remaining debris left over from the burning process and deposited in an area of unknown dimensions to the north of the burning area. Because the burning operation was not a controlled process, all wastes may not have been completely destroyed.

There may exist residual wastes within the burn area and/or debris zone. The burn area is presently clear of debris with the exception of four abandoned aboveground tanks located in the northwest portion of the site. Around one tank, the sides, foundation, and ground were covered with an unknown black asphalt like substance. The remaining three tanks are clustered together near a scrap iron rod pile. ~~Much of the area is subject to tidal inundation.~~

The debris area, of unknown size, has a predominant thick cover of mangrove trees, spotted with areas of open water. Debris can still be seen lying among the mangroves and in the open areas. The presence of mangrove trees in the debris area has led to the area being classified as a wetland, protected by state and federal dredge and fill regulations. The presence of mangrove trees are also indicative of a salt water environment, suggesting the occurrence of saline water intrusion from the ocean.

### ***3.3.1.2 Existing Data***

The following information was discerned from a previous study conducted by consultants Geraghty and Miller. Four groundwater monitoring wells (KWM-05 through KWM-08) were installed to depths of 10 to 12 feet at the perimeter of the burn area. Groundwater elevations in these monitoring wells ranged from 0.56 to 0.92 feet above MSL with a general southeasterly direction of groundwater flow toward the Atlantic Ocean.

Groundwater samples were collected from each monitoring well and analyzed for pH, specific conductivity, total dissolved solids (TDS), and US EPA priority pollutants. Generally, the analytical results listed the TDS range from 24,000 to 42,000 ppm. Acid extractable,

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 PROJ. NO.: 993392  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
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 APPROVED BY:  
 LAST REV DATE: 10/24/92  
 DRAWN BY: L. NIST  
 STARTING DATE: 9/27/91  
 DRAWN BY: L. NIST

**GROUNDWATER SAMPLES**

COMPOUND	STANDARDS* μg/l	SAMPLE LOCATIONS
1,2 DICHLOROETHENE	4.2	KWM-07 6
NE = NOT ESTABLISHED		

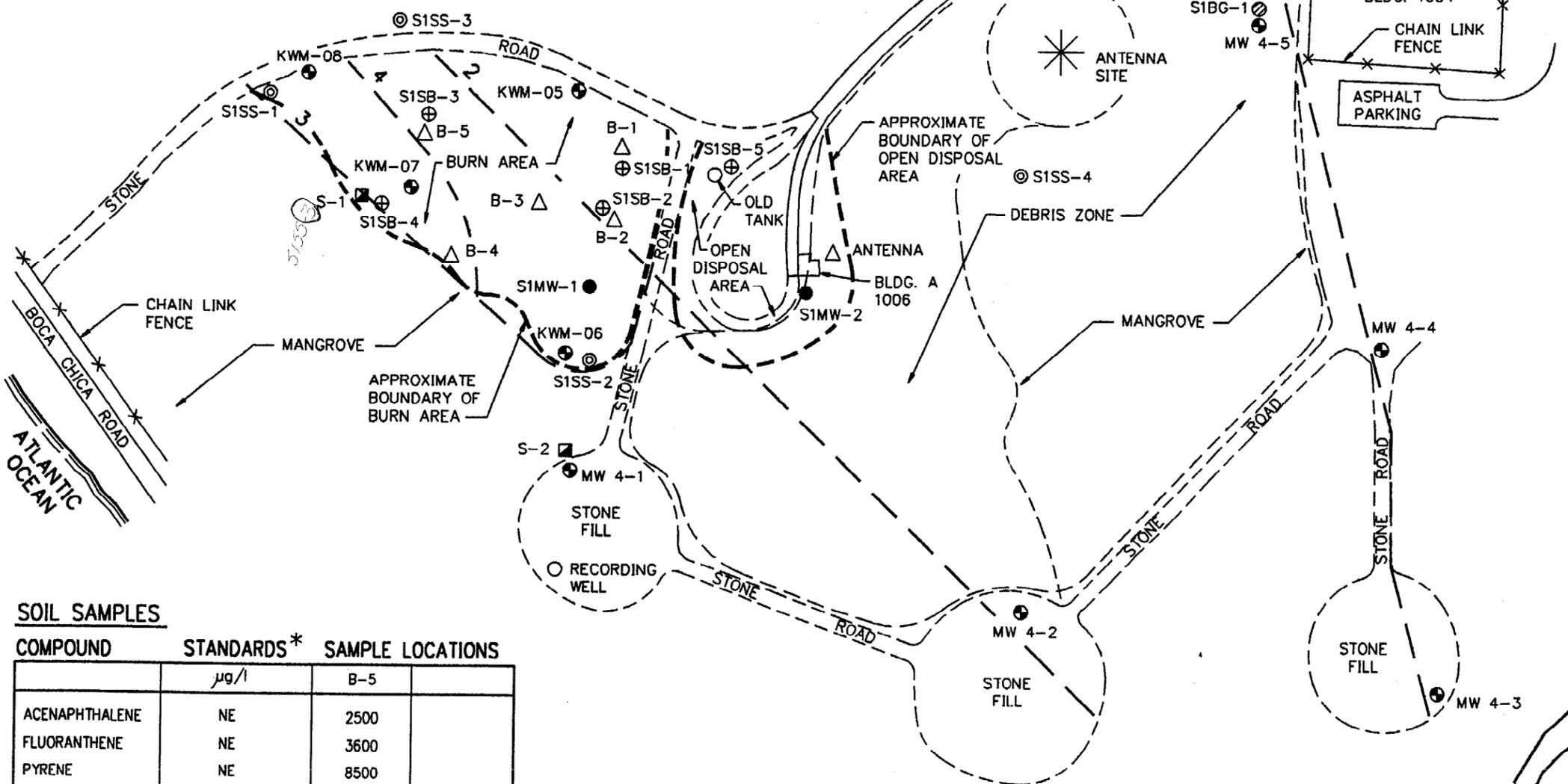
**SEDIMENT SAMPLES**

COMPOUND	STANDARDS* μg/l	SAMPLE LOCATIONS
ALDRIN	21	84
DELTA - BHC	NE	69
HEPTACHLOR EPOXIDE	38	71
ACENAPHTHYLENE	NE	13,000
ANTHRACENE	NE	6300
BENZO (a) ANTHRACENE	NE	7500
BENZO (b) FLUORANTHENE	NE	7600

COMPOUND	STANDARDS* μg/l	SAMPLE LOCATIONS
BENZO (K) FLUORANTHENE	NE	10,000
BENZO (A) PYRENE	NE	8300
BENZO (G,H,I) PERYLENE	NE	8600
CHRYSENE	NE	16,000
FLUORANTHENE	NE	8300
INDENO (1,2,3-CD) PYRENE	NE	7000
PYRENE	NE	18,000

\* STANDARDS REFERS TO A COMBINATION OF DRINKING WATER STANDARDS, FLORIDA GUIDANCE CONCENTRATIONS AND CORRECTIVE ACTION LIMITS.

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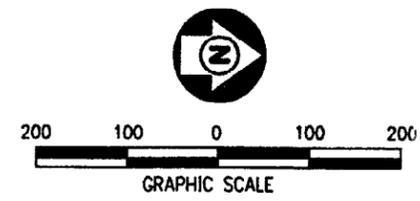


**SOIL SAMPLES**

COMPOUND	STANDARDS* μg/l	SAMPLE LOCATIONS
ACENAPHTHYLENE	NE	2500
FLUORANTHENE	NE	3600
PYRENE	NE	8500
BENZO (a) ANTHRACENE	NE	2900
CHRYSENE	NE	5900
BENZO (b) FLUORANTHENE	NE	3800
BENZO (k) FLUORANTHENE	NE	3800
BENZO (a) PYRENE	NE	3500
INDENO (1,2,3-cd) PYRENE	NE	3000
BENZO (g,h,i) PERYLENE	NE	3900
HEPTACHLOR EPOXIDE	38	120

**LEGEND**

- KWM-08 GERAGHTY & MILLER MONITORING WELL
- MW 4-2 IT CORP. MONITORING WELL
- △ B-2 BORING NO. 2
- S-1 SURFACE WATER & SEDIMENT SAMPLE NO. 1
- 2 AIR QUALITY SURVEY TRANSECT AND NUMBER
- S1MW-1 PROPOSED MONITORING WELL
- ⊕ S1SB-1 PROPOSED SOIL BORING
- ⊙ S1SS-1 PROPOSED SEDIMENT/SURFACE WATER SAMPLE
- ⊙ S1BG-1 PROPOSED BACKGROUND SOIL SAMPLE



**FIGURE 3-6**  
 INVESTIGATION & SAMPLING LOCATIONS  
 BOCA CHICA  
 OPEN DISPOSAL AREA  
 Prepared for:  
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pesticides and PCBs were not detected above the analytical method detection limit in these samples. Several VOCs were detected in concentrations at or below 16 ppb and total xylenes were detected at 35 ug/l. Several base neutral extractable compounds also were detected in concentrations of less than 10 ug/l. Only naphthalene was detected at a concentration (34 ug/l) higher than 10 ug/l. Of the metals analyzed, concentrations of mercury (0.01 mg/l), copper (0.06 mg/l), and arsenic (0.065 mg/l) were above detection limits. Existing monitoring wells KWM-05 and KWM-06 contained the highest concentrations of contaminants. If groundwater flow is towards the southeast, these wells should be upgradient of the burn area and contain no contaminants. The presence of contaminants in monitoring wells KWM-05 and KWM-06 suggests that the debris to the north (upgradient) of the burn area may be releasing contaminants to the groundwater flow system.

For the Phase I Remedial Investigation, the concentrations of compounds and metals detected in the groundwater and surface water were compared against a combination of Drinking Water Standards and standards identified in Florida Administrative Code (FAC) 17-550.310 through 320 and the Florida Groundwater Guidance Concentrations. For soils and sediments the Corrective Action Limits as per proposed rule for RCRA Corrective Action for Solid Waste Management Units at Hazardous Waste Management Facilities Subpart S was used as the comparison standard. These standards were used in the previous Phase I RI Study in order to assess impacts and decide if a release occurred. When standards were exceeded, the media was considered to be impacted. The combination of Groundwater Guidance Concentration Drinking Water Standards and Corrective Action Limits will hereafter be referred to in this document as "standards."

Two soil samples were analyzed for Resource Conservation and Recovery Act (RCRA) metals by EP Toxicity. Concentrations of these metals were all below the analytical method detection limits.

The following additional information was discerned from the Phase I RI conducted by IT at the site. A total of seven metal concentrations were detected exceeding their Standards in the groundwater at the site. Of these seven metals, lead and iron are the most dominant. Table A-2 in Appendix A lists a summary of the inorganic contaminants detected at the site during the Phase I RI study. The sample locations and levels of organic contamination detected during the Phase I RI study are presented in Figure 3-6. Volatile organics were detected in

only one groundwater sample and the reported concentrations were only slightly above their respective Standards. Because of very limited and random detections of volatile organics and metals in groundwater and surface water samples, widespread impacts due to these contaminants does not appear to be present. Although these contaminants appear to be isolated, IT considers the locations where these compounds were detected above their Standards to have been impacted.

Pesticide compounds were also detected above their Standards in the sediment, and soil samples at this site. The data indicates that the detection of pesticides may be local contamination only. Due to the isolated nature of detection, pesticide contamination is not likely to cause immediate impacts on human health or the environment. However, it is not recommended that this site be dropped from further consideration for remedial action because the metal contamination in soil and groundwater may require remedial measures.

#### Geologic and Hydrogeologic Setting

The following discussion presents the geologic and hydrogeologic setting existing at the site.

Information derived from the borings installed during the Phase I RI was used to construct a geologic framework to assess the potential for contaminant migration. The material encountered during drilling of the monitoring well boreholes consisted of fill overlying natural oolitic limestone. The fill material was encountered at the ground surface and ranged from ground surface to 8 feet BLS in the monitoring wells. Specifically, the fill encountered was composed of minor amounts of sand and gravel mixtures with slight fractions of salt and reworked crushed oolitic limestone with varying amounts of shell fragments. Natural oolitic limestone and the limestone/sand mixtures were encountered below the fill and continued to boring termination in all three boreholes (18 to 20 feet BLS). The SPT blow counts indicate that the limestone to be of medium density.

Geotechnical data was obtained from analysis of a composite soil sample collected from ground surface to 2 feet BLS from the borehole for monitoring well MW 4-1. Geotechnical data included grain size distribution, moisture content, soil pH, cation exchange capacity, and total organic carbon content and permeability. The grain size distribution indicated that the soil sample was a poorly sorted medium to coarse grained sandy gravel with a fraction of fines. The soil had a pH 7.50 and an ion exchange capacity of 35.74 meq/g. The total organic

carbon (TOC) value of 1.04 mg/kg indicated that the soil did not contain much organic matter. The vertical permeability value of the soil was  $2.29 \times 10^{-6}$  centimeters per second which is representative of a low permeability material.

The indigenous material encountered consists of oolitic limestone, hence the higher hydraulic conductivity and transmissivity values are considered to be representative of the site's geology. Hydraulic conductivity of the compacted fill material is expected to represent the lower end of the stated values previously discussed in Section 2.4.

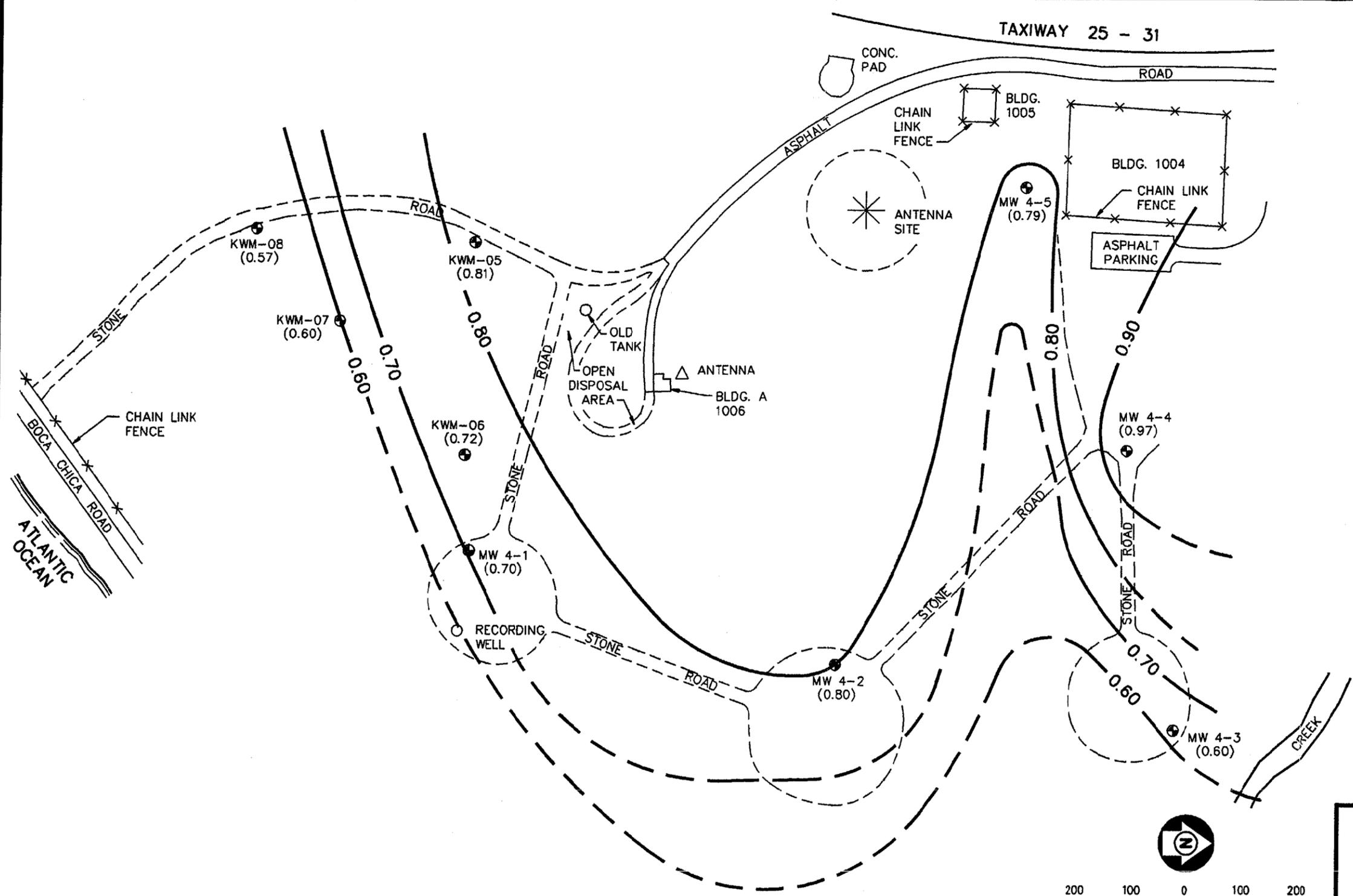
Groundwater elevations obtained at the site were contoured and are depicted on Figure 3-7. Groundwater elevations are influenced by surface water bodies and wetlands present at the site. The groundwater mound feature at the north end of the site near monitoring well MW4-5 may result from the influence of surface water present in the mangroves as shown on the site map. Groundwater at the site is suspected to discharge into the mangroves and Atlantic Ocean. Recharge of the aquifer is probably through direct infiltration of precipitation.

Groundwater levels in the recording well were continuously monitored through the month of August 1990 to assess tidal influences. This information was then compared with actual sea level fluctuations during the same time period. Sea level fluctuations ranged from approximately 0.1 feet to 2.4 feet, while fluctuations in the groundwater level ranged only from approximately 0.6 to 2.0 feet.

Based upon the information presented to date, continuing investigations should include:

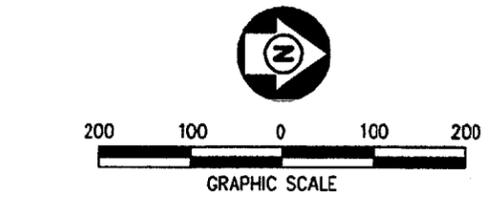
1. A background sampling program to obtain analytical data for surface soil, subsurface soil, groundwater, surface water and sediment to establish background levels for this site. The background samples will be analyzed for Appendix IX parameters.
2. Installation and sampling of two additional monitoring wells in the locations shown in Figure 3-6. This will be performed to confirm groundwater flow patterns and determine if metal concentrations are leaching into the groundwater system.
3. Performance of a Quantitative Risk Assessment.

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 LAST REV DATE: 2/18/92  
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 APPROVED BY: MLH  
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 PROJ. MGR.: M. HAMPTON  
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 PROJ. NO.: 595392  
 PLOT: 1-1



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**FIGURE 3-7**  
**GROUNDWATER ELEVATION**  
**CONTOUR MAP - AUGUST, 1990**  
**BOCA CHICA**  
**OPEN DISPOSAL AREA**  
*Prepared for:*  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**



- LEGEND**
- KWM-08 GERAGHTY & MILLER MONITORING WELL
  - MW 4-2 IT CORP. MONITORING WELL
  - (0.80) GROUNDWATER ELEVATION
  - - - 0.70 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
  - GROUNDWATER FLOW DIRECTION ARROW



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### **3.3.1.3 Utility Survey**

All utilities in the areas of the proposed sampling locations will be identified by NAS - Key West personnel prior to the commencement of field activities. If necessary, proposed sampling locations will be relocated to avoid interference with the identified utilities.

### **3.3.1.4 Ambient Air Monitoring**

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

### **3.3.1.5 Waste Characterization**

Waste characterization will not be performed during this phase of investigation based on Phase I RI recommendations.

### **3.3.1.6 Soil Investigation**

In order to evaluate the subject area, five soil borings will be installed in the locations in Figure 3-6. Four samples will be collected near former borings that were installed in the Burn Area. The remaining one sample will be collected from a location within the debris area. Surface soil samples (0-1 ft.) will be collected from the soil boring locations. Subsequent subsurface discrete soil samples will be collected using a split spoon sampler. Samples will be collected for every 5 feet of boring to a depth of 20 feet below land surface. An OVA will be used in the field to conduct a headspace analysis. One surface soil sample and one subsurface soil sample (based on visual observation and OVA readings) will be sent to the laboratory for analysis of Appendix IX parameters and three soil samples will be analyzed for TCLP parameters. Contract Laboratory Protocol (CLP) data packages will be generated on analysis of the samples. Alternate boring locations will be determined if existing sample locations are inaccessible to the drill rig without excessive disturbance (clear cutting) of the mangroves.

### **3.3.1.7 Hydrogeologic Investigation**

Two additional monitoring wells S1MW-1 and S1MW-2 are proposed to be installed in locations shown in Figure 3-6 so as to further refine the monitoring well network. Details of the well installation are presented in Section 2.4.3.1 of the SAP. The wells will be installed so that the well screen (approximately 5 to 20 feet BLS) intercepts the water table. Groundwater samples will be collected from both wells. The sample from monitoring well

S1MW-1 will be analyzed for Appendix IX parameters. Existing wells on site will also be sampled. The groundwater samples from Monitoring Well S1MW-2 as well as from all the existing wells will be analyzed for:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pesticides
- Metals

CLP data packages will be generated on analysis of the samples.

In order to obtain a better understanding of groundwater flow patterns and tidal influences on groundwater flow, water levels at the site will be monitored. A water level recorder will be placed in the furthest well (MW4-5) away from the coast and a second water level recorder will be placed at the recording well closest to the shoreline. Groundwater levels will be monitored at every hour for approximately 30 days. Groundwater levels will be measured in all monitoring wells once a week for four weeks. Four groundwater elevation maps will be prepared to better understand groundwater flow patterns at the site.

#### ***3.3.1.8 Surface Water and Sediment Investigation***

Three surface water and sediment samples (S1SS1, S1SS2 and S1SS3) will be collected from the locations shown in Figure 3-6. The surface water and sediment sample collected from location S1SS2 will be analyzed for Appendix IX parameters. The surface water and sediment samples collected from location S1SS2 will be analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pesticides
- Metals

CLP data packages will be generated on analysis of the samples. Surface water samples will be collected only if surface water is present at the time of sampling.

#### ***3.3.1.9 Background Sampling***

A background sampling and analysis program was recommended by IT to obtain analytical data for surface soil, subsurface soil, groundwater, surface water and sediments. The

background samples for surface (0-1 ft.), subsurface soil, and groundwater will be collected from locations at SWMU 3 (refer to Section 3.3.3.9 for detail). The background samples for surface water/sediment will be collected from location S1SS3. All background samples will be analyzed for Appendix IX parameters (excluding dioxin/furan compounds. CLP data packages will be generated on analysis of the samples.

Analysis of the background samples should offer site specific standards of comparison for media impact studies.

#### ***3.3.1.10 Preliminary Biological Hazard Assessment***

A preliminary biological hazard assessment will not be performed because a baseline risk assessment will be performed instead.

#### ***3.3.1.11 Baseline Risk Assessment***

IT will perform a quantitative baseline risk assessment. The risk assessment will evaluate the potential impacts of potential, current, and future exposure scenarios on public health and the environment. The specific tasks of the quantitative baseline risk assessment are:

- Identification of chemicals of concern
- Exposure assessment
- Toxicity assessment
- Risk characterization.

The objectives of the exposure assessment are to identify the potential receptors, exposure pathways, and estimate the levels of potential exposures. The toxicity assessment will examine the potential adverse health effects associated with exposure to the chemicals of concern.

The exposure and toxicity assessment will be integrated to define the general magnitude of human health risks and environmental risks. The risk characterization is based upon a Reasonable Maximum Exposure scenario so that risks can be accurately estimated to ensure protection of human health.

Endangered and threatened species, at or near the site, will be identified using information from federal, state, and local agencies. Ecological receptors will be identified for the site. Chemicals of potential concern will be identified and concentrations of these chemicals will

be measured. Exposure concentrations for ecological receptors will be estimated for the site using site specific data, data from the scientific literature, or exposure models. Exposure pathways for ecological receptors will be identified. Exposure to ecological receptors will be quantified based on the most sensitive species identified. Toxicological information about the chemicals of concern and acceptable exposure levels will be based on information from scientific literature and from promulgated standards such as Ambient Water Quality Criteria.

#### ***3.3.1.12 Topographic Mapping and Site Surveying***

A field survey will establish the horizontal and vertical control of the new monitoring well, soil boring locations, and other pertinent features, including all surface staining or other signs of contamination.

From the field survey, a base map will be prepared for this site. The map will have an appropriate horizontal scale to show pertinent site features. Elevations will be referenced to MSL.

#### ***3.3.1.13 Sample Analysis Summary***

At the Boca Chica Open Disposal Area, SWMU No. 1, the following media types and number of samples will be submitted for laboratory analyses.

- Soil - 5
- Groundwater - 11
- Surface water - 3
- Sediment - 3

Table A-1 in Appendix A lists the number of samples, media, and recommended analysis methods.

### ***3.3.2 SWMU No. 2 - Boca Chica DDT Mixing Area***

#### ***3.3.2.1 Site Description***

The location of the Boca Chica DDT Mixing Area is shown in Figure 3-1. The site is located next to a man-made drainage ditch that is connected to a large borrow pit, along the west side of Runway 13. The site is shown in detail in Figure 3-8. DDT mixing operations were conducted at the site of Building 915 (demolished in 1982) from the 1940s to the early 1970s. DDT contamination at the site reportedly occurred during the removal of a 500-gallon mixing

tank and a 1,000-gallon storage tank, both of which were located to the west of Building 915. During the removal of the tanks, some spillage reportedly occurred as per NAS-Key West records. Contamination may also have occurred when pesticides were mixed with waste fuel oil to allow the pesticide to float on the surface of any standing water in order to help destroy insect larvae.

A slight odor of pesticide was detectable at the site during the onsite survey (July 1989). A man-made drainage ditch is located just south of the site. Drainage from the ditch is to a large borrow pit to the east of the site. The area near the demolished building is now partly covered with sparse grass. The ditch has medium size mangroves around its banks. During the on site survey, numerous fish were observed in the ditch.

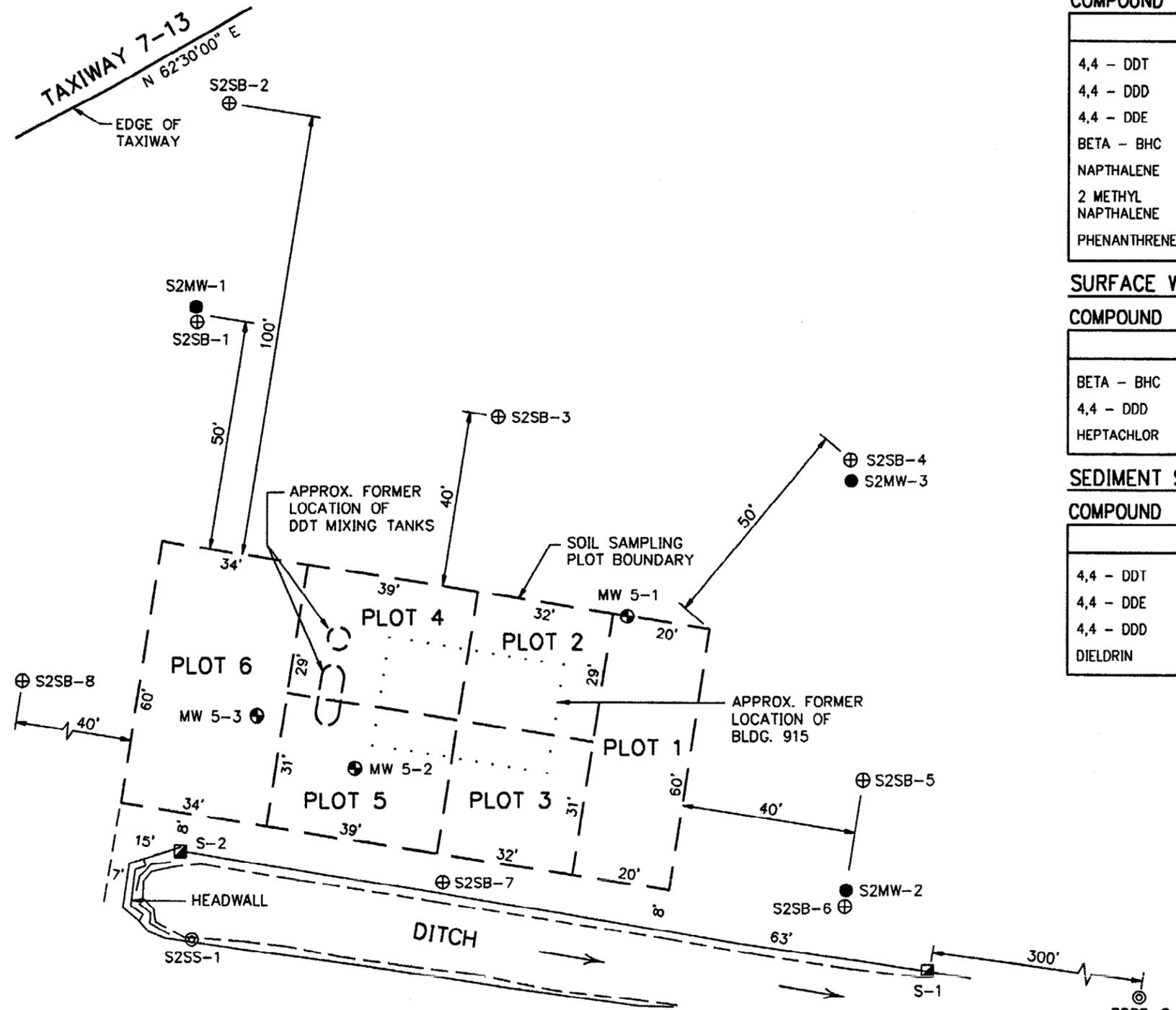
### **3.3.2.2 Existing Data**

During a previous study conducted by consultants Geraghty and Miller, the site was divided into six plots and three sample points were selected in each plot. Soil samples were collected at 1-foot depth intervals to a depth of 3 feet at each of the sampling points in the plot. The exact locations of these points are unknown. The laboratory analyses of the soil samples indicated the presence of pesticides throughout the 3-foot sampling range. The highest concentrations ranged from 80 to 936 ppm of DDT and its daughter products DDE and DDD. In addition, other pesticides including alpha-BHC, beta-BHC, gamma-BHC, and delta-BHC were detected.

During the Phase I RI study, IT collected and analyzed samples from all media. Figure 3-8 shows the levels and locations at which organic contaminants were detected. Table A-3 in Appendix A lists the levels and locations at which inorganic contaminants were detected. The site has high concentrations of pesticides in all media.

The pesticides DDD, DDE, DDT, and related chlorinated hydrocarbon pesticides were detected in the soil, sediment, surface water, and groundwater samples significantly above the established Standards. The soil samples at this site contain the highest pesticide concentration levels. Due to significant leaching in the area, these same pesticides are found to a lesser degree in the sediment and groundwater at this site. Most likely, the pesticide contamination is spread by soil erosion, and groundwater movement. Certain volatile substances such as

CAD FILE: AB201842.DWG PLOT # 1-1  
 DRAWING NO.: AB201842 PROJ. NO.: 595392  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
 CHECKED BY: L. NIST  
 APPROVED BY:  
 LAST REV. DATE: 10/28/92  
 DRAWN BY: L. NIST  
 STARTING DATE: 9/27/91  
 DRAWN BY: L. NIST



**SOIL SAMPLES**

COMPOUND	STANDARDS* µg/l	SAMPLE LOCATIONS							
		PLOT 1	PLOT 2	PLOT 3	PLOT 4	PLOT 5	PLOT 6	MW5-2	MW5-1
4,4 - DDT	1000	2,800,000	42,000	160,000	210,000	470,000	25,000	8100	1000
4,4 - DDD	1500	1,800,000	620,000	840,000	49,000	580,000	23,000	37,000	-
4,4 - DDE	1000	-	-	-	-	-	-	8400	-
BETA - BHC	NE	-	-	-	-	-	1100	-	-
NAPHTHALENE	NE	6000	-	-	-	-	-	-	-
2 METHYL NAPHTHALENE	NE	25,000	12,000	16,000	-	-	-	-	-
PHENANTHRENE	NE	2600	-	-	-	-	-	-	-

**SURFACE WATER SAMPLES**

COMPOUND	STANDARDS* µg/l	SAMPLE LOCATIONS	
		S-1	S-2
BETA - BHC	0.05	0.07	-
4,4 - DDD	0.15	-	0.24
HEPTACHLOR	0.0078	0.062	-

**GROUNDWATER SAMPLES**

COMPOUND	STANDARDS* µg/l	SAMPLE LOCATIONS		
		MW5-1	MW5-2	MW5-3
BENZENE	1	90	-	-
CHLOROBENZENE	10	210	57	-
1,2 DICHLOROETHENE	4.2	1800	-	-
ETHYLBENZENE	2	38	-	-
2 METHYL NAPHTHALENE	NE	52	-	-
NAPHTHALENE	10	46	-	-
XYLENES (TOTAL)	50	76	-	-
ALPHA - BHC	0.05	16	-	-
BETA - BHC	0.05	6.1	2.4	0.05
DELTA - BHC	0.05	15	13	0.1
4,4 - DDE	0.01	22	1.5	0.16
4,4 - DDT	0.01	34	0.72	0.16
4,4 - DDD	0.15	-	-	0.76

**SEDIMENT SAMPLES**

COMPOUND	STANDARDS* µg/l	SAMPLE LOCATIONS	
		S-1	S-2
4,4 - DDT	1000	1900	2500
4,4 - DDE	1000	2800	1800
4,4 - DDD	1500	6000	13,000
DIELDRIN	NE	<3100	-

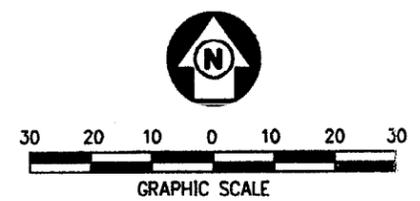
\* STANDARDS REFERS TO A COMBINATION OF DRINKING WATER STANDARDS, FLORIDA GUIDANCE CONCENTRATIONS AND CORRECTIVE ACTION LIMITS.

NE = NOT ESTABLISHED

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**LEGEND**

- ⊕ MW 5-1 IT CORP. MONITORING WELL
- ⊕ S2SB-1 PROPOSED SOIL BORING
- ⊙ S2SS-1 PROPOSED SEDIMENT/SURFACE WATER SAMPLE
- S2MW-1 PROPOSED MONITORING WELL
- ⊕ S2SB-2 PROPOSED SOIL BORING
- ⊕ S2SB-3 PROPOSED SOIL BORING
- ⊕ S2SB-4 PROPOSED SOIL BORING
- S2MW-2 PROPOSED MONITORING WELL
- ⊕ S2SB-5 PROPOSED SOIL BORING
- ⊕ S2SB-6 PROPOSED SOIL BORING
- ⊕ S2SB-7 PROPOSED SOIL BORING
- ⊕ S2SB-8 PROPOSED SOIL BORING
- S-1 SURFACE WATER & SEDIMENT SAMPLE NO. 1
- S-2 SURFACE WATER & SEDIMENT SAMPLE NO. 2
- PLOT # PLOT BOUNDARY & NUMBER



**FIGURE 3-8**  
**INVESTIGATION & SAMPLING LOCATIONS**  
**BOCA CHICA**  
**DDT MIXING AREA**  
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**KEY WEST, FLORIDA**



benzene, 1,2-dichloroethene, chlorobenzene, and naphthalene were also present in levels above their established standards in groundwater, thus further supporting the information that the site is contaminated.

Groundwater flow (and potential pesticide migration) is in a southeasterly direction into the borrow pit. Although the groundwater at the site is not piped for domestic use, the aquatic life in the surface water around this site may be contaminated with the pesticide compounds. Those organisms higher in the food chain, such as humans, ultimately may become contaminated if ingestion of the lower organisms occurs. Currently, access to this site is restricted, so public exposure to the pesticides and related compounds should not be likely now or in the future.

It should be noted that due to the frequency and concentrations of pesticides and related compound detection at the site, remedial action eventually will be required. The limited accessibility of the site to the public indicates that an immediate remedial action plan is not necessary, however, IT recommends the following actions: (1) continued restriction of civilian and military personnel to the site; (2) background sampling of all media for use in a risk assessment study ; (3) performance of a quantitative baseline risk assessment; (4) additional sampling of selected media and analysis to add to the existing database so as to further delineate the extent of contamination. EPA has specified that a corrective measures study must be performed at the site in the near future. Data obtained from the Phase II remedial investigation study will be used in conjunction with the existing data as the basis for the corrective measures study.

#### Geologic and Hydrogeologic Setting

The following discussion presents the geologic and hydrogeologic setting existing at the site.

Information derived from the borings during the Phase I RFI was used to construct a geologic framework that was utilized to assess the potential for contaminant migration. The material encountered during drilling of the monitoring well boreholes consisted of fill sands, reworked limestone, gravel and natural oolitic limestone. Specifically, the fill encountered was composed of minor amounts of sand and gravel mixtures with slight fractions of silt and reworked crushed oolitic limestone with varying amounts of shell fragments. Natural oolitic

limestone and limestone/sand mixtures were encountered continuously to boring termination in all three boreholes (10 feet BLS).

Geotechnical data were obtained from the analysis of a composite soil sample. Geotechnical data included grain size distribution, moisture content, soil pH, cation exchange capacity, total organic carbon content, and permeability. Grain size analysis indicates that the soil sample was a silty, medium to fine grained sand with 12 percent passing a 200 mesh sieve. The pH of the sample was 8.25, which is expected because of the abundance of carbonate soils and rocks. The ion exchange capacity was 39.37 meq/g. The TOC content of the soil was 6,600 mg/kg. The permeability was  $9.05 \times 10^{-6}$  centimeters per second, which is representative of a sandy clay.

The indigenous subsurface material encountered at the site consists of oolitic limestone, hence the higher hydraulic conductivity values discussed in Section 2.4 are considered representative. Hydraulic conductivity of the compacted fill material is expected to be at the lower end of the values stated in Section 2.4, and is representative of a silty sandy soil.

Groundwater was encountered at approximately 1.5 feet BLS during installation of the monitoring wells. This level is influenced by seasonal rainfall variations. The water table is higher during the rainy summer season (June through October) and lower during the drier months (January through May) with the highest levels occurring in September and the lowest in May. Water level data was obtained in August and most likely is near the seasonal high. The vadose zone occurs in soils above the water table and, considering the rainfall, appears to have an average thickness of approximately 1.5 to 2 feet.

Groundwater levels collected for this site were contoured, and are depicted on Figure 3-9. Groundwater flow is suspected to be towards the southeast and mainly discharges into the Atlantic Ocean. Recharge of the aquifer is probably through direct infiltration of precipitation.

### ***3.3.2.3 Utility Survey***

All utilities in the areas of the proposed sampling locations will be identified by NAS - Key West personnel prior to the commencement of field activities. If necessary, proposed sampling locations will be relocated to avoid interference with the identified utilities.

#### **3.3.2.4 Ambient Air Monitoring**

For health and safety reasons, an OVA will be used during all subsurface work as required by the Health and Safety Plan (HSP).

#### **3.3.2.5 Waste Characterization**

The waste has been sufficiently characterized during the Phase I RI study. As a result, waste characterization will not be performed during this phase of investigation based on Phase I recommendations.

#### **3.3.2.6 Soils Investigation**

In order to further delineate the extent of soil contamination, a total of eight additional soil borings will be installed around the site. The proposed sampling locations are shown in Figure 3-8. Surface sampling will be performed at the eight proposed boring locations shown in Figure 3-8. Discrete split spoon samples will be collected from the surface (0-1 ft.) and subsurface for every five feet of boring. The borings will be terminated at a depth of 20 feet. Based on visual observation and field screening by an OVA, two soil samples will be collected per boring locations in order to delineate contamination. One surface soil sample and one subsurface soil sample collected from an area which potentially has the most contamination will be analyzed for Appendix IX parameters (including dioxins and furans). The remaining soil samples will be analyzed for the following parameters:

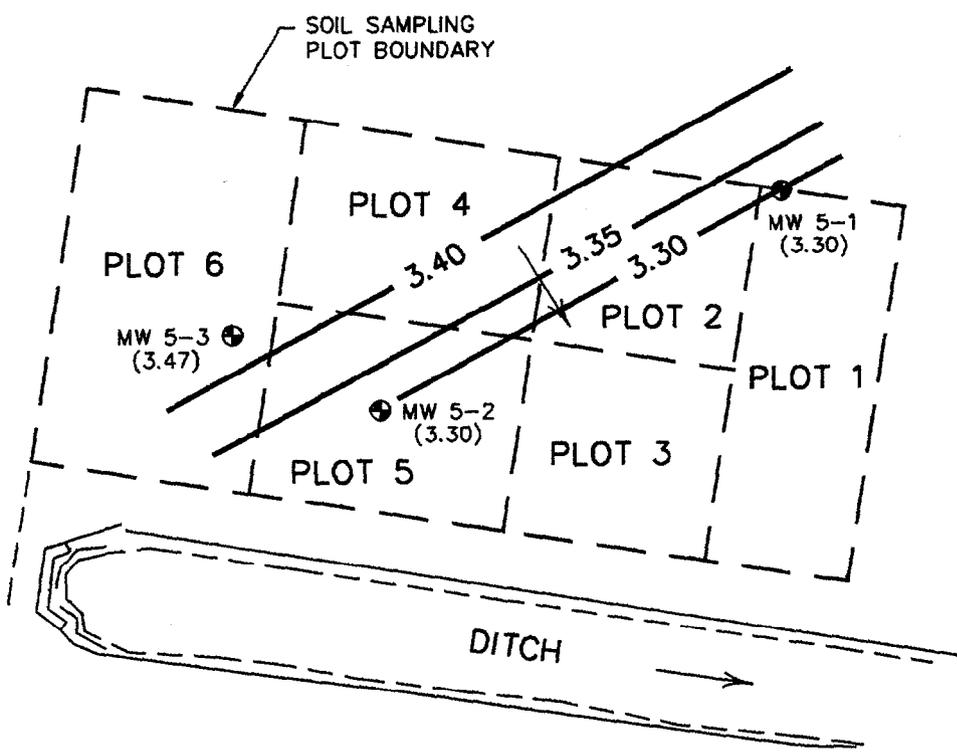
- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenyls/Pesticides
- Metals

CLP data packages will be generated on analysis of the samples.

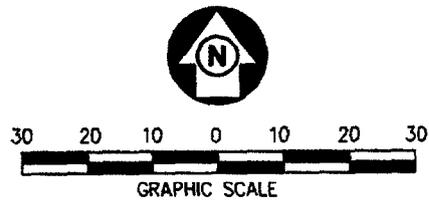
#### **3.3.2.7 Hydrogeologic Investigation**

Three additional monitoring wells S2MW-1, S2MW-2 and S2MW-3 will be installed at the locations shown in Figure 3-8. The soil boring locations S2SB1, S2SB4 and S2SB6 will be converted to monitoring wells. Monitoring well S2MW-1 will serve as a background well. Monitoring wells S2MW-2 and S2MW-3 have been located so that groundwater contamination to the northeast and southeast can be delineated. Well installation details are presented in Section 2.4.3.1 of the SAP.

STARTING DATE: 9/27/91	INITIATOR: S. PILLAI	DRAWING NO.: A1/D2278	CAD FILE: FG3-9.DWG	PLOT 1 of 1
DRAWN BY: L. NIST	PROJ. MGR.: M. HAMPTON	PROJ. NO.: 595392	ARCHIVED:	
LAST REV DATE: 2/18/92	CHECKED BY: <i>SP</i>			
DRAWN BY: L. NIST	APPROVED BY: <i>MH</i>			



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- LEGEND**
- ⊕ MW 5-1 IT CORP. MONITORING WELL
  - (3.30) GROUNDWATER ELEVATION
  - 3.40 GROUNDWATER ELEVATION CONTOUR
  - GROUNDWATER FLOW DIRECTION ARROW

**FIGURE 3-9**

**GROUNDWATER ELEVATION  
 CONTOUR MAP - AUGUST, 1990**

**BOCA CHICA  
 DDT MIXING AREA**

*Prepared for:*

**NAS - KEY WEST  
 KEY WEST, FLORIDA**

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Groundwater level measurements will be collected from the three existing wells and the proposed additional monitoring wells once a week for four weeks. Four groundwater elevation maps will be prepared to confirm the hydraulic gradient and the direction of groundwater flow.

Groundwater samples will be collected from monitoring wells S2MW-1, S2MW-2, S2MW-3 and the three existing wells on site for a total of six (6) wells. The groundwater sample collected from monitoring well MW5-1 will be submitted for laboratory analysis of the complete list of Appendix IX parameters (including dioxins and furans). Groundwater samples from S2MW-2, S2MW-3 and the three existing wells on site will be analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenyls/Pesticides
- Metals

CLP data packages will be generated on analysis of the samples.

### ***3.3.2.8 Surface Water and Sediment Investigation***

Two surface water and sediment samples will be collected from the locations S2SS-1 and S2SS-2 shown in Figure 3-8. The samples collected from location S2SS-1 will be used as background and the sample collected from location S2SS2 will be analyzed for the complete list of Appendix IX parameters (including dioxins and furans).

### ***3.3.2.9 Background Sampling***

A background sampling and analyses program is recommended by IT to obtain analytical data for surface soil, subsurface soil, groundwater, surface water and sediments. The background samples for surface (0-1 ft.) and subsurface soil will be collected from the vicinity of sample location S2SB-2. The background samples for groundwater will be collected from S2MW1 and for surface water/sediment from location S2SS-1. All background samples will be analyzed for Appendix IX parameters (including dioxin/furan compounds). CLP data packages will be generated on analysis of the samples. The soil and groundwater samples would also be representative of background conditions at SWMU 4 and SWMU 5.

Analysis of the background samples should offer site specific standards of comparison for media impact studies.

#### **3.3.2.10 Preliminary Biological Hazard Assessment**

A preliminary biological hazard assessment as described in Section 3.1.8 will not be performed for this SWMU.

#### **3.3.2.11 Baseline Risk Assessment**

IT will perform a quantitative baseline risk assessment. The risk assessment will evaluate the potential impacts of potential, current and future exposure scenarios on public health and the environment. The specific tasks of the quantitative baseline risk assessment are:

- Identification of chemicals of concern
- Exposure assessment
- Toxicity assessment
- Risk characterization.

The objectives of the exposure assessment are to identify the potential receptors, exposure pathways, and estimate the levels of potential exposures. The toxicity assessment will examine the potential adverse health effects associated with exposure to the chemicals of concern.

The exposure and toxicity assessment will be integrated to define the general magnitude of human health risks and environmental risks. The risk characterization is based upon a Reasonable Maximum Exposure scenario so that risks can be accurately estimated to ensure protection of human health.

Endangered and threatened species, at or near the site, will be identified using information from federal, state, and local agencies. Ecological receptors will be identified for the site. Chemicals of potential concern will be identified and concentrations of these chemicals will be measured. Exposure concentrations for ecological receptors will be estimated for the site using site specific data, data from the scientific literature, or exposure models. Exposure pathways for ecological receptors will be identified. Exposure to ecological receptors will be quantified based on the most sensitive species identified. Toxicological information about the

chemicals of concern and acceptable exposure levels will be based on information from scientific literature and from promulgated standards such as Ambient Water Quality Criteria.

#### **3.3.2.12 Topographic Mapping and Site Surveying**

A field survey will establish the horizontal and vertical control of the new monitoring well, soil boring locations, and other pertinent features, including all surface staining or other signs of contamination.

From the field survey, a base map will be prepared for this site. The map will have an appropriate horizontal scale to show pertinent site features. Elevations will be referenced to MSL.

#### **3.3.2.13 Sample Analysis Summary**

At the Boca Chica DDT Mixing Area SWMU No. 2, the following media and number of samples will be submitted for laboratory analysis:

- Soil - 16
- Groundwater - 6
- Surface water - 2
- Sediment - 2

Table A-1 in Appendix A lists the number of samples, media, and recommended analysis methods.

### **3.3.3 SWMU No. 3 - Boca Chica Fire Fighting Training Area (IR Site 10)**

#### **3.3.3.1 Site Description**

The Boca Chica Fire Fighting Training Area is located on Boca Chica Key and is shown in Figure 3-1. The area is located to the south and southwest of the southern blimp pad and is shown in detail in Figure 3-10. The fire training facility consists of two unlined circular pits approximately 20 feet in diameter and 2 to 3 feet in depth. The pits are surrounded by a gravel apron. The fire pit area is reported to be used only occasionally during the year during training sessions. Each time a training session occurs, flammable liquids such as JP-5, waste oils or hydraulic fluids are poured onto mock vehicles/planes within the pit and ignited. The

area surrounding the vehicles/planes shows visible evidence of burning and oil staining from past training exercises.

### ***3.3.3.2 Existing Data***

Ten soil borings and two shallow monitoring wells (KWM-18 and KWM-19) were installed in a previous investigation by Geraghty and Miller to a depth of approximately 11 feet. Groundwater quality samples were collected from the monitoring wells and analyzed for VOCs, PCBs, and TDS. Results of these analyses indicate that the concentrations of TDS were 2,200 ppm in monitoring well KWM-18 and 38,000 ppm in monitoring well KWM-19. PCBs were not detected in the groundwater samples collected from this site and only methylene chloride (believed to be an artifact of the analytical laboratory) was detected in the VOC analyses.

The following additional information was discerned from the Phase I RI work conducted at the site. The metals chromium and manganese were detected above their established standards in groundwater samples collected at the site. However, the detections of these metals were random and isolated.

In addition, some volatile organic compounds were detected above their established standards in groundwater samples at this site. These compounds include benzene, ethyl benzene, and naphthalene. Concentrations of these volatile organics also appear isolated in nature and were reported only slightly above the established standards. A widespread impact of volatile organics is not likely, based on a current understanding of the site. Figure 3-10 lists the levels and locations of organic contamination detected at the site. Table A-4 in Appendix A lists levels and locations of inorganic contamination detected at the site during the Phase I-RI study.

Groundwater flow at the site is to the southwest. Elevated levels of volatile and semi-volatile organic compounds were present in the downgradient wells. The groundwater at this site is not used as a public/domestic water supply system; therefore, exposure of human beings to these contaminants at the site would not be expected to occur.

Based upon the information gathered to date, further investigation is necessary to determine the actual extent of suspected contamination. Continuing investigations should include: (1)

sampling of the nearby shore and lagoon sediments. (2) installation of additional wells to further delineate contamination (3) installation of soil borings in the fire fighting areas, and (4) background sampling of all media.

#### Geologic and Hydrogeologic Setting

The following description presents the geologic and hydrogeologic setting existing at the site.

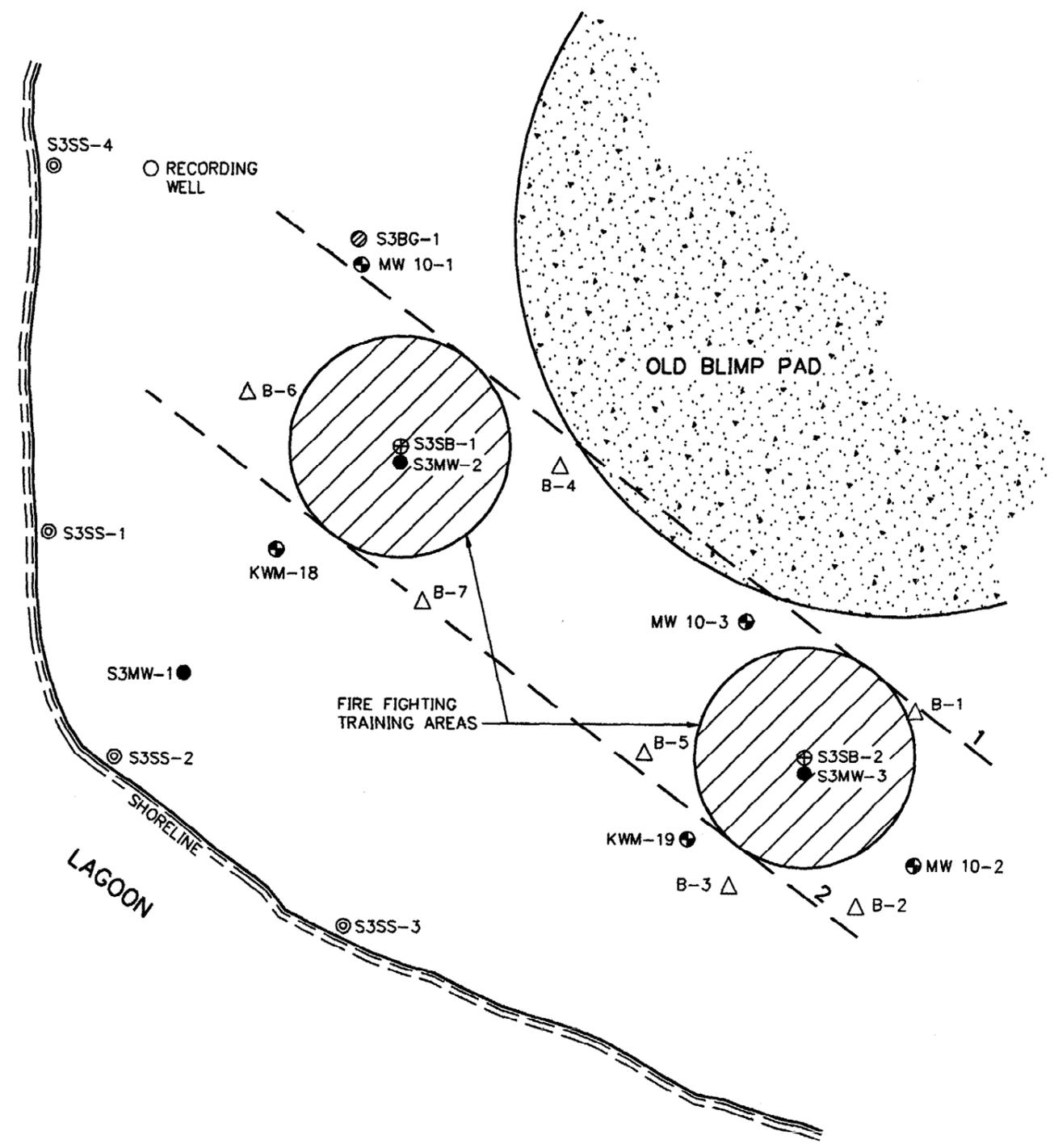
Information derived from the borings installed during the Phase I RI was used to construct a geologic framework to assess the potential for contaminant migration. The material encountered during drilling of the boreholes consisted of reworked limestone gravel that was encountered at the ground surface and extended to boring termination at 10 feet BLS. Specifically, fill encountered was composed of reworked crushed oolitic limestone with slight fractions of silt near the surface. Standard Penetration Test (SPT) blow counts indicate that the fill is mostly medium to very dense, suggesting that compaction efforts may have been used during placement; or that the fill has been in place for a relatively long time; or both. Debris was not encountered during the drilling of the boreholes.

Geotechnical data were obtained from the analysis of a composite soil sample collected from 2 to 8 feet BLS from Boring B-2. Geotechnical data included grain size distribution, moisture content, soil pH, cation exchange capacity, total organic carbon content and permeability. Grain size analysis indicates that the soil sample is a well graded gravelly, medium to coarse grained sand with a minor fraction of fines (17.8 percent). The pH of the sample was 8 as was expected because of the natural condition (carbonate soils and rocks). The ion exchange capacity is 44.22 meq/g.

The TOC (0.73 mg/kg) is low as compared to the other values, indicating little organic matter. The permeability value was  $9.55 \times 10^{-6}$  centimeters per second, which is representative of a fine sand.

Groundwater levels collected for this site were plotted and contoured, and are depicted on Figure 3-11. Elevation contours indicate that groundwater is moving toward the lagoon area. Recharge of the aquifer is probably through direct infiltration of precipitation.

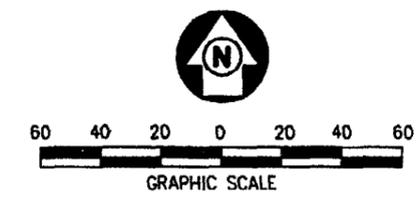
STARTING DATE: 9/27/91  
 DRAWN BY: L. NIST  
 LAST REV DATE: 10/24/92  
 DRAWN BY: L. NIST  
 CHECKED BY:  
 APPROVED BY:  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
 DRAWING NO.: AB201843  
 PROJ. NO.: 59392  
 CAD FILE: AB201843.DWG  
 PLOT: 1=1  
 ARCHIVED:



COMPOUND	STANDARDS*		SAMPLE LOCATIONS			
	μg/l		MW10-2	MW10-3	KWM-18	KWM-19
BENZENE	1		-	-	11	-
ETHYLBENZENE	2		-	-	15	-
NAPHTHALENE	10		-	-	39	-

\* STANDARDS REFERS TO A COMBINATION OF DRINKING WATER STANDARDS, FLORIDA GUIDANCE CONCENTRATIONS AND CORRECTIVE ACTION LIMITS.

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- LEGEND**
- KWM-18 GERAGHTY & MILLER MONITORING WELL
  - S3MW-1 PROPOSED MONITORING WELL
  - ⊕ MW 10-1 IT CORP. MONITORING WELL
  - ⊕ S3SB-1 PROPOSED SOIL BORING
  - RECORDING WELL
  - ⊙ S3SS-1 PROPOSED SEDIMENT/SURFACE WATER SAMPLE
  - △ B-2 BORING NO. 2
  - ⊙ S3BG-1 PROPOSED BACKGROUND SOIL SAMPLE
  - 2 AIR QUALITY SURVEY TRANSECT AND NUMBER

**FIGURE 3-10**  
**INVESTIGATION & SAMPLING LOCATIONS**  
**BOCA CHICA, FIRE FIGHTING TRAINING AREA**  
 Prepared for:  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**  
 **INTERNATIONAL TECHNOLOGY CORPORATION**

0070007

Based upon the groundwater flow map, the hydraulic gradient is relatively flat inland and becomes steeper near the shoreline areas of the lagoon.

#### ***3.3.3.3 Utility Survey***

All utilities in the areas of the proposed sampling locations will be identified by NAS - Key West personnel prior to the commencement of field activities. If necessary, proposed sampling locations will be relocated to avoid interference with the identified utilities.

#### ***3.3.3.4 Ambient Air Monitoring***

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

It should be noted that part of this facility currently is still in use and will likely contain volatile organic vapors as a result of the presence of waste fuel (used to ignite the mock airplanes for training purposes).

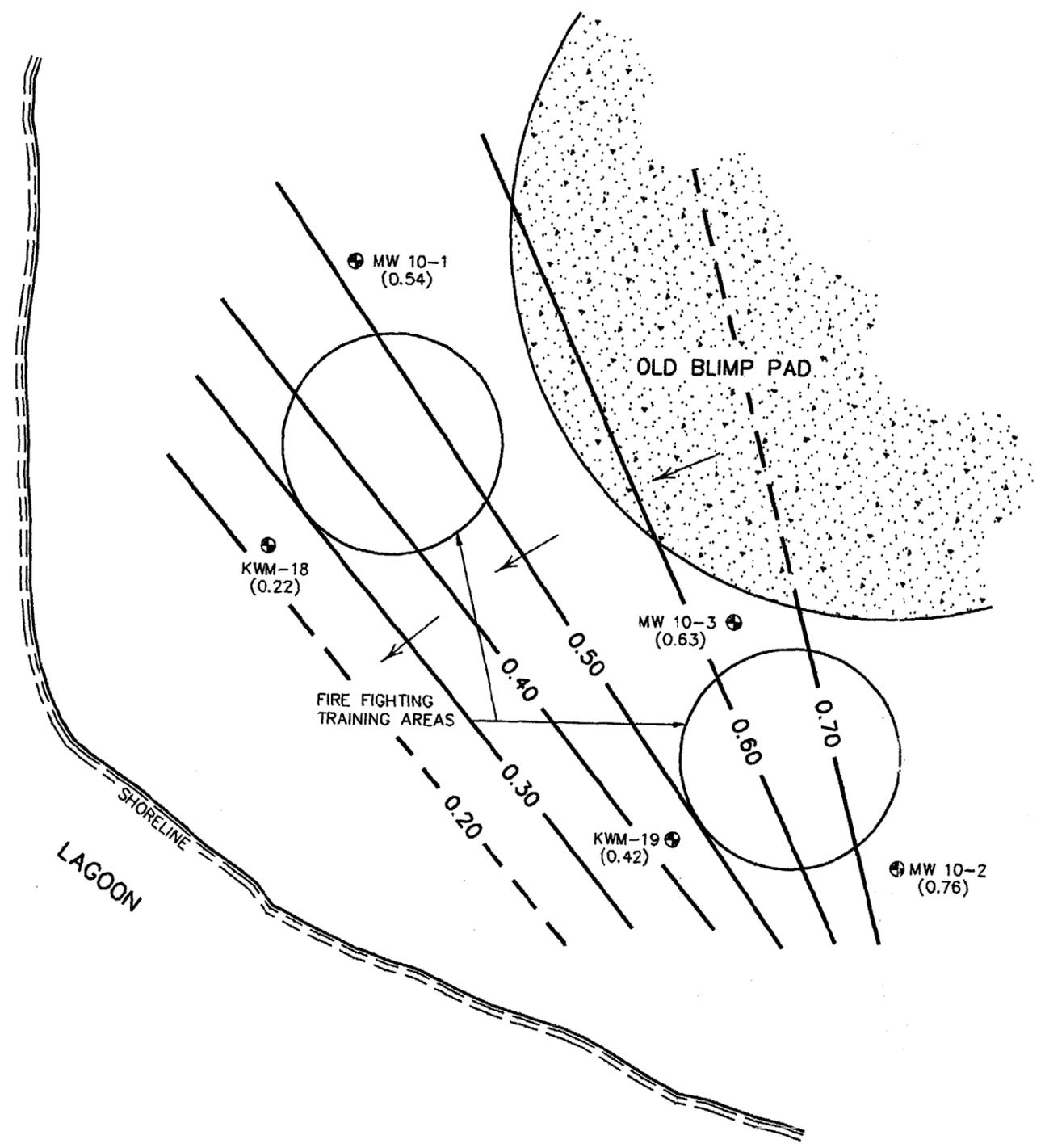
#### ***3.3.3.5 Waste Characterization***

Waste characterization will be performed in conjunction with the soil boring program during this phase of investigation.

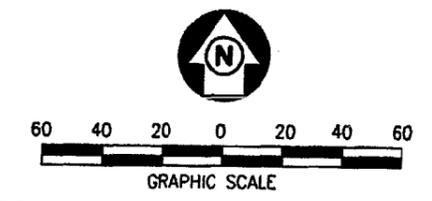
#### ***3.3.3.6 Soil Investigation***

One soil boring will be installed at the center of each fire fighting area (for a total of two soil borings) in order to better characterize the waste components in the source areas. The soil boring locations are shown in Figure 3-10. Surface samples will be collected from the first 1-foot of soil. Discrete subsurface samples will be collected using a split spoon sampler. One subsurface sample will be collected for every five feet of boring and the boring will be terminated at a depth of 10 feet. Based on visual observations and field screening with an OVA, two surface and two subsurface samples from the boring locations will be submitted to the laboratory for analysis. One surface and one subsurface sample will be analyzed for Appendix IX parameters. The remaining samples will be analyzed for the following parameters:

START: E: 9/27/91  
 DRAWN BY: L. NIST  
 LAST REV DATE: 2/19/92  
 CHECKED BY: S. PILLAI  
 APPROVED BY: MZ  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
 DRAWING NO.: A10202276  
 PROJ. NO.: 595392  
 CAD FILE: FIG3-11.DWG  
 ARCHIVED: PLOT 1-1



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 MIAMI, FLORIDA 33157



- LEGEND**
- ⊕ KWM-18 GERAGHTY & MILLER MONITORING WELL
  - ⊕ MW 10-2 IT CORP. MONITORING WELL  
(0.76) GROUNDWATER ELEVATION
  - 0.70 GROUNDWATER ELEVATION CONTOUR  
(DASHED WHERE INFERRED)
  - GROUNDWATER FLOW DIRECTION ARROW

**FIGURE 3-11**  
 GROUNDWATER ELEVATION  
 CONTOUR MAP - AUGUST, 1990  
 BOCA CHICA, FIRE  
 FIGHTING TRAINING AREA  
*Prepared for:*  
 NAS - KEY WEST  
 KEY WEST, FLORIDA



- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenyls
- Metals

### **3.3.3.7 Hydrogeologic Investigation**

Sampling conducted during the Phase I RI study shows that contamination was detected only at monitoring well KWM-18. Groundwater samples obtained from monitoring well KWM-19 (which is downgradient of the southern fire fighting area) showed no contamination. In order to further delineate contamination in the groundwater, one monitoring well, S3MW-1, will be installed downgradient of KWM-18 in the location shown in Figure 3-10. Additionally, two monitoring wells, S3MW2 and S3MW3, will be installed at the center of each fire fighting training area at the same location as soil borings S3SB1 and S3SB2, respectively. The groundwater sample collected from S3MW2 will be analyzed for Appendix IX and the remaining samples will be analyzed for the following:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenyls
- Metals

Groundwater levels will be measured in all monitoring wells once a week for four weeks. Four groundwater elevation maps will be prepared to better understand flow patterns at this site.

### **3.3.3.8 Surface Water and Sediment Investigation**

Four sediment samples will be collected from the nearby shore area and lagoon using a ponar dredge at the sample locations shown in Figure 3-10. Actual sample locations, however, may vary based on field judgement. Surface water samples will also be collected from the locations at which sediment samples are collected. One surface water sample and one sediment sample collected from location S3SS2 will each be analyzed for the Appendix IX parameters. The remaining surface water and sediment samples will be analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons

- Polychlorinated Biphenyls
- Metals

#### ***3.3.3.9 Background Sampling***

A background sampling and analyses program is recommended by IT to obtain analytical data for surface soil, subsurface soil, groundwater, surface water and sediments. The background samples for surface (0-1 ft.) and subsurface soil will be collected from the vicinity of sample location S3BG-1. The background samples for groundwater will be collected from MW10-1 and for surface water/sediment from location S3SS-4. All background samples will be analyzed for Appendix IX parameters (excluding dioxin/furan compounds). The soil and groundwater samples would also be representative of background conditions at SWMU 1.

Analysis of the background samples should offer site specific standards of comparison for media impact studies.

#### ***3.3.3.10 Preliminary Biological Hazard Assessment***

A preliminary biological hazard assessment as described in Section 3.1.8 will be performed for this SWMU.

#### ***3.3.3.11 Baseline Risk Assessment***

A baseline risk assessment is not proposed at this time.

#### ***3.3.3.12 Topographic Mapping and Site Surveying***

A field survey will establish the horizontal and vertical control of the additional monitoring well, soil boring and other pertinent features. The top of well casing of the monitoring well will be measured to determine elevation. From this survey, a base map will be prepared for the site. The map will have an appropriate horizontal scale to show pertinent site features and all elevations will be referenced to MSL.

#### ***3.3.3.13 Sample Analysis Summary***

At the Boca Chica Fire Fighting Training Area SWMU No. 3, the following media and numbers of samples will be submitted for laboratory analyses.

- Soil - 6
- Groundwater - 8
- Surface water - 4
- Sediment - 4

Table A-1 in Appendix A lists the number of samples, media, and recommended analysis methods.

## 4.0 Characterization of Installation Restoration Sites

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The sites contained in Section 4.0 are the Installation Restoration (IR) sites requiring Phase II RI work and sites requiring initial Phase I RI work. This section presents the rationale used to separate the sites into stages of work.

Stage 3 sites are IR sites that have already been investigated, as part of the Phase I Remedial Investigation efforts, but require additional sampling and analysis for better characterization.

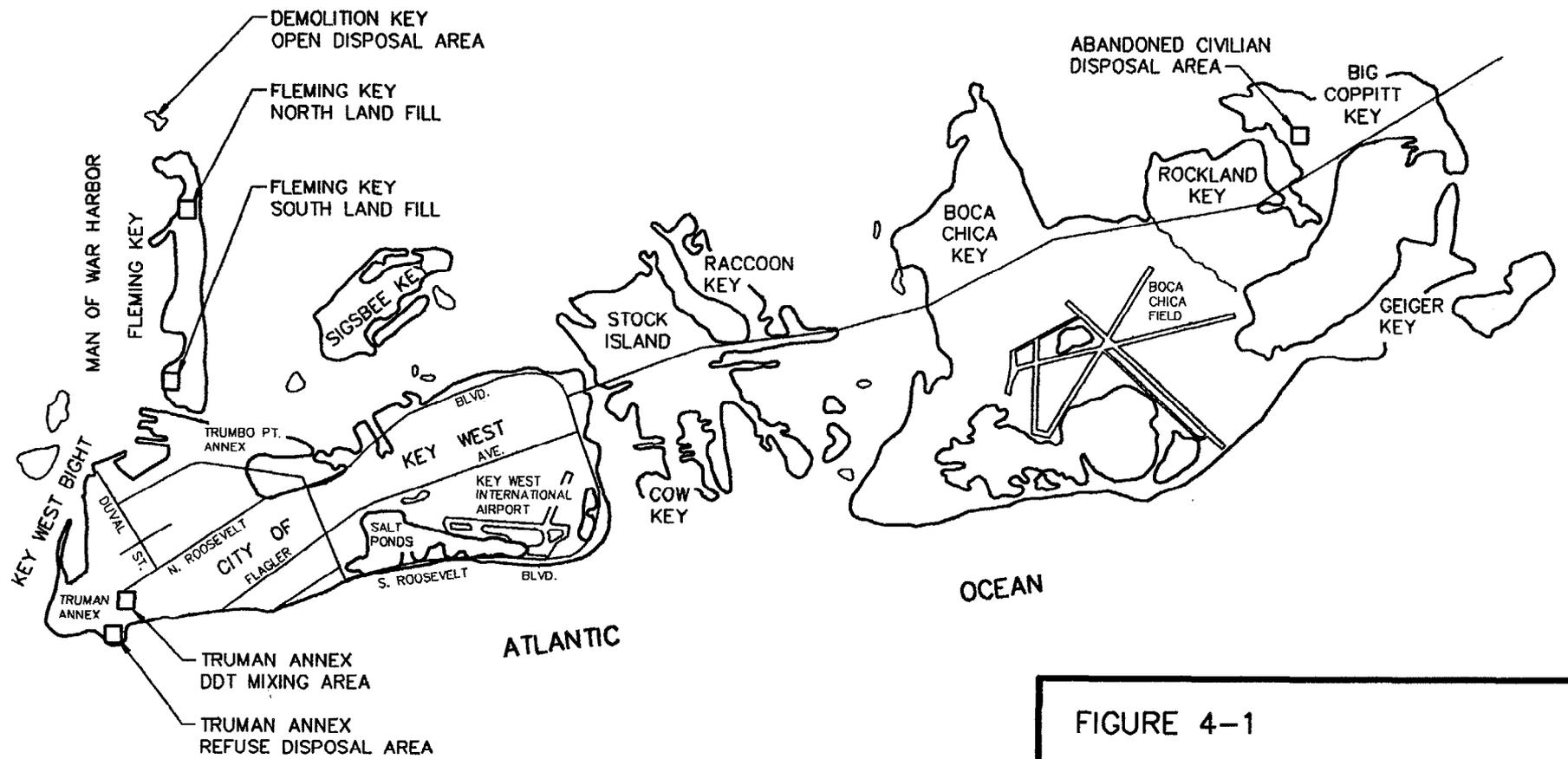
Stage 4 sites have been added at this time to receive Phase I RI. This work will confirm the presence or absence of media impacts.

The IR sites are grouped accordingly:

- Stage 3 - Sites requiring additional Phase II RI work
  - IR Site No. 1 - Truman Annex Refuse Disposal Area
  - IR Site No. 3 - Truman Annex DDT Mixing Area
  - IR Site No. 7 - Fleming Key North Landfill
  - IR Site No. 8 - Fleming Key South Landfill
  
- Stage 4 - Sites requiring a Phase I RI
  - Big Coppitt Key - Abandoned Civilian Disposal Area
  - Demolition Key - Open Disposal Area

The 6 IR sites are identified in the vicinity map shown in Figure 4-1. A description of investigation techniques to be used for this study are discussed in Section 4.1. The specific investigative approaches to be implemented at each of the 6 IR sites at NAS-Key West are described in Sections 4.2 through 4.3. Conditions encountered in the field may necessitate changes to the specific investigation approaches. The field methods and analytical techniques to be utilized are discussed in more detail in the Sampling and Analysis Plan (SAP) which is submitted under separate cover.

STARTING	2/20/92	LAST REV DATE: 2/24/92	CHECKED BY:	38	INITIATOR: S. PILLAI	DRAWING NO.: AA201844	CAD FILE: AA20184	PLOT ● 1=1
DRAWN BY: L. NIST		DRAWN BY: L. NIST	APPROVED BY:	MV	PROJ. MGR.: M. HAMPTON	PROJ. NO.: 595392	ARCHIVED:	



**FIGURE 4-1**

**LOCATION OF NAVAL ACTIVITIES AND STUDY SITES**  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**

*Prepared for:*  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**

**IT** INTERNATIONAL TECHNOLOGY CORPORATION



NOT TO SCALE

SOURCES: 1) FREDERICK H. HILDERBRANDT, INC.  
ENGINEERS-SURVEYORS-PLANNERS  
15321 S. DIXIE HWY., SUITE 202  
MIAMI, FLORIDA 33157

2) GERAGHTY AND MILLER, INC.

#### **4.1 Methods of Investigation**

In an effort to develop an accurate and comprehensive understanding of actual site conditions the following investigative methods are listed as potential tools to be utilized depending on the site's stage of work.

- Utility survey
- Ambient air monitoring
- Waste characterization
- Soils investigation
- Hydrogeologic investigation
- Surface water and sediment investigation
- Background characterization
- Preliminary Biological Hazard Assessment
- Baseline Risk Assessment
- Sample analysis.

Each of the above referenced areas are addressed in the following sections.

##### **4.1.1 Utility Survey**

NAS-Key West personnel will identify and mark the locations of all known utilities at all sites prior to work. This information will be provided to IT field personnel and is necessary to ensure that the locations selected for drilling and/or other investigative techniques are free of obstructions that would otherwise endanger site investigation personnel or interfere with station operations. Alternate locations will be selected where data indicate the presence of utilities. Authorization for drilling will be obtained from NAS-Key West prior to commencement of drilling activities.

##### **4.1.2 Ambient Air Monitoring**

During all subsurface activities, ambient air conditions will be monitored using an organic vapor analyzer (OVA) equipped with either a photoionization or flame ionization detector as described in Section 6.0 of the Health and Safety Plan (HSP).

#### **4.1.3 Waste Characterization**

Waste characterization will be performed at the Stage 4 sites in conjunction with the soil boring program. The waste has been characterized during the Phase I RI study for the Stage 3 sites.

#### **4.1.4 Soils Investigation**

Activities to assess contamination in surface soils will include collection of soil samples and their subsequent laboratory analyses. Headspace analysis of surface soil samples will be performed in the field to detect the presence of organic vapors and to help in selecting appropriate samples for laboratory analysis if organics are suspected.

To confirm the chemical characteristics of the soils underlying the waste units, a soil boring program will be implemented. For the sites at which a Phase I-RI has already been performed, sampling will be carried out with the aim of further delineating the extent of soil contamination. Surface soil samples will be collected using a trowel and a pan. Subsurface soil samples will be collected using a split spoon sampler, hand auger, or similar device. A geologic log will be prepared for each borehole. Headspace analyses of soil borings will be performed in the field to detect the presence of organic vapors for selection of appropriate samples for analysis. Soil sampling and boring techniques are described in Section 2.4 of the SAP. Soil samples will be submitted for laboratory analyses for chemical characterization.

#### **4.1.5 Hydrogeologic Investigation**

The hydrogeologic system at each site influences the horizontal and vertical extent of groundwater contamination. Specifically, the permeability of the sediments and the boundaries of the groundwater flow system will determine the flow path along which contaminants, if any, will travel.

As approved by EPA, the monitoring wells that are to be installed for this investigation will be constructed of 2-inch diameter PVC casing and screen enveloped by a sand pack, bentonite seal and neat cement grout as shown in Figure 3-2. All monitoring wells will have protective steel casings that can be locked. Well completion logs will be prepared for each monitoring well. Monitoring well installation and construction is described in detail in Section 2.4.3.1 of the SAP.

Groundwater levels will be measured once a week for four weeks at all existing and new monitoring wells at all sites. Water level measurement techniques are described in more detail in Section 2.4.5 of the SAP. Based on the measured groundwater levels, groundwater elevation maps will be prepared for each site in order to better understand the flow patterns. At IR sites 1 (Truman Annex Refuse Disposal Area) and 7 (Fleming Key North Landfill) and 8 (Fleming Key South Landfill) where groundwater flow could be significantly affected by tidal influences, one water level recorder will be placed in the well closest to the ocean and a second water level recorder will be placed in the well farthest from the ocean. The water level recorders will be set to record groundwater levels at hourly intervals for a duration of approximately 30 days. Water levels in all other wells at the sites will be measured once a week and these water levels will be correlated to the water levels in the recorder wells.

All existing wells at the various sites will be sampled based on the criterion that the wells produce a sand free discharge and be within 0.5 feet of their reported installed depth.

#### ***4.1.6 Surface Water and Sediment Investigation***

An inspection of the sites at NAS-Key West during the Phase I RI study determined the lack of permanent, intermittent, or ephemeral streams at all of the sites. Several sites, however, contained man-made drainage ways for runoff control, and at Fleming Key a small tidal creek was present. Rainfall either evaporates or percolates into the ground. Surface water samples will be collected if present at the site during the sampling event.

Ocean water samples will be collected as part of this investigation. Because of the turbulent nature of the shoreline, extreme care will be taken during collection to ensure a representative sample. The Environmental Compliance Branch Standard Operating Procedures and Quality Assurance (ECB SOP and QA) Manual does not specifically address sampling of ocean waters. In order to ensure collection of a representative sample, sampling will be conducted during low tide (and ebb tide) and during calm ocean conditions with the guidelines established for surface water sampling. A limitation exists in that concentrations of contaminants leaching into the beach and surf zone would be quickly diluted and could potentially go undetected by chemical analysis. However, where sites are along the shoreline, contaminants are more likely to adsorb onto sediments. In such cases, sediment samples will also be collected to gain an accurate account of existing conditions.

Sediment and surface water sampling procedures are described in detail in Sections 2.4.2 and 2.4.8, respectively of the SAP.

#### ***4.1.7 Background Characterization***

Background samples are scheduled to be obtained for all the IR sites at NAS-Key West. The background samples will consist of groundwater, surface water, soil and sediment media. All background samples will be analyzed for the list of Target Analyte List/Target Compound List (TAL/TCL) parameters. The performance of this task will aid in the establishment of actual background concentration standards representative of those areas. These concentration standards will be used in the risk and exposure assessment work to be conducted at the sites. Actual site locations for sampling will be based on field judgement and conditions as encountered by the Field Operations Coordinator during the field activities event.

#### ***4.1.8 Preliminary Biological Hazard Assessment***

A preliminary biological hazard assessment will be performed at IR Sites 1, 7, and 8 to evaluate the potential risk that may exist at a site. The assessment compares the chemical concentrations of potential biological concern in soils or waters to biological ARARs; or, in the absence of biological ARARs, concentrations are compared to conservative environmentally protective screening values. Potential biological ARARs for aquatic organisms include the Florida Surface Water Quality Standards and the U.S. Environmental Protection Agency's Water Quality Criteria for chronic exposure of aquatic and marine organisms. At present there are no published biological ARARs for wildlife.

Screening values for wildlife will be determined based upon exposure scenarios for different types of terrestrial environmental receptors (e.g., a piscivorous bird or mammal, a mammalian herbivore, or a raptor) and acceptable daily intakes for birds or mammals. Exposure scenarios will be developed to estimate the potential daily intake from either water or soil for a generic environmental receptor. The exposure scenarios used in calculating these screening values will be designed to characterize the potential exposure for those organisms at greatest risk from exposure to chemicals in either water or soils. Acceptable daily intake for birds and mammals will be based upon toxicological data from the available published literature. The screening value for a chemical is the maximum concentration of a chemical in either water or soils,

which will not result in an unacceptable intake for a defined generic environmental receptor, given the assumptions used in the exposure models.

Screening values for water will be determined based on the potential exposure of a piscivorous bird and piscivorous mammal. These organisms would have greater potential intake relative to other environmental receptors as a result of exposure via drinking water and bioaccumulation of site-related chemicals in their food. Potential water consumption and food ingestion rates for a generic receptor will be estimated based on allometric or other physiological models. Potential concentrations in water will be estimated from water sampling data and chemical concentrations in food will be estimated using appropriate bioaccumulation models.

Screening values for soils will be determined based on the potential exposure of a mammalian herbivore, an avian herbivore, a mammalian predator and a raptor. Herbivores represent those populations at greatest risk from chemicals which are bioaccumulated into plants, i.e., metals and hydrophilic organics. A mammalian herbivore is considered a burrowing organism. Therefore the receptor would be exposed via ingestion of both food and soil. The food consumption rate for this generic receptor will be estimated based on allometric or physiological models. Soils consumption will be estimated based on allometric or physiological models. Soils consumption will be estimated based on a defined percentage of the food consumption and will be based on soil ingestion studies published in the available scientific literature. For the purposes of this preliminary biological hazard assessment, it will be assumed that avian herbivores are exposed only via consumption of food. Some avians such as turkeys or burrowing owls may be exposed via ingestion of soils. However it is unlikely that these organisms are found in the Florida Keys. Food consumption rates for generic avian herbivores will be estimated based on allometric or other physiological models.

Mammalian predators and raptors are at greatest risk from exposure to chemicals which biomagnify in the food chain. For the purposes of this assessment, it is assumed that the prey is represented by a burrowing mammal which is a herbivore, thus maximizing the potential exposure of the prey. Potential concentration of site-related chemicals in the prey will be estimated using the appropriate bioaccumulation models and estimated intakes as described above for mammalian herbivores. Food consumption rates for both mammals and birds will be estimated using allometric equations or other physiological models. For the purpose of this

assessment is will be assumed that mammalian predator is a burrowing organism. Therefore this receptor may be exposed to site-related chemicals via ingestion of soils as well as in prey. The soil ingestion rate will be estimated based on published soil ingestion studies in the available literature.

Acceptable daily intakes for mammals and birds will be based upon the toxicological studies in the available published literature. Appropriate uncertainty factors will be used in the extrapolation of toxicological values from scientific studies to acceptable daily intake values for either mammals or birds.

Exceeding these screening values does not in itself imply a potential hazard. It does suggest that a given type of biological receptor should be more closely scrutinized. These screening values will be used to determine if a potential risk to biological receptors exists at a site and which biological receptors should be further evaluated.

#### ***4.1.9 Baseline Risk Assessment***

An environmental baseline risk assessment will be performed at IR Site 3 to evaluate the potential impact of site-related chemicals upon environmental receptors. Baseline risk assessments are not proposed at this time for the remaining IR sites the limited existing data base of the IR sites cannot support the need for a risk assessment.

At sites where a risk assessment will be performed, potential impacts will be evaluated by comparing estimated daily intake for identified environmental receptors relative to a maximum acceptable daily intake. The risk assessment will include the following:

- Selection of chemicals of potential concern
- Exposure assessment
- Toxicity assessment
- Hazard characterization

Each of these selections are discussed below.

Chemicals of potential concern will be selected from site-related chemicals following the guidance as given in the Risk Assessment Guidance for Superfund, Vol I: Human Health

Evaluation Manual (USEPA, 1989). The methodology used in selecting chemicals of potential concern has been discussed previously.

The purpose of the exposure assessment is to describe site-specific pathways related to the potential exposure of environmental receptors and to provide estimates of these exposures. The three components of an exposure assessment are:

- Receptor survey
- Exposure pathway analysis
- Exposure estimation

Each of these elements is addressed separately below.

The receptor survey identifies the significant environmental receptors which potentially may be exposed to chemicals either on-site or as a result of chemical migration to off-site areas.

Significant environmental receptors would include listed endangered or threatened species and economically important species.

Endangered or threatened species include any organism listed as endangered by either the United States Fish and Wildlife Service or the Florida Game and Freshwater Fish Commission. Economically important species include all species which are hunted or utilized as a food source for humans. Potential receptors at each site will be determined based on a review of the available published literature concerning endangered species, published government or scientific studies of the area and information maintained by government agencies.

The exposure pathway analysis will characterize the exposure setting, identify potential exposure pathways and select the site-specific exposure pathways to be quantitatively evaluated in the risk assessment. Potential exposure pathways to be evaluated include ingestion of soils and water and potential exposure via food chain bioaccumulation. Potential exposure pathways will be determined based on behavioral characteristics of the identified receptors (e.g. burrowing, food preferences, home range size, etc.) and the environmental matrix in which

site-related chemicals are found, i.e., site-related chemicals at a site may be limited to either soil, groundwater or surface waters.

The potential intakes via each identified exposure pathway will be estimated utilizing species specific data. In the absence of species specific data, i.e., specific feeding or water consumption rates, allometric models will be used to estimate potential intake rates. Estimated concentrations in food sources, e.g. fish, plants, or prey organisms, will be estimated using either chemical specific bioaccumulation factors (BCF) or BCFs estimated using an appropriate model. Exposure pathways to fish and other aquatic populations will be limited to exposure via water.

The purpose of the toxicity assessment is to estimate acceptable daily intakes for each chemical of potential concern. Acceptable daily intakes will be estimated based on toxicological data published in the available scientific literature. Appropriate uncertainty factors will be used in the extrapolation of toxicological values from scientific studies to acceptable daily intake values for the identified environmental receptors. Acceptable exposure concentrations for aquatic populations will also be estimated based on published toxicological data in the available scientific literature.

Characterization of potential impacts upon environmental receptors will be determined by using a hazard quotient (HQ). An HQ may be defined as the ratio between the estimated daily intake of a chemical and the estimated acceptable daily intake for that chemical. The HQ does not define dose-response relationships and its numerical value should not be construed to be a direct estimate of risk. The HQ is only a numerical indication of the nearness to acceptable limits of exposure or the degree to which acceptable exposure levels are exceeded. As this index approaches unity, concern for the potential hazard of the chemical increases. Exceeding unity does not in itself imply a potential hazard, it does suggest that a given situation should be more closely scrutinized. Potential impacts upon aquatic communities will be evaluated in a similar manner by comparing measured water concentrations with acceptable exposure concentrations.

A conservative approach will be maintained throughout the risk assessment. Environmentally protective assumptions will be used that are designed to overestimate any potential hazards.

This biased approach is designed to overestimate rather than underestimate potential hazards to environmental receptors. This approach compensates for risk assessment uncertainties and provides a safety margin when determining potential impacts upon environmental receptor populations.

#### **4.1.10 Sample Analysis**

All samples collected for laboratory analyses will be submitted to IT Analytical Services Laboratory (ITAS) in Knoxville, Tennessee. This laboratory is approved by the Naval Energy and Environmental Support Activity (NEESA) and also has an approved Comprehensive Quality Assurance Plan on file with the Florida Department of Environmental Regulation (FDER). All analytical methods will be in conformance with applicable Federal and State procedures. The laboratory will perform analyses using United States Environmental Protection Agency (US EPA) approved methods in accordance with NEESA Level C Quality Control as specified in the Scope of Work.

Volatile organic compounds, polynuclear aromatic hydrocarbons, pesticides/PCBs and metals will be analyzed according to CLP as specified in Statement of Work (SOW) 288. A CLP data package will only be generated for analysis of samples collected from IR site 3.

One sample per media from each IR site will be analyzed for the complete list of parameters in the TAL/TCL. Volatile organic compounds will be analyzed according to EPA Method 8010/8020. Polynuclear aromatic hydrocarbons will be analyzed according to EPA Method 8310, pesticides/PCBs by EPA Method 8080 and Methods ICAP, Graphite Furnaces, Cold Vapor for metals. Section 3.2 of the SAP contains a detailed explanation of the laboratory analytical procedures.

Table A-1 in Appendix A lists sample media, numbers, and recommended analysis methods for each site.

#### **4.2 Stage 3 - Sites Requiring Additional RI Work**

A Phase I Remedial Investigation was performed by IT from May 1990 to December 1990 at NAS-Key West. Based on the results of the Phase I-RI study the following four sites require Phase II RI work:

- IR Site 1 - Truman Annex Refuse Disposal Area
- IR Site 3 - Truman Annex DDT Mixing Area
- IR Site 7 - Fleming Key North Landfill
- IR Site 8 - Fleming Key South Landfill

Based on an assessment of the required data, the investigative process has been reduced to a specific set of objectives for the four sites to be studied during this phase:

- Background sampling of groundwater, surface water, ocean water, soil, and sediment to establish background levels
- Additional sampling of selected media and analyses to add to the existing database so as to further delineate contamination

Evaluation of information developed in this phase will determine future actions.

#### ***4.2.1 IR Site 1 - Truman Annex Refuse Disposal Area***

##### ***4.2.1.1 Site Description***

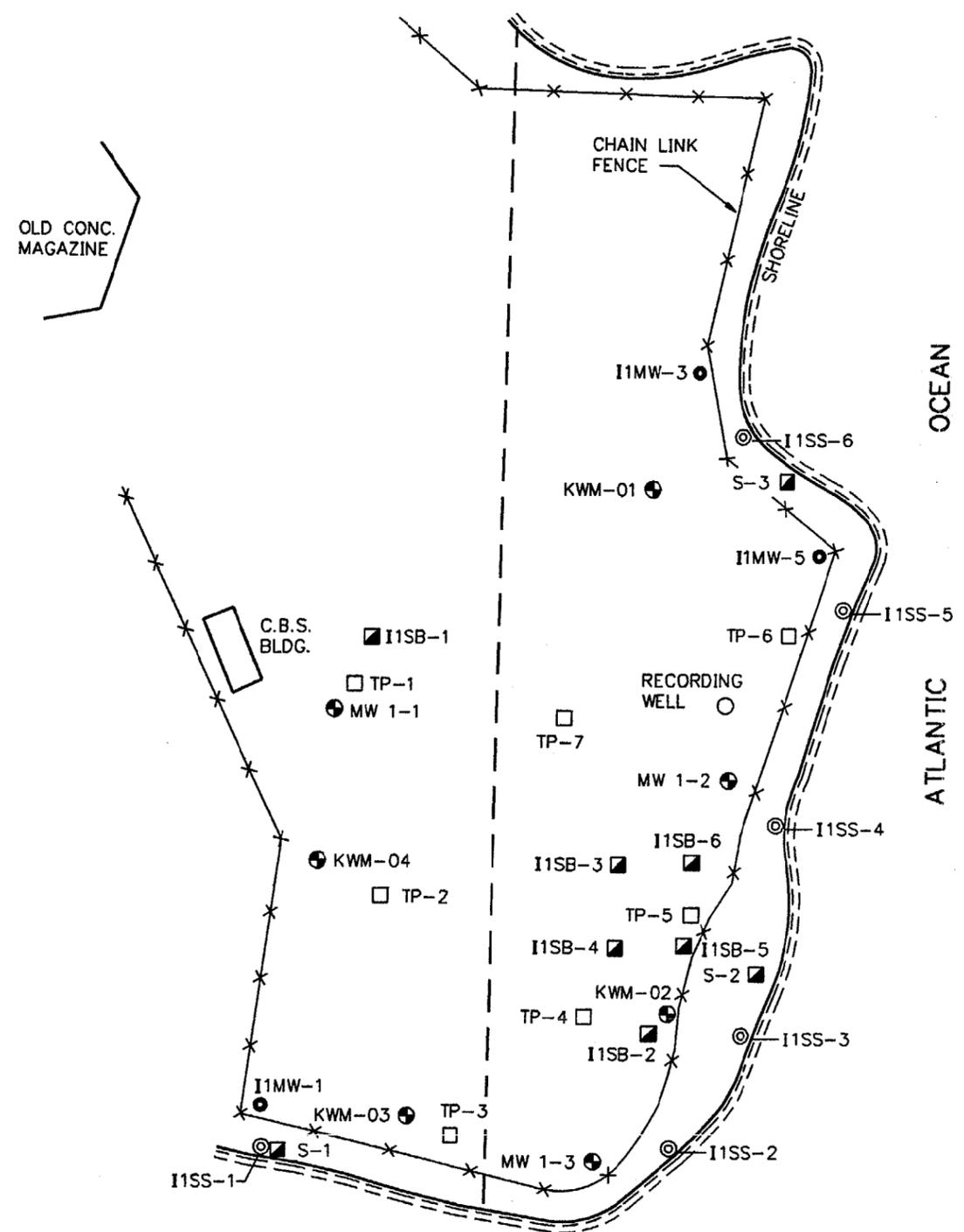
The Truman Annex Refuse Disposal Area is located along the southern shore of Truman Annex which is shown on the vicinity map, (Figure 4-1) and is shown in detail on Figure 4-2. The site covers an area of approximately seven acres. From 1952 until the mid 1960s the Truman Annex Refuse Disposal Area was used for general refuse disposal and open burning. No restrictions were placed on the types of wastes disposed at the site. It is believed that in addition to general refuse, waste paint thinners and solvents were also disposed.

The subsurface at the site consists of landfill material in a shallow fill area with the landfill extending beyond the natural shoreline. Data from the Phase I-RFI investigation suggests that groundwater in the area is approximately six to eight feet BLS and flow is in a southerly direction towards the Atlantic Ocean.

##### ***4.2.1.2 Existing Data***

The previous study conducted by the consulting firm of Geraghty & Miller at the Truman Annex Refuse Disposal Area included the installation of four shallow monitoring wells (KWM-01, KWM-02, KWM-03, and KWM-04). Each monitoring well was installed to a depth of approximately 18 feet with 5 feet of slotted section from 13 to 18 feet BLS.

PLOT ● 1-1  
 CAD FILE: AB201845.DWG  
 ARCHIVED:  
 DRAWING NO.: AB201845  
 PROJ. NO.: 595392  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
 CHECKED BY:  
 APPROVED BY:  
 LAST REV DATE: 2/11/93  
 DRAWN BY: L. NIST  
 STARTING DATE: 9/27/91  
 DRAWN BY: L. NIST



**GROUNDWATER SAMPLES**

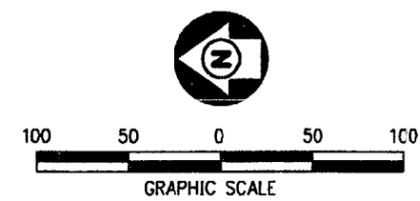
COMPOUND	STANDARDS*	SAMPLE LOCATIONS							
		μg/l	MW1-1	MW1-2	MW1-3	KWM-01	KWM-02	KWM-03	KWM-04
ALPHA CHLORDANE	0.03	-	0.98	-	-	-	-	-	
ALPHA CHLORDANE	0.03	-	1.10	-	-	-	-	-	

**SEDIMENT SAMPLES**

COMPOUND	STANDARDS*	SAMPLE LOCATIONS		
		μg/l	S-1	S-2
AROCOR 1260	450	-	2300	-

\* STANDARDS REFERS TO A COMBINATION OF DRINKING WATER STANDARDS, FLORIDA GUIDANCE CONCENTRATIONS AND CORRECTIVE ACTION LIMITS.

SOURCE: FREDERICK H. HILDBRANDT, INC.  
 ENGINEERS-SURVEYORS-PLANNERS  
 15321 S. DIXIE HWY., SUITE 202  
 MIAMI, FLORIDA 33157



**LEGEND**

- KWM-01 GERAGHTY & MILLER MONITORING WELL
- MW 10-1 IT CORP. MONITORING WELL
- RECORDING WELL
- TP-4 TEST PIT NO. 4
- 2 — AIR QUALITY SURVEY TRANSECT AND NUMBER
- S-2 SEDIMENT SAMPLE NO. 2
- I1MW-1 PROPOSED MONITORING WELL
- ⊕ I1SB-1 PROPOSED SOIL BORING
- ⊙ S1SS-1 PROPOSED SEDIMENT/SURFACE WATER SAMPLE

NOTE:  
 BACKGROUND SOIL AND GROUNDWATER SAMPLE WILL BE COLLECTED FROM THE TRUMAN ANNEX, DDT MIXING AREA (IR SITE 3).

**FIGURE 4-2**  
**INVESTIGATION & SAMPLING LOCATIONS**  
**TRUMAN ANNEX**  
**REFUSE DISPOSAL AREA**  
*Prepared for:*  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**



00270087

Three rounds of water level measurements were collected from these monitoring wells in 1986. At the time of measurement, water levels at the site were reported about 2 to 3 feet BLS and ranged from about 0.5 foot below to 1 foot above mean sea level (MSL).

Groundwater samples were collected from these monitoring wells and analyzed for pH, specific conductivity, total dissolved solids (TDS) and the US EPA priority pollutants, including volatile organic compounds (VOCs), acid and base neutral extractable compounds, pesticides, polychlorinated biphenyls (PCBs), and metals. The analyses of groundwater samples from monitoring wells KWM-01 and KWM-03 detected only metals. The analyses of the groundwater sample from monitoring well KWM-02 detected several base neutral extractable compounds, VOCs, and metals. Analyses for priority pollutant metals indicated that copper, mercury, and arsenic were present in the groundwater. High specific conductance readings and high TDS were also reported in all groundwater samples.

In December 1986, four soil samples were collected from excavated fill material contained within the Refuse Disposal Area. The soil samples were analyzed by EP Toxicity for the eight drinking water metals, oil and grease, TOX, PCBs, and a solvent scan. The results of the analyses showed the excavated soils to be hazardous by EP Toxicity for lead as defined by 40 CFR, Part 261.

The following additional information was discerned from the Phase I RI work conducted at the site. A total of 11 metal concentrations exceeding the standards have been detected in the groundwater samples taken at the site. These metals fractions include antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc. Of these metals, only copper, iron, lead, manganese, and mercury are present in significant amounts. The suspected origin of the lead contamination is believed to be north of monitoring wells MW1-2 and KWM-02. IT considers the groundwater to have been impacted by metals at this site.

One sediment sample and one groundwater sample had both pesticide and PCB concentrations above their standards. However, since these detections were isolated to one well at the site, this contamination is believed to be local.

Like the lead concentrations described above, the metal concentrations present in the groundwater at Site 1 are highest in the monitoring wells in downgradient positions along the coastline. This distribution of metal concentrations suggests the migration of dissolved metals to the south toward the Atlantic coastline. Although groundwater at this site is not used as a public/domestic water supply system, human life could be affected indirectly by this contamination. If groundwater is seeping into the ocean in significant amounts, bioaccumulation may occur in the tissues in receptor organisms.

Figure 4-2 illustrates the locations at which sampling was performed during the Phase I investigative work.

The data gathered to date show elevated levels of metals, particularly antimony, cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc at this site. Groundwater migration of metals toward the Atlantic Ocean is suspected. Due to the potential bioaccumulation of some of these metals (mercury, chromium, and lead) in aquatic life and vegetation along the coast of this site, further investigation is necessary to determine the extent of contamination. Table A-5 in Appendix A lists the levels and locations of inorganic contaminants detected at the site.

Further investigation at this site should include the following: (1) sampling of groundwater, sediment and surface water (ocean) along the coast at this site. This will aid in determining contaminant migration into the ocean. (2) Analysis of soil samples using TCLP procedures. This will aid in determining the potential for migration of contaminants that may be leaching from the soils in the landfill. (3) Background sampling of all media.

#### Geologic and Hydrogeologic Setting

The following discussion presents the geologic and hydrogeologic setting existing at the site.

Information derived from the borings installed during the Phase I RI study was used to construct a geologic framework to assess the potential for contaminant migration. The material encountered during drilling of the monitoring well boreholes consisted of fill sands and reworked limestone and gravel interspersed with debris, trash and natural oolitic limestone. The fill material was encountered at the ground surface and extended to 13 to 15 feet BLS in

all three monitoring well boreholes. Specifically, fill encountered was composed of minor amounts of sand and gravel mixtures with slight fractions of silt and reworked crushed oolitic limestone with varying degrees of shell fragments. Standard Penetration Test (SPT) blow counts indicate that the fill is medium to very dense suggesting that compaction efforts may have been used during placement, or that the fill has been in place for a relatively long time, or both. Natural oolitic limestone and limestone/sand mixtures were encountered below the fill and continued to boring termination (approximately 14.5 to 20 feet BLS) in all three boreholes. The SPT blow counts indicate that the limestone beneath the fill is of medium density.

Geotechnical data were obtained from a composite soil sample collected from ground surface to 2 feet BLS in Borehole MW1-2. These data include grain size distribution, moisture content, soil pH, cation exchange capacity, total organic carbon content, and permeability. Grain size analysis indicates that the soil sample is a well graded sand. Grain sizes range from cobbles to clay size fractions. The pH of the sample was 8.15, as expected, because of the abundance of carbonate soils and rock. The ion exchange capacity is 189.98 milliequivalents per gram (meq/g).

The total organic content (TOC) is 1.96 mg/kg. The permeability of the soil sample is  $2.49 \times 10^{-6}$  centimeters per second (cm/sec) which is representative of a mixture of sand, silt, and clay.

The indigenous material encountered below the site consists of oolitic limestone, hence the higher hydraulic conductivity values discussed in Section 2.4 are considered representative. Hydraulic conductivity of the compacted fill material is expected to represent the lower end of the stated values which are representative of silty sandy soil.

Groundwater was encountered at approximately 8 feet BLS during installation of the monitoring wells. This level is influenced by seasonal rainfall variations and tidal fluctuations. The water table is higher during the rainy summer season (June through October) and lower during the drier months (January through May). The highest levels normally occur in September and the lowest in May. Water level data were obtained in August, most likely near the seasonal high. The vadose zone occurs in soils above the water table and, considering the

rainfall and tidal fluctuations, appears to have an average thickness of approximately 6 to 7 feet.

Groundwater levels collected for this site were contoured and are depicted on Figure 4-3. Based on the data, a groundwater mound feature exists that provides for groundwater movement towards the Atlantic Ocean. However, groundwater levels in the vicinity of Monitoring Well MW1-2 appear to be under a tidal influence and groundwater flow is inland to approximately 125 feet from the shoreline. A stagnation zone is, therefore, created, in the center of the site and probably only occurs when the tide is rising. Groundwater at this site mainly discharges into the Atlantic Ocean. Recharge of the aquifer probably is through direct infiltration of precipitation at the site, except for those areas that are covered by impermeable pavement or buildings. Based upon the groundwater flow map, the hydraulic gradient is relatively flat inland and becomes steeper near the shoreline areas.

Groundwater levels in the recorder were monitored continuously through the month of August 1990 to assess tidal influences. This information then was compared with actual sea level fluctuations during the same time period. The peaks and valleys on both hydrographs coincided and tidal influence was noted; however, the degree of influence of the groundwater flow is limited. Sea level fluctuations ranged from approximately 0.1 feet to 2.5 feet, while fluctuations in the groundwater level only ranged from approximately 0.04 feet to 1.5 feet.

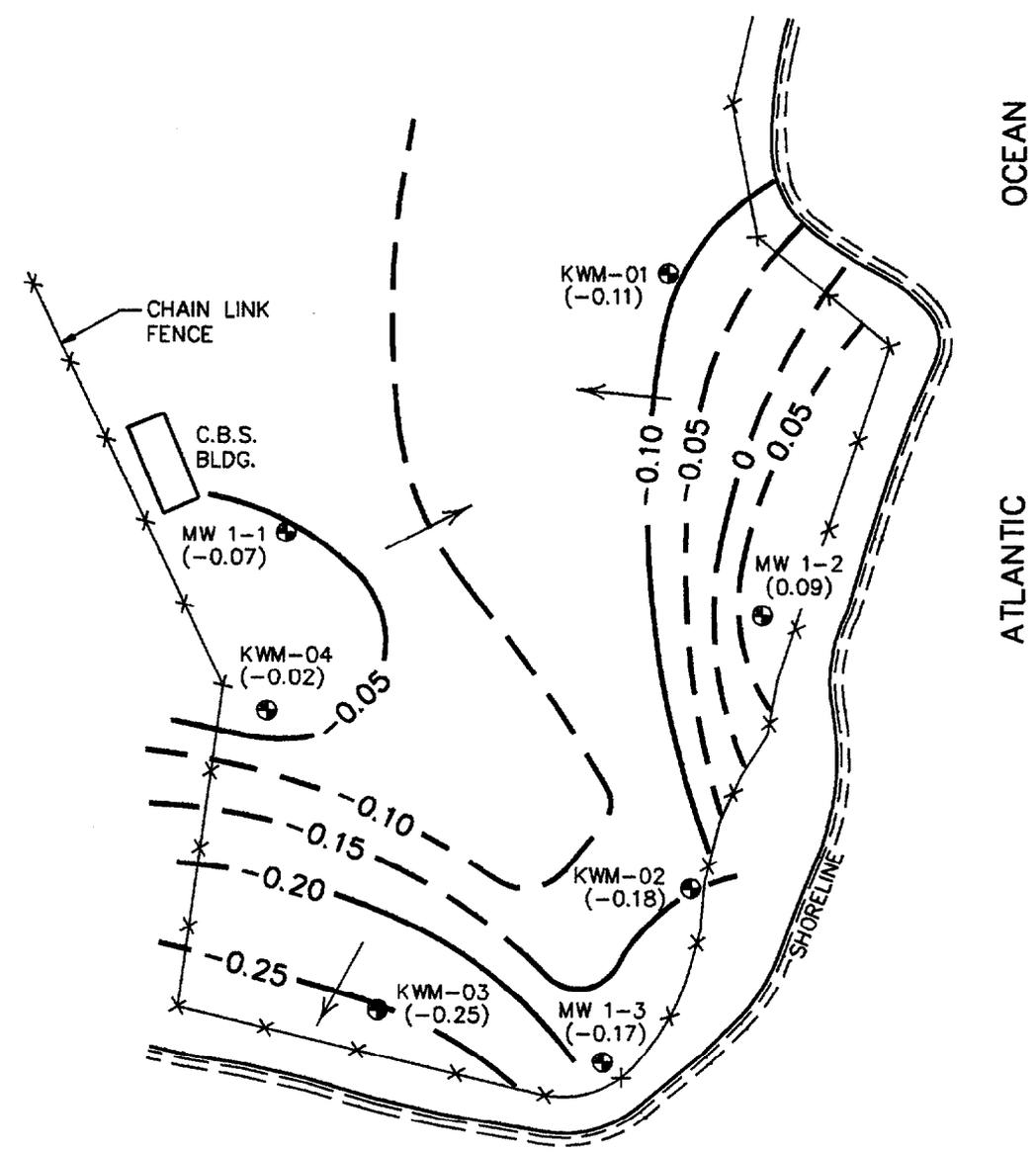
#### ***4.2.1.3 Utility Survey***

All utilities in the areas of the proposed sampling locations will be identified by NAS - Key West personnel prior to the commencement of field activities. If necessary, proposed sampling locations will be relocated to avoid interference with the identified utilities.

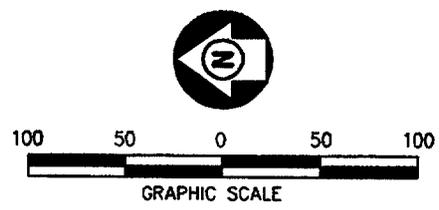
#### ***4.2.1.4 Ambient Air Monitoring***

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

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 DRAWN BY: L. NIST  
 CHECKED BY: 2/19/92  
 APPROVED BY: L. NIST  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
 DRAWING NO.: A1102297  
 PROJ. NO.: 595392  
 CAD FILE: FIG4-3.DWG  
 ARCHIVED:  
 LOT 1-1



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- LEGEND**
- KWM-01 GERAGHTY & MILLER MONITORING WELL
  - MW 1-1 IT CORP. MONITORING WELL
  - (-0.07) GROUNDWATER ELEVATION
  - 0.10 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
  - GROUNDWATER FLOW DIRECTION ARROW

FIGURE 4-3

GROUNDWATER ELEVATION  
 CONTOUR MAP - AUGUST, 1990  
 TRUMAN ANNEX  
 REFUSE DISPOSAL AREA

*Prepared for:*  
 NAS - KEY WEST  
 KEY WEST, FLORIDA



#### **4.2.1.5 Waste Characterization**

The waste has been characterized by excavation of test pits during the Phase I RI study. Waste characterization will not be performed during this phase of investigation based on Phase I RI recommendations.

#### **4.2.1.6 Soil Investigation**

Soil samples will be collected from the six soil boring locations I1SB-1 through I1SB-6 shown in Figure 4-2. Surface soil samples will be collected from the first 12 inches of soil from all soil boring locations. At soil boring location I1SB-1 and I1SB-2, subsurface soil samples will be collected using split spoon techniques. One split spoon sample will be collected for every five feet of boring. The borings will terminate at the base of the landfill (approximately 20 feet BLS). One surface soil sample and two subsurface soil samples will be collected from each boring. The soil samples will be collected based on OVA readings and visual observation. One surface soil sample and one subsurface soil sample (based on field screening with an OVA and visual observations) from boring locations I1SB-1 and I1SB-2 will be submitted for analysis of the list of TAL/TCL parameters. One subsurface soil sample from each boring will be analyzed for TCLP parameters and the remaining samples from boring locations I1SB-1 and I1SB-2 will be analyzed for the following:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pesticides/Polychlorinated Biphenyls
- Metals

At soil boring location I1SB-3 through I1SB-6, (in addition to the surface samples) soil samples will be collected from 3 feet below grade. All samples collected from boring locations I1SB-3 through I1SB-6 will be analyzed for Appendix IX metals.

#### **4.2.1.7 Hydrogeologic Investigation**

In order to achieve a better understanding of groundwater flow patterns and tidal influences on groundwater flow, a water level recorder will be placed in the well furthest away from the coast. A second water level recorder will be placed at the shoreline to monitor groundwater levels at hourly intervals for the entire duration of field work (approximately 30 days). Water levels in all the wells at the site will be measured once a week for four weeks. These water

levels will be correlated with the water levels in the recorder wells to produce four groundwater elevation maps.

The analytical results of the Phase I RI study indicate lead contamination in the groundwater. Groundwater in monitoring wells MW1-1 and KWM-01 have lead contamination only slightly above and below the established standards, respectively. Hence, KWM-01 delineates the area of lead contamination. Concentrations of approximately 1 mg/l of alpha chlordane was also detected in monitoring well MW1-2. It is observed that the concentration of the contaminants is in the south and southeast portions of the landfill. Figure 4-2 lists the levels and locations of organic contaminants detected at the site.

In view of past detections, IT will install three monitoring wells (I1MW-1, I1MW-2 and I1MW-3) at the locations identified on Figure 4-2 so as to determine if any leaching of contaminants is occurring. The monitoring wells will be installed to collect groundwater along the shoreline of the site. If metals are migrating towards the ocean, analysis of groundwater samples at the proposed locations should detect these metals as they migrate to the Atlantic Ocean. One groundwater sample collected from monitoring well MW1-2 will be analyzed for the list of TAL/TCL parameters. Groundwater samples will also be collected from the monitoring wells and the samples will be analyzed for metals and pesticides/PCBs.

#### ***4.2.1.8 Surface Water and Sediment Investigation***

Sediment and ocean water samples will be collected at locations depicted in Figure 4-2. These samples will be collected at the shoreline.

Sediment samples will be collected from the upper 0.5 foot at each sample location utilizing a ponar dredge or similar device. A total of six sediment samples will be collected and analyzed for metals and pesticides/PCBs.

Ocean water samples will be collected from as close as possible to the surface water/sediment interface using a kemmerer tube. One surface water and one sediment sample collected from location I1SS4 will be analyzed for the list of TAL/TCL parameters. The remaining samples will be analyzed for metals and pesticides/PCBs. A total of six ocean water samples will be collected.

#### **4.2.1.9 Background Sampling**

A background sampling and analyses program was recommended by IT to obtain analytical data for groundwater, surface water, ocean water, soil, surficial soil, and sediment. Background soil (surface and subsurface) and groundwater samples will be collected from locations at IR Site 3 (refer to Section 4.2.2.9 for detail). Surface water and sediment background samples will be collected from location I1SS6. All background samples will be analyzed for the list of TAL/TCL parameters.

Analysis of the background samples should offer site specific standards of comparison for media impacts studies.

#### **4.2.1.10 Preliminary Biological Hazard Assessment**

A preliminary biological hazard assessment as described in Section 4.1.8 will be performed for this site.

#### **4.2.1.11 Baseline Risk Assessment**

A baseline risk assessment is not proposed at this time.

#### **4.2.1.12 Topographic Mapping and Site Surveying**

A field survey will establish the horizontal and vertical control of the new monitoring wells, soil boring locations, and other pertinent features, including all surface staining or other signs of contamination.

From this survey, a base map will be prepared for this site. The map will have an appropriate horizontal scale to show pertinent site features and elevations will be referenced to MSL.

#### **4.2.1.13 Sample Analysis Summary**

At the Truman Annex Refuse Disposal Area, the following media and number of samples will be submitted for laboratory analysis:

- Soil - 14
- Groundwater - 10
- Surface water - 6
- Sediment - 6

Table A-1 in Appendix A lists the number of samples, media, and recommended analysis methods.

#### **4.2.2 IR Site 3 - Truman Annex DDT Mixing Area**

##### **4.2.2.1 Site Description**

The Truman Annex DDT Mixing Area is located at the former site of Building 265 and is shown in detail in Figure 4-4. The site covers an area of about 0.25 acres and is located approximately 1,100 feet inland from the coastline in an area that is subject to restricted vehicular and pedestrian traffic. The site is underlain by highly permeable soils with no surface water drainage or holding features present.

From the 1940s to the early 1970s, the location was used as a DDT mixing area. Powdered DDT concentrate was mixed with water and temporarily stored in 55-gallon drums both inside and outside the former building. The mixed solution was then transferred to trucks for disposal. Discharges at the site were by accidental spillage.

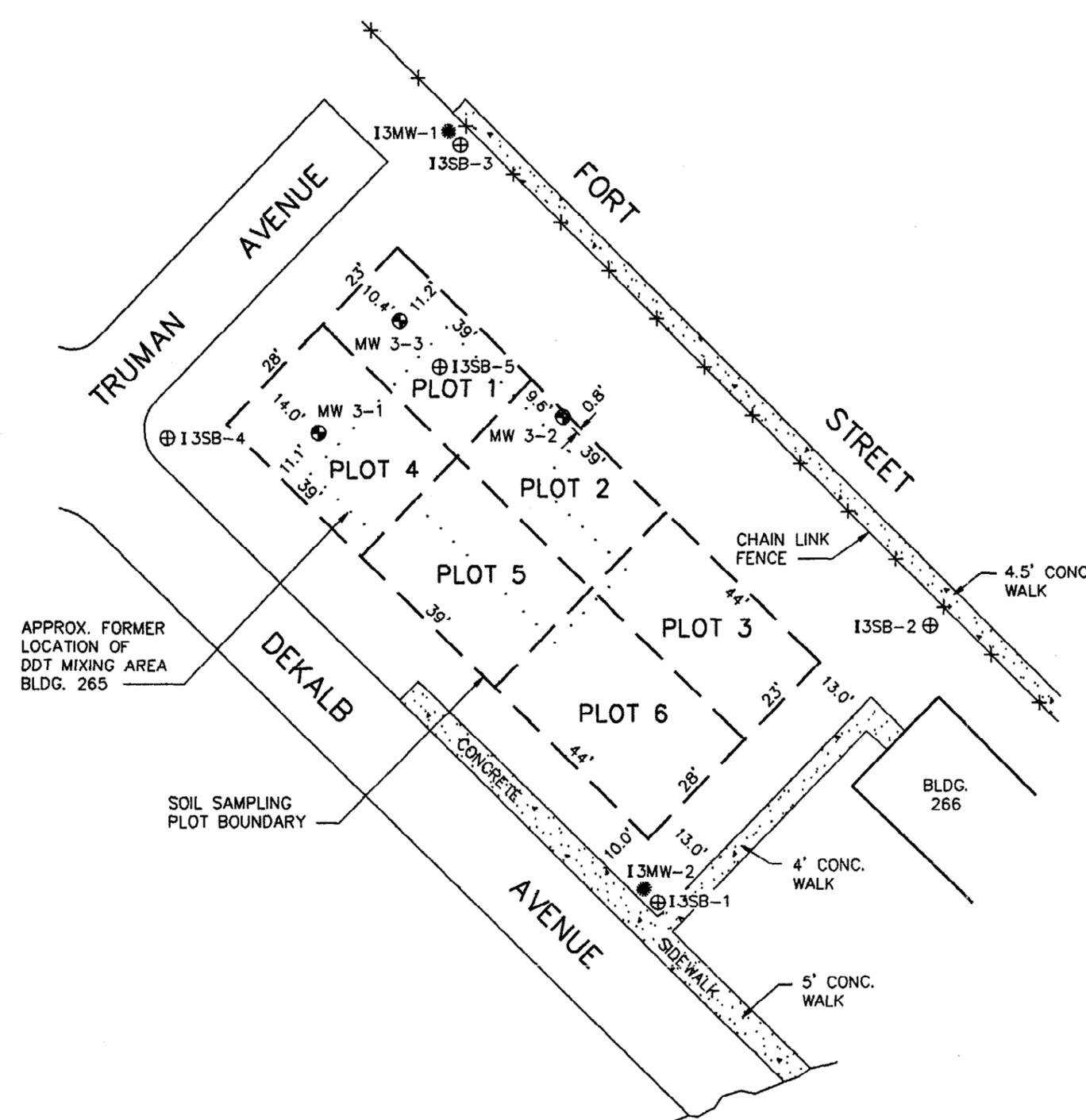
##### **4.2.2.2 Existing Data**

During a previous study by consultants Geraghty and Miller, 18 composite soil samples were collected at the site. The site was divided into six plots and three sampling points were selected in each plot. Soil samples were collected at depths of 0 to 1, 2 to 2, and 2 to 3 feet BLS at each of the sampling points in each plot. The laboratory analyses of these composite samples indicated that DDT and other pesticides such as BHC were present in soil samples taken at the site. Information regarding the specific locations of these sampling points is not available.

The following additional information was discerned from the Phase I RFI work conducted at the site. A groundwater study of the site indicates that cadmium, iron, and sodium are present in concentrations above their established standards. Iron and sodium are considered to occur naturally at the site, but cadmium is more indicative of groundwater contamination.

Seven different pesticide compounds have also been detected in the groundwater above their established standards. Figure 4-4 lists the levels and locations at which organic contamination was found in all media. Pesticide concentrations in the groundwater suggests that leaching

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 PROJ. NO.: 595392  
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 ARCHIVED:  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
 CHECKED BY:  
 APPROVED BY:  
 LAST REV DATE: 2/19/92  
 DRAWN BY: L. NIST  
 DATE: 9/27/91  
 DRAWN BY: L. NIST



**SOIL SAMPLES**

COMPOUND	STANDARDS*	SAMPLE LOCATIONS							
		μg/l	PLOT 1	PLOT 2	PLOT 3	PLOT 4	PLOT 5	PLOT 6	MW3-2
4,4 - DDT	1000	220,000	86,000	100,000	79,000	17,000	9100	1800	6000
4,4 - DDD	1500	34,000	6700	80,0000	68,000	2000	1200	-	83,000
4,4 - DDE	1000	30,000	20,000	33,000	26,000	9100	8700	-	8600
BETA - BHC	NE	-	-	2900	4700	800	-	89	2300
DIELDRIN	NE	28,000	-	6800	4400	-	-	-	-

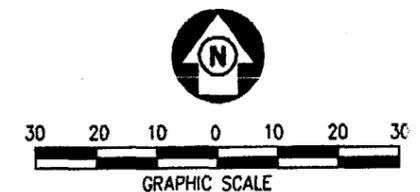
**GROUNDWATER SAMPLES**

COMPOUND	STANDARDS*	SAMPLE LOCATIONS		
		μg/l	MW3-1	MW3-2
ALPHA - BHC	0.05	-	-	0.11
BETA - BHC	0.05	1.0	7.0	0.91
DIELDRIN	0.05	0.47	-	1.8
4,4 - DDD	0.15	2.1	0.77	-
4,4 - DDE	0.1	-	-	0.19
4,4 - DDT	0.1	-	-	0.21
HEPTACHLOR EPOXIDE	0.0039	-	0.14	-

NE = NOT ESTABLISHED

\* STANDARDS REFERS TO A COMBINATION OF DRINKING WATER STANDARDS, FLORIDA GUIDANCE CONCENTRATIONS AND CORRECTIVE ACTION LIMITS

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**LEGEND**

- ⊕ MW 3-1 IT CORP. MONITORING WELL
- [ PLOT # ] PLOT BOUNDARY & NUMBER
- ⊕ I3SB-1 PROPOSED SOIL BORING
- I3MW-1 PROPOSED MONITORING WELL

**FIGURE 4-4**  
**INVESTIGATION & SAMPLING LOCATIONS**  
**TRUMAN ANNEX**  
**DDT MIXING AREA**  
 Prepared for:  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**



may be occurring at the site. IT considers this site impacted with respect to pesticides. Table A-6 in Appendix A lists the levels and locations of inorganic contamination detected at the site.

Groundwater at the site flows to the south-southeast and towards the Atlantic Ocean. Although analytical data on groundwater flow indicate pesticide migration is occurring in a southeasterly direction at the site, it has not been determined whether the pesticide concentrations are leaching into the Atlantic Ocean. If the pesticides are leaching into the waters of the ocean, humans may ingest these materials indirectly through consumption of seafood.

Based upon the data presented to date, seven pesticide compounds have been confirmed at the site. Since the pesticide contamination levels fall within acceptable ranges as calculated in a preliminary baseline risk assessment performed by IT in February 1990 (as part of the Phase I-RI study), immediate remedial action is not deemed necessary. However, due to bioaccumulation of these compounds and the frequent exposure of personnel in this area, IT recommended the following: (1) restriction of access to the site (i.e., fencing); (2) performance of a quantitative baseline risk assessment. Further, EPA has specified that a corrective measures study will have to be performed at the site in the near future. Data obtained from the Phase II remediation investigation study will be used in conjunction with the existing data as a basis for the corrective measures study.

#### Geologic and Hydrogeologic Setting

The following discussion presents the geologic and hydrogeologic setting at the site.

Information was gathered from soil boring logs to construct the geologic framework necessary to assess the potential for contaminant migration. Visual observations depicted a top soil cover with small areas of sparse grass cover. The materials encountered during the monitoring wells installation range from poorly sorted limestone fill mixed with gravel at the surface, to sandy limestone fill that was well sorted with depth. The recorded observations in the visual classification of soils demonstrate a very dense material from 0-5 feet BLS. The water table is at approximately 5 feet BLS, where the density of the material encountered changes from very hard to soft. The soft material encountered is suspected to be part of the Miami Oolite formation.

Geotechnical data were obtained from analysis of a composite soil sample collected from ground surface to approximately 2 feet BLS. Grain size analysis indicates a well graded natural material with grain sizes ranging from gravel to clay. The pH was 8.35 due to the occurrence of carbonate properties in soils/rocks in the area. The ion exchange capacity was 89.97 meq/g.

The total organic content (TOC) was the highest reported value in comparison with the other sites. The value for TOC was 8,700 parts per million (ppm).

The permeability of the composite soil sample is  $6.55 \times 10^{-7}$  cm/sec, which is characteristics of very impermeable material.

Groundwater levels were measured in the three new monitoring wells installed at this site. Groundwater contours were calculated using these wells to define the water table as shown in Figure 4-5. Based on the contours, groundwater flow is to the south-southeast towards the Atlantic Ocean. Although a recorder well was not installed at this site, groundwater fluctuations can be related to those at Truman Annex Refuse Disposal Area where a recorder well was installed. The fluctuations would be smaller because the location of the site is further inland, thereby lessening the effects of the tidal influence.

#### ***4.2.2.3 Utility Survey***

All utilities in the areas of the proposed sampling locations will be identified by NAS - Key West personnel prior to the commencement of field activities. If necessary, proposed sampling locations will be relocated to avoid interference with the identified utilities.

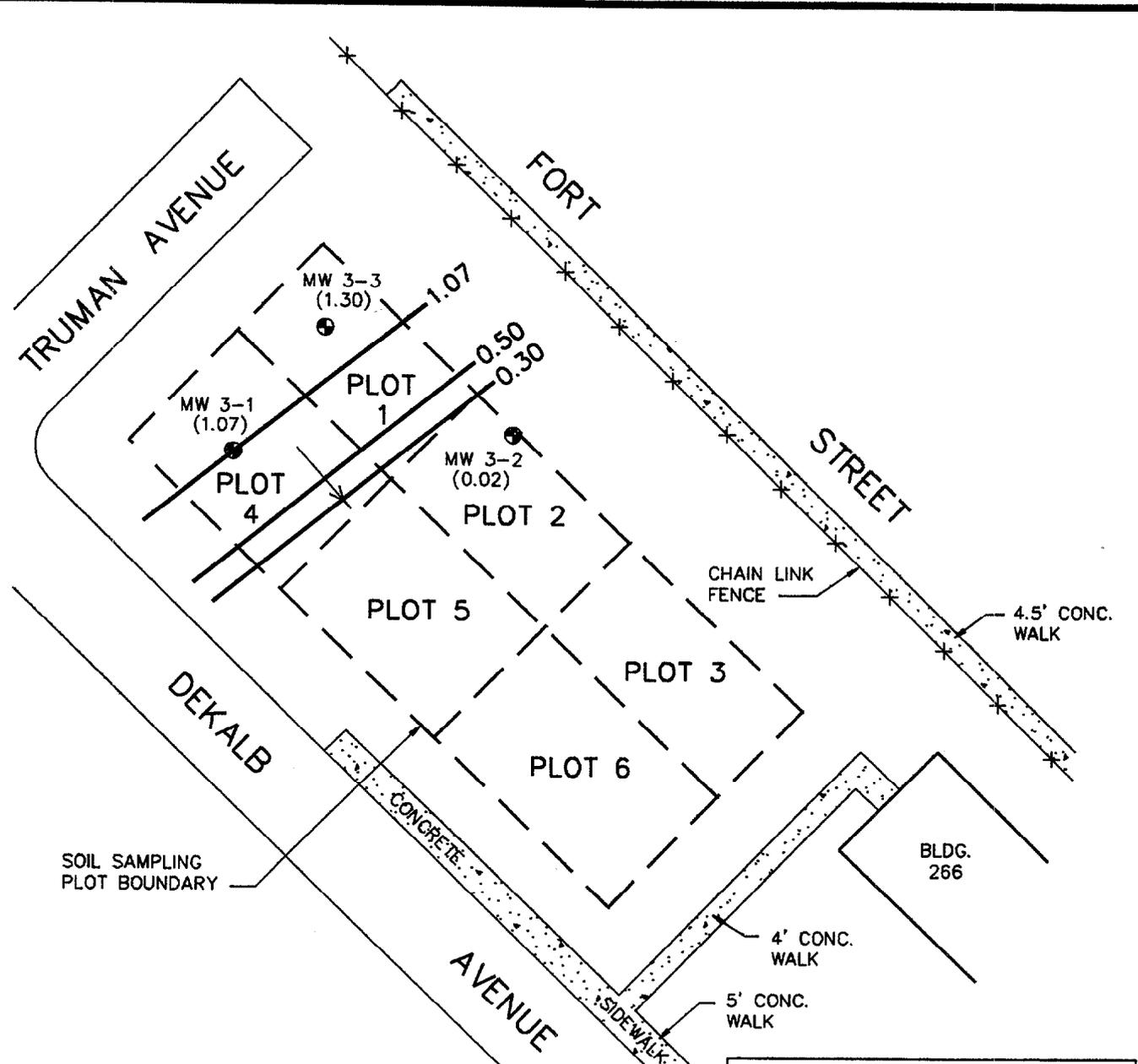
#### ***4.2.2.4 Ambient Air Monitoring***

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

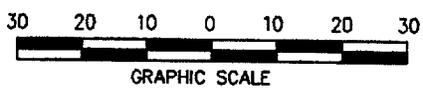
#### ***4.2.2.5 Waste Characterization***

Waste characterization will be performed during this phase of the investigation in conjunction with the soil boring program.

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 CAD FILE: FIG4-5.DWG  
 PLOT: 1 of 1  
 PROJ. NO.: 595392  
 ARCHIVED:  
 INITIATOR: S. PILLAI  
 PROJ. MGR.: M. HAMPTON  
 CHECKED BY:  
 APPROVED BY:  
 LAST REV DATE: 2/19/92  
 DRAWN BY: L. NIST  
 STARTING DA: 1/27/91  
 DRAWN BY: L. NIST



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- LEGEND**
- MW 3-1 IT CORP. MONITORING WELL  
 (1.07) GROUNDWATER ELEVATION
  - 0.50 GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
  - GROUNDWATER FLOW DIRECTION ARROW

FIGURE 4-5

GROUNDWATER ELEVATION  
 CONTOUR MAP - AUGUST, 1990  
 TRUMAN ANNEX  
 DDT MIXING AREA

*Prepared for:*  
 NAS - KEY WEST  
 KEY WEST, FLORIDA



#### **4.2.2.6 Soils Investigation**

In order to further delineate the extent of soils contamination, five additional soil borings, I3SB-1, I3SB-2, I3SB-3, I3SB-4, and I3SB-5, will be installed at the locations show in Figure 4-3. Surface soil samples will be collected from the first 12 inches of soil. Subsurface soil samples will be collected by split spoon techniques. One subsurface sample will be collected for every 5 feet of boring. The borings will be terminated at a depth of 16 feet. One surface and one subsurface soil sample obtained from boring I3SB-5 will be analyzed for the list of TAL/TCL parameters. Five samples (one from each boring location) will be analyzed according to the Toxic Characteristic Leaching Procedure (TCLP). The remainder of the samples will be analyzed for pesticides/PCBs. CLP data packages will be generated on analysis of the samples.

#### **4.2.2.7 Hydrogeologic Investigation**

Data obtained from the Phase I-RI report indicates that groundwater flow is in a south-southeasterly direction. Groundwater samples collected from the three existing wells indicate the presence of pesticide contamination.

In order to further delineate the downgradient extent of contamination, two additional monitoring wells (I3MW-1 and I3MW-2) are proposed in the locations shown in Figure 4-4. The soil borings I3SB-3 and I3SB-1 will be converted into monitoring wells. Well construction details are given in Section 2.4.1.3 of the SAP.

Groundwater levels will be measured in all wells once a week for four weeks. Four groundwater elevation maps will be compiled to confirm the hydraulic gradient and groundwater flow directions beneath the site. In addition to collecting groundwater samples from the proposed monitoring wells, samples will also be collected from the three existing onsite wells. The groundwater sample collected from monitoring well MW3-3 will be analyzed for the complete list of TAL/TCL parameters. The samples collected from monitoring wells I3MW-2, MW3-1 and MW3-2 will be analyzed for metals and pesticides/PCBs. CLP data packages will be generated on analysis of the samples.

#### **4.2.2.8 Surface Water/Sediment Investigation**

No surface water and sediment samples are proposed as there are no surface water features on site.

#### **4.2.2.9 Background Sampling**

A background sampling and analyses program was recommended by IT to obtain analytical data for groundwater and soil. Background samples for soil and groundwater will be collected from locations I3SB-3 and I3MW-1, respectively and analyzed for the list of TAL/TCL parameters. The soil and groundwater samples would also be representative of background conditions at IR Site 1. Analysis of the background samples should offer site specific standards of comparison for media impact studies.

#### **4.2.2.10 Preliminary Biological Hazard Assessment**

A preliminary biological hazard assessment will not be performed because a quantitative baseline risk assessment will be performed instead.

#### **4.2.2.11 Baseline Risk Assessment**

Although a preliminary baseline risk assessment was performed in February 1990, it was not comprehensive and was intended solely to determine whether any immediate actions, such as access restrictions, were required. Only risks associated with exposure to a single indicator chemical, 4,4-DDT, were evaluated. Several other chemicals that were detected above acceptable concentrations at the site were not evaluated in this risk assessment. In addition, more recent data have indicated the presence of unacceptable concentrations of other chemicals. Also, EPA guidance (EPA, 1989) suggests that the risks associated with all chemicals of concern via all exposure pathways should be evaluated in the risk assessment process.

The specific tasks of the quantitative baseline risk assessment are:

- Identification of chemicals of concern
- Exposure assessment
- Toxicity assessment
- Risk characterization.

The objectives of the exposure assessment are to identify the potential receptors, exposure pathways, and estimate levels of potential exposures. The toxicity assessment will examine the potential adverse health effects associated with exposure to the chemicals of concern.

The exposure and toxicity assessment will be integrated to define the general magnitude of human health risks. The risk characterization is based upon a Reasonable Maximum Exposure scenario so that risks can be accurately estimated to ensure protection of human health.

Endangered and threatened species, at or near the site, will be identified using information from federal, state, and local agencies. Ecological receptors will be identified for the site. Chemicals of potential concern will be identified and concentrations of these chemicals will be measured. Exposure concentrations for ecological receptors will be estimated for the site using site specific data, data from the scientific literature, or exposure models. Exposure pathways for ecological receptors will be identified. Exposure to ecological receptors will be quantified based on the most sensitive species identified. Toxicological information about the chemicals of concern and acceptable exposure levels will be based on information from scientific literature and from promulgated standards such as Ambient Water Quality Criteria.

#### ***4.2.2.12 Topographic Mapping and Site Surveying***

A field survey will establish the horizontal and vertical control of the new monitoring well, soil boring locations, and other pertinent features, including all surface staining or other signs of contamination.

From this survey, a base map will be prepared for this site. The map will have an appropriate horizontal scale to show pertinent site features and elevations will be referenced to MSL.

#### ***4.2.2.13 Sample Analysis Summary***

At the Truman Annex DDT Mixing Area, the following media and number of samples will be submitted for laboratory analysis:

- Soil - 20
- Groundwater - 5

### **4.2.3 IR Site 7 - Fleming Key North Landfill**

#### **4.2.3.1 Site Description**

The Fleming Key North Landfill covers approximately 30 acres on the northern end of Fleming Key and is shown in detail in Figure 4-6. Reportedly, 4,000 to 5,000 tons of unknown wastes were disposed of annually into various excavated trenches between 1952 and 1962. The trenches typically were cut 25 feet wide, 10 feet deep and 500 to 1,000 feet in length.

In 1977 a building housing the US Department of Agriculture Animal Import Center was constructed over a portion of the landfill. During the construction phase, various wastes were excavated and transferred to an area immediately to the west of the construction site and buried under a soil/rock cover.

Groundwater in the area is approximately three to four feet below the surface over most of the site. Saline groundwater was encountered during trenching activities conducted during the Phase I RI study.

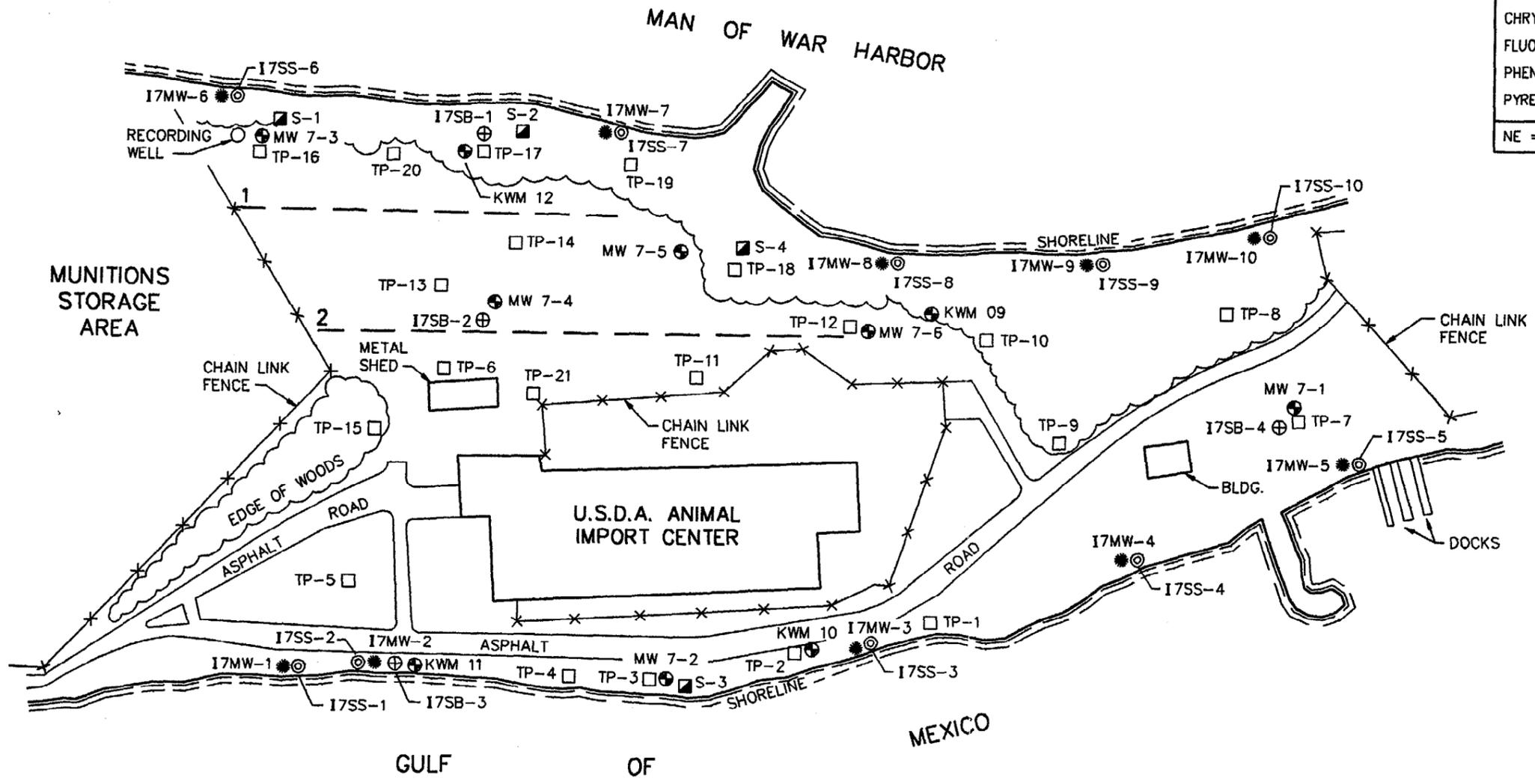
#### **4.2.3.2 Existing Data**

The previous study conducted by consultants Geraghty and Miller at the Fleming Key North Landfill included the installation of four shallow monitoring wells (KWM-09, KWM-10, KWM-11, and KWM-12). Each of these monitoring wells were installed to depths of between 9.5 and 12 feet with 5 feet of screen located at the bottom portion of each well. Groundwater elevations determined for this site ranged from 0.29 to 0.79 feet below MSL.

The land surface along the eastern side of the site is at a slightly higher elevation than along the western side of the key. A topographic low exists in the southwest area of the site.

Water quality samples were collected from each monitoring well and analyzed for pH, specific conductance, US EPA priority pollutants, and TDS. Results of these analyses indicate that the TDS ranged from 36,000 to 54,000 ppm and that no acid extractables, PCBs, or pesticides were detected. One base neutral extractable, diethylphthalate, was detected at a concentration of 1.1 ppb at KWM-09. VOCs were detected in monitoring wells KWM-10, KWM-11, and KWM-12 at concentrations below 5 ppb. Analyses for priority pollutant metals indicate that

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 INITIATOR: S. PILLAI PROJ. MGR.: M. HAMPTON  
 CHECKED BY: L. NIST DRAWN BY: L. NIST  
 LAST REV DATE: 2/19/91  
 STARTING DATE: 9/27/91



**SEDIMENT SAMPLES**

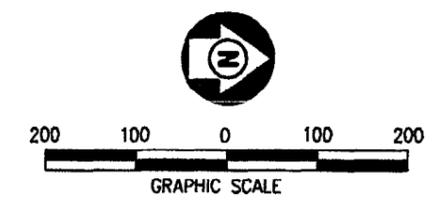
COMPOUND	STANDARDS* µg/l	SAMPLE LOCATIONS			
		S-1	S-2	S-3	S-3
CHRYSENE	NE	-	950	-	-
FLUORANTHENE	NE	-	1900	-	-
PHENANTHENE	NE	-	2100	-	-
PYRENE	NE	-	1700	-	-

NE = NOT ESTABLISHED

\* STANDARDS REFERS TO A COMBINATION OF DRINKING WATER STANDARDS, FLORIDA GUIDANCE CONCENTRATIONS AND CORRECTIVE ACTION LIMITS.

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- LEGEND**
- KWM-09 GERAGHTY & MILLER MONITORING WELL
  - MW 7-2 IT CORP. MONITORING WELL
  - RECORDING WELL
  - TP-14 TEST PIT NO. 14
  - S-1 SURFACE WATER & SEDIMENT SAMPLE NO. 1
  - I7MW-1 PROPOSED MONITORING WELL
  - ⊕ I7SB-1 PROPOSED SOIL BORING
  - ⊙ I7SS-1 PROPOSED SEDIMENT/SURFACE WATER SAMPLE
  - 2 — AIR QUALITY SURVEY TRANSECT AND NUMBER



**FIGURE 4-6**  
 INVESTIGATION & SAMPLING LOCATIONS  
 FLEMING KEY  
 NORTH LANDFILL  
 Prepared for:  
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00270102

the concentrations of copper, mercury, and arsenic were above detection limits, the highest concentrations of these metals being 0.070, 0.067, and 0.007 ppm, respectively.

The following additional information was obtained from the Phase I-RI work conducted at the site. Elevated concentrations of lead, manganese, antimony, cadmium, chromium, iron, and mercury were detected in the only surface water sample collected at this site. Significant metal concentrations were not detected in any of the sediment samples. Certain polynuclear aromatic hydrocarbons were detected in the sediment samples. Therefore, IT considers only the groundwater to have been impacted by metals at the site. Figure 4-6 and Table A-7 in Appendix A lists the levels and locations of organic and inorganic compounds detected at the site.

Groundwater flow at the site is to the eastern and western coastline of the island. Tidal influences have been observed to affect groundwater flow throughout the entire site. In addition, there appears to be a relationship between groundwater flow and the location of detected metal concentrations. Specifically, wells located downgradient towards the shoreline but within the landfill area have the highest metal concentrations. Hence, evidence for the migration of metals in groundwater is apparent and contamination may be seeping into the ocean. Since all potable water supplied to the Key West area is via an aqueduct from Miami, humans would not be directly exposed to the metals present in the groundwater at this site.

Groundwater at this site is the only medium that appears to contain potential chemicals of concern. Based upon the data gathered to date, further investigations are necessary to determine the extent of contamination. Continuing field investigations should include: (1) sampling for groundwater, sediment and surface water (ocean) along the coast at this site; this will aid in determining the extent of contaminant migration. (2) analysis of soil samples for TCLP parameters; this will aid in determining the potential for migration of contaminants that may be leaching from the landfill. (3) background sampling of media.

#### Geologic and Hydrogeologic Setting

The following discussion presents the geologic and hydrogeologic setting existing at this site.

Information regarding the geologic framework at the site was obtained from the test pit and soil boring programs.

The materials encountered consisted of debris and trash interspersed with reworked limestone fill. This fill material and debris was encountered throughout the study area from land surface to about 17 feet BLS in some areas of the site.

Review of the SPT data indicate that the fill is dense. Geotechnical data were obtained from analysis of a composite sample collected at boring location MW7-2. These data show that the fill material ranges in size from a clay to a fine gravel with an average particle size (D50) of 4 millimeters. The uniformity coefficient of 0.541 indicates a well graded material.

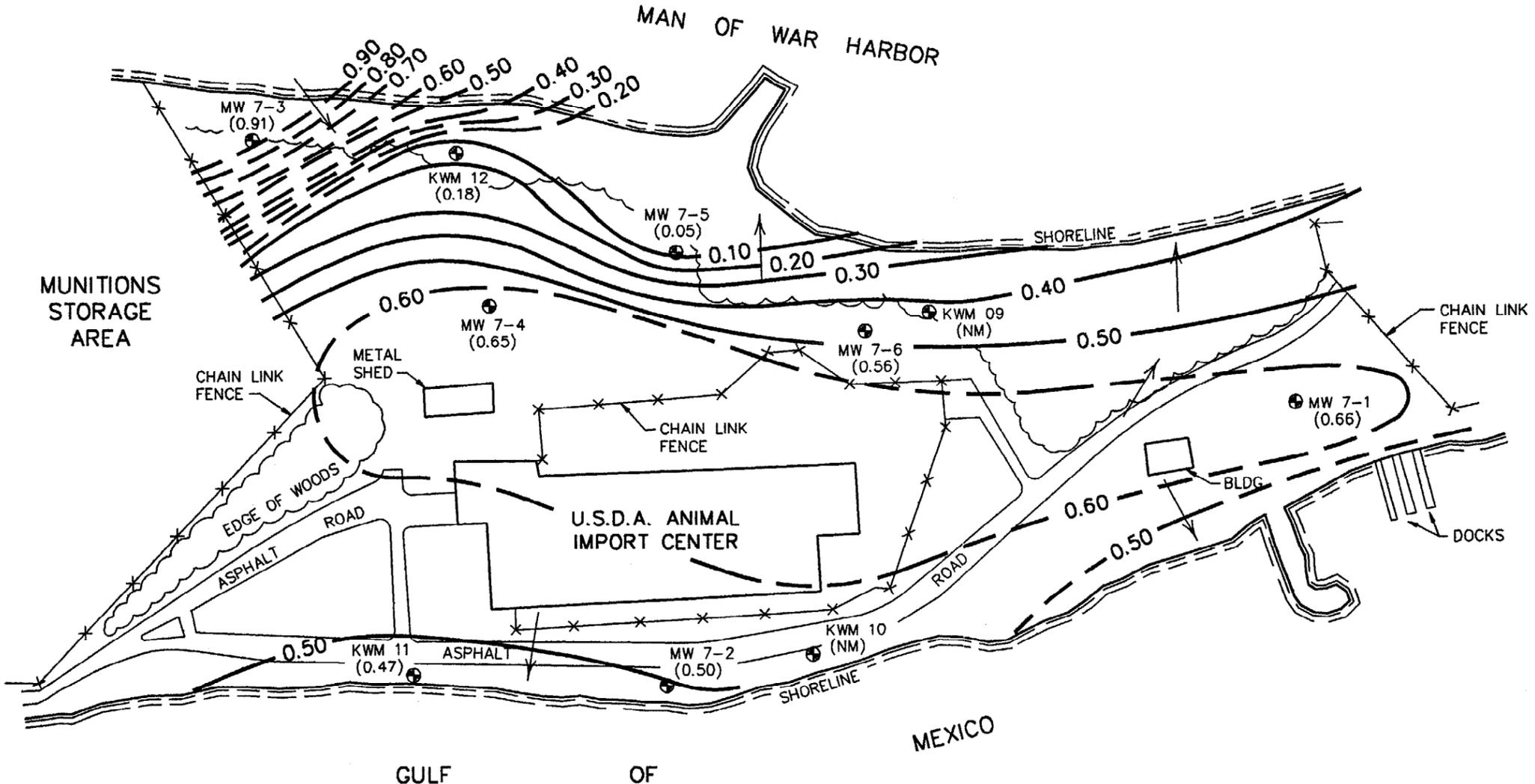
The soil sample showed a cation exchange capacity of about 39.4 meq/g and a total organic carbon concentration of 6,600 mg/kg. The pH of the sample was 8.35 due to the carbonate nature of the fill materials.

Natural oolitic limestone was encountered below the fill and continued to boring termination in all the boreholes. The SPT blow counts indicate that the underlying limestone is of medium density. No impermeable layers or voids were noted during the SPT work conducted at the site.

Groundwater levels at the site were encountered from about 0.5 feet BLS at MW7-3 to about 6 feet BLS at the higher topographic areas of the site.

The groundwater elevation and water level contours are shown on Figure 4-7. In general, groundwater flow at the site is from the center of the Key toward the eastern and western coastline. A groundwater mound feature exists in the southwestern portion of the study area. The water level at MW7-3 was the highest elevation and indicates an area of inward flow. Based on the water level elevations, it is observed that the hydraulic gradient across the site is relatively flat.

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 INITIATOR: S. PILLAN  
 PROJ. MGR.: M. HAMPTON  
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 PROJ. NO.: 595392  
 CAD FILE: F04-7.DWG  
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 PLOT: 1-1



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200 100 0 100 200  
 GRAPHIC SCALE

**LEGEND**  
 ● KWM-09 GERAGHTY & MILLER MONITORING WELL  
 ● MW 7-1 IT CORP. MONITORING WELL  
 (0.66) GROUNDWATER ELEVATION  
 — 0.30 — GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)  
 → GROUNDWATER FLOW DIRECTION ARROW  
 NM NOT MEASURED

**FIGURE 4-7**  
**GROUNDWATER ELEVATION**  
**CONTOUR MAP - AUGUST, 1990**  
**FLEMING KEY**  
**NORTH LANDFILL SITE NO. 7**  
*Prepared for:*  
**NAS - KEY WEST**  
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0027011Z

Recharge is via direct infiltration of precipitation at the site. Site inspections conducted during and after rainfall events showed much of the rainwater discharge is by sheet flow to the shoreline. Ponding of rainwater was noted in the southwestern area of the site.

Permeability analysis performed on a soil sample collected at the site indicates an apparent permeability value  $1.11 \times 10^{-5}$  centimeters per second. This permeability is representative of a fine to silty sand.

#### ***4.2.3.3 Utility Survey***

All utilities in the areas of the proposed sampling locations will be identified by NAS - Key West personnel prior to the commencement of field activities. If necessary, proposed sampling locations will be relocated to avoid interference with the identified utilities.

#### ***4.2.3.4 Ambient Air Monitoring***

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

#### ***4.2.3.5 Waste Characterization***

Waste characterization will be performed during this phase of the investigation in conjunction with the soil boring program.

#### ***4.2.3.6 Soil Investigation***

IT proposes to collect soil samples from four soil boring locations to further delineate contamination. The proposed soil boring locations are shown in Figure 4-6.

Surface soil samples will be collected from the first 12 inches of soil. Subsurface samples will be collected using split spoon techniques. Split spoon samples will be collected for every 5 feet of boring and the borings will be terminated at a depth of 11 feet. One surface and one subsurface soil sample will be submitted for analysis of the list of TAL/TCL parameters. One soil sample from each boring (which will be selected by field screening with an OVA) will be submitted to the laboratory for analysis using TCLP. The results of the analysis should indicate the potential for leaching of contaminants from the soil.

#### **4.2.3.7 Hydrogeologic Investigation**

In order to obtain a better understanding of groundwater flow patterns and tidal influences on groundwater flow, a water level recorder will be placed in the well furthest from the coast and a second water level recorder will be placed at the shoreline to record groundwater levels. Groundwater levels will be collected at hourly intervals for a period of approximately 4 weeks. Water levels in all the wells at the site will be measured once a week and correlated with the water levels in the recorder wells to produce four groundwater elevation maps.

IT proposed installing ten well points at the locations identified on Figure 4-6. Actual locations may vary depending on site conditions and will be based on field judgement. The well points will be installed to collect groundwater samples at the base of the site, along the shoreline. If metals are migrating towards the ocean, analysis of groundwater samples at the proposed locations should detect these metals. In addition to the proposed well points, groundwater samples will also be collected from ten existing on-site monitoring wells. The groundwater samples collected from location I7MW-7 will be analyzed for the list of TAL/TCL parameters. The remaining samples will be analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Metals

#### **4.2.3.8 Surface Water and Sediment Investigation**

Sediment and ocean water samples will be collected at the shoreline intersect at locations close to each well point. Figure 4-6 shows the locations at which surface water and sediment samples will be collected.

Sediment samples will be collected from the upper 0.5 feet at each sample location utilizing a ponar dredge. A total of 10 sediment samples will be collected.

Ocean water samples will be collected from as close as possible to the surface water/sediment interface utilizing a Kemmerer tube or similar device. A total of 10 ocean water samples will be collected. One sediment and one ocean water sample collected from location I7MW7 will be analyzed for the list of TAL/TCL parameters. The remaining sediment samples and ocean water samples will be analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Metals

#### ***4.2.3.9 Background Sampling***

A background sampling and analysis program was recommended by IT to obtain analytical data for groundwater, surface water, ocean water, soil, and sediment so as to establish background levels for the site. Background samples for soil will be obtained from sample locations I7SB-4. Background groundwater ocean water and sediment samples will be collected from sample location I7MW-10. All background samples will be analyzed for the list of TAL/TCL parameters. The soil and groundwater samples will be representative of background conditions at IR Site 8.

Analysis of the background samples should offer site specific standards of comparison for media impact studies.

#### ***4.2.3.10 Preliminary Biological Hazard Assessment***

A preliminary biological hazard assessment as described in Section 4.1.8 will be performed at this site.

#### ***4.2.3.11 Baseline Risk Assessment***

A baseline risk assessment is not proposed at this time.

#### ***4.2.3.12 Topographic Mapping and Site Surveying***

A field survey will establish the horizontal and vertical control of the new well points, soil boring locations, and other pertinent features, including all surface staining or other signs of contamination.

From this survey, a base map will be prepared for this site. The map will have an appropriate horizontal scale to show pertinent site features and all elevations will be referenced to MSL.

#### **4.2.3.13 Sample Analysis Summary**

At the Fleming Key North Landfill Area, the following media and number of samples will be submitted for laboratory analysis:

- Soil - 8
- Groundwater - 20
- Surface water - 10
- Sediment - 10

#### **4.2.4 IR Site 8 - Fleming Key South Landfill**

##### **4.2.4.1 Site Description**

The Fleming Key South Landfill covers approximately 45 acres on the southern end of Fleming Key and is shown in detail in Figure 4-8. Reportedly, as much as 8,000 tons of unknown wastes were disposed at the landfill annually between 1962 and 1982. Since 1966, the waste disposal activities of the City of Key West were combined with those of the Navy at this site.

The open trench disposal method was practiced at this site, with the trenches being constructed in a manner similar to that at Fleming Key North Landfill. The trenches were partially full of sea water when the wastes were disposed. Combustible wastes were taken to the western portion of the site and burned. The ash and unburned wastes were then deposited in an area in the western portion of the site.

##### **4.2.4.2 Existing Data**

The following information was obtained from the study conducted by consultants Geraghty and Miller. Five shallow monitoring wells (KWM-13 through KWM-17) were installed at the site to depths of between 12 feet and 22 feet. Groundwater levels ranged from 0.35 feet to 0.90 feet above MSL.

Groundwater quality samples were collected from each monitoring well and analyzed for pH, specific conductance, TDS, and US EPA priority pollutants. Results of the analyses indicate concentrations of TDS ranged from 15,000 to 43,000 ppm while acid extractables, pesticides, or PCBs were not detected. Concentrations of VOCs were above the detection limit in two of the monitoring wells (KWM-13 and KWM-17). These base neutral extractable compounds

were reported in concentrations above detection limits but below 5 ppb in monitoring wells KWM-13, KWM-14, and KWM-17. Arsenic, copper, and mercury were detected in all samples, the highest concentrations being 0.007, 0.300, and 0.620 ppm, respectively.

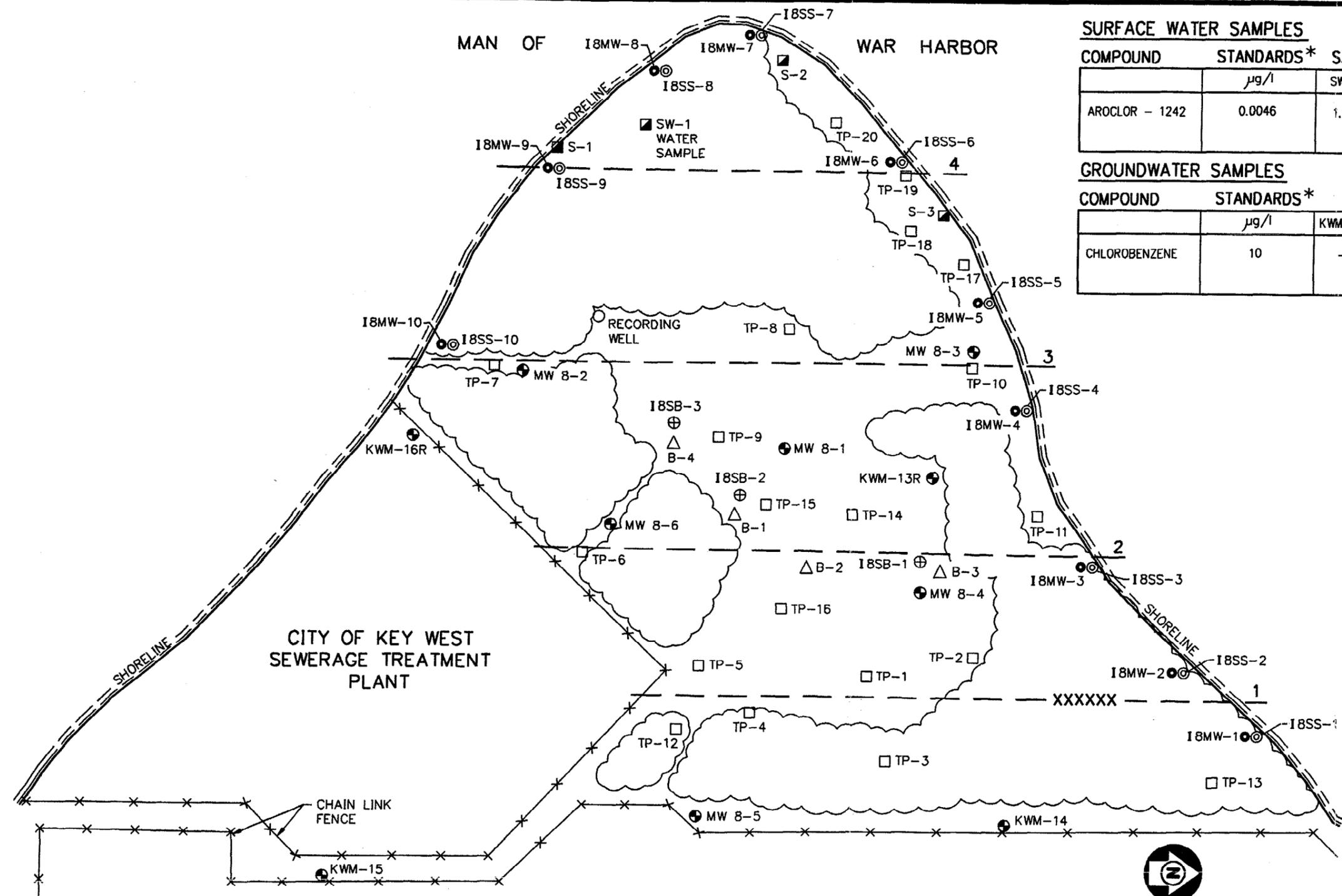
The following additional information was discerned from the Phase I work conducted at the site. The seven metals detected in the groundwater above their established standards include antimony, cadmium, chromium, copper, lead, manganese, and mercury. The volatile organic compound, chlorobenzene was also detected above its established standard at the site. Several metals were also detected in a surface water sample. Pesticide contamination was detected in one of the groundwater samples. IT considers this site to have been impacted with respect to metals in the groundwater. Figure 4-8 and Table A-8 in Appendix A list the levels and locations of organic and inorganic contamination detected at the site.

Groundwater flow at the site tends to the northeast and is greatly influenced by tidal variation. High metal concentrations were detected in the downgradient wells thereby showing evidence of the migration of metals in groundwater. Potable water in Key West is piped in from the mainland, therefore, direct human ingestion of metal contaminated groundwater would not be expected. The effect of metal contaminated groundwater discharging into the ocean is inconclusive now and does require further investigation. This site does not appear to have any immediate impact on human health based on the preceding information.

Figure 4-8 illustrates the locations at which sampling was performed during the Phase I investigative work.

Groundwater at the site is the only medium to transport chemicals of potential concern. The migration of metals toward the ocean shoreline may be occurring. Based upon the data gathered to date, further investigations are necessary to determine the extent of contamination. Continuing investigations should include the following: (1) sampling of groundwater, sediment and ocean water along the coast at the site. (2) analysis of soil samples for TCLP parameters. This will aid in determining the potential for migration of contaminants that may be leaching from the landfill itself. (3) background sampling of all media.

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 PROJ. MGR.: M. HAMPTON  
 DRAWING NO.: AB201848  
 PROJ. NO.: 595392  
 CAD FILE: AB201848.DWG  
 PLOT: 1=1  
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**SURFACE WATER SAMPLES**

COMPOUND	STANDARDS* µg/l	SAMPLE LOCATION
AROCLOR - 1242	0.0046	SW-1

**GROUNDWATER SAMPLES**

COMPOUND	STANDARDS* µg/l	SAMPLE LOCATIONS							
		KWM-14	KWM-15	MW 8-1	MW 8-2	MW 8-3	MW 8-4	MW 8-5	MW 8-6
CHLOROBENZENE	10	-	-	-	-	-	-	-	63

\* STANDARDS REFERS TO A COMBINATION OF DRINKING WATER STANDARDS, FLORIDA GUIDANCE CONCENTRATIONS AND CORRECTIVE ACTION LIMITS.

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**FIGURE 4-8**  
**INVESTIGATION & SAMPLING**  
**LOCATIONS**  
**FLEMING KEY**  
**SOUTH LANDFILL**  
 Prepared for:  
**NAS - KEY WEST**  
**KEY WEST, FLORIDA**



- LEGEND**
- ⊕ KWM-14 GERAGHTY & MILLER MONITORING WELL
  - ⊕ MW 8-2 IT CORP. MONITORING WELL
  - ⊕ KWM-16R REPLACEMENT MONITORING WELL
  - RECORDING WELL
  - TP-4 TEST PIT NO. 4
  - S-1 SEDIMENT SAMPLE NO. 1
  - ⊕ I8SB-1 PROPOSED SOIL BORING
  - I8MW-1 PROPOSED WELL POINT
  - ⊙ I8SS-1 PROPOSED SEDIMENT/SURFACE WATER SAMPLE
  - △ B-1 BORING NO. 1
  - XXXXXX HIGH LEVELS OF ORGANIC VAPORS
  - 2 AIR QUALITY SURVEY TRANSECT AND NUMBER

NOTE:  
 BACKGROUND SOIL AND GROUNDWATER SAMPLE WILL BE COLLECTED FROM FLEMING KEY NORTH LANDFILL (IR SITE 7).

### Geologic and Hydrogeologic Setting

The following discussions present the geologic and hydrogeologic setting existing at the site.

Information derived from monitoring well borings was used to construct a geologic framework to assess the potential for contamination migration. The water table was encountered from 5 to 10 feet BLS during the drilling of monitoring well boreholes. Material encountered above the water table at these borings consisted of poorly sorted limestone fill with reworked limestone and gravel. Material encountered below the water table consisted of poor to moderately sorted sandy limestone. Debris (i.e., glass, plastic, metal) was encountered throughout all borings. SPT blow counts indicate the poorly sorted material encountered above the water table is of medium density. The material encountered below the water table is soft offering little penetration resistance. Native material was usually encountered below 18 to 20 feet BLS. This native material is part of the Miami Oolite Formation.

Geotechnical data were obtained from analysis of a composite sample taken from 16 to 20 feet BLS from the borehole of Monitoring Well MW8-6. In comparison with other results from this area, grain size distribution indicates the soil is very coarse sand with an average particle size of 1.8 mm. The uniformity coefficient is 1267, suggesting it is poorly sorted. The cation exchange capacity was 56.1 meq/g. The total organic content was 5,700 mg/kg. The sample permeability was  $1.04 \times 10^{-5}$ . The pH is very basic at 8.50; however, this is to be expected due to the abundance of carbonate rocks and soils.

The lower hydraulic conductivity is considered to be representative of the fill material encountered at shallow depth at this site. The higher value is representative of the native Miami Oolite encountered below the fill material.

Groundwater levels were collected and plotted to determine groundwater flow at this site, as shown in Figure 4-9. Clearly the area is affected greatly by tidal variations. A groundwater trough appeared to exist in the northeast portion of the site and is evident at the time these water level readings were collected. Accordingly, groundwater flow seems to be toward this low-lying area and then trends northeast toward inner Fleming Key. Recharge of this area is by direct infiltration of precipitation.

MAN OF WAR HARBOR

SHORELINE

SHORELINE

CITY OF KEY WEST  
SEWERAGE TREATMENT  
PLANT

MUNITIONS STORAGE AREA

KWM-15  
(0.49)

MW 8-5  
(0.46)

KWM-14  
(0.28)

MW 8-4  
(0.36)

KWM-13R  
(NM)

MW 8-1  
(0.46)

MW 8-3  
(0.48)

MW 8-2  
(0.58)

KWM-16R  
(0.43)

MW 8-6  
(NM)

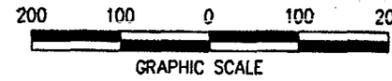
0.50

0.40

0.30

0.50

CHAIN LINK  
FENCE



LEGEND

- KWM-14 GERAGHTY & MILLER MONITORING WELL
- MW 8-1 IT CORP. MONITORING WELL
- (0.46) GROUNDWATER ELEVATION
- 0.40 — GROUNDWATER ELEVATION CONTOUR (DASHED WHERE INFERRED)
- GROUNDWATER FLOW DIRECTION ARROW
- NM NOT MEASURED

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FIGURE 4-9  
GROUNDWATER ELEVATION  
CONTOUR MAP - AUGUST, 1990  
FLEMING KEY  
SOUTH LANDFILL  
*Prepared for:*  
NAS - KEY WEST  
KEY WEST, FLORIDA



START DATE: 9/27/91  
DRAWN BY: L. NIST  
LAST REV DATE: 2/24/92  
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CHECKED BY:  
APPROVED BY:  
INITIATOR: S. PILLAI  
PROJ. MGR.: M. HAMPTON  
DRAWING NO.: A.B.2.0261  
PROJ. NO.: 595382  
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00270137

Based upon the groundwater flow map the average hydraulic gradient is relatively flat.

Groundwater levels were monitored continuously throughout August 1990 in the recorder well at this site. Sea level data were compiled also during this time interval to assess tidal influences on groundwater levels. The correlation of the high and low water readings between both hydrographs closely coincide. Sea level fluctuations range from approximately -0.9 to 1.5 feet MSL. Groundwater elevations range from approximately 1.7 to 3.1 feet MSL.

#### ***4.2.4.3 Utility Survey***

All utilities in the areas of the proposed sampling locations will be identified by NAS - Key West personnel prior to the commencement of field activities. If necessary, proposed sampling locations will be relocated to avoid interference with the identified utilities.

#### ***4.2.4.4 Ambient Air Monitoring***

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

#### ***4.2.4.5 Waste Characterization***

Waste characterization will not be performed during this phase of the investigation based on Phase I recommendations.

#### ***4.2.4.6 Soil Investigation***

Three soil borings will be installed at the site to further delineate contamination. The samples will be collected from locations shown in Figure 4-5. Surface samples will be collected from the first 12 inches of soil. Subsurface samples will be collected by split spoon techniques. Discrete samples will be collected for every five feet of boring. The borings will be terminated at the base of the landfill (approximately 18 feet BLS). One surface and one subsurface sample will be selected (by field screening with an OVA) for analysis of the list of TAL/TCL parameters. One sample from each boring will be selected (by field screening with an OVA and visual observation) and submitted to the laboratory for analysis by TCLP. One soil sample from each boring will also be analyzed for metals.

#### **4.2.4.7 Hydrogeologic Investigation**

In order to obtain a better understanding of groundwater flow patterns and tidal influences on groundwater flow, a water level recorder will be placed in the well furthest from the coast and a second water level recorder will be placed at the shoreline to monitor groundwater levels at hourly intervals for an entire duration of approximately 30 days. Water levels throughout the site will be measured once a week for four weeks. Four groundwater elevation maps will be compiled and correlated with the water levels in the recorder wells.

IT proposed installing 9 well points at locations shown in Figure 4-9. The well points will be installed to collect groundwater samples at the base of the site, along the shoreline to determine whether contaminants are leaching into the ocean. If contaminants are migrating towards the ocean, analysis of groundwater samples at the proposed locations should detect these contaminants. In addition to the ten proposed well points, samples also will be collected from the ten wells existing on-site. The groundwater sample collected from MW8-6 will be analyzed for the list of TAL/TCL parameters. The remaining samples will be analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pesticides
- Metals

#### **4.2.4.8 Surface Water and Sediment Investigation**

Sediment and ocean water samples will be collected from locations close to each well point. These samples will be collected at the shoreline.

Sediment samples will be collected from the upper 0.5 foot at each sample location utilizing a ponar dredge or similar device. A total of 10 sediment samples will be collected.

Ocean water samples will be collected from as close as possible to the surface water/sediment interface utilizing a discrete sampling depth sampler. A total of 10 ocean water samples will be collected. One sediment sample and one ocean water sample collected from location 18MW-8 will be analyzed for the list of TAL/TCL parameters. The remaining sediment and

ocean water samples will be submitted to the laboratory for analysis of the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pesticides
- Metals

#### ***4.2.4.9 Background Sampling***

A background sampling and analyses program was recommended by IT to obtain analytical data for groundwater, surface water, ocean water, soil, surficial soil, and sediment in order to establish background levels for the site. Background samples for soil and groundwater will be collected from locations at IR Site 7 (refer to Section 4.2.3.9 for detail). Ocean water and sediment will be collected from location I8SS10. The background samples will be analyzed for the list of TAL/TCL parameters.

Analysis of the background samples should offer site specific standards of comparison for media impact studies.

#### ***4.2.4.10 Preliminary Biological Hazard Assessment***

A preliminary biological hazard assessment as described in Section 4.1.8 will be performed at this site.

#### ***4.2.4.11 Baseline Risk Assessment***

A baseline risk assessment is not proposed at this time.

#### ***4.2.4.12 Topographic Mapping and Site Surveying***

A field survey will establish the horizontal and vertical control of the new monitoring well, soil boring locations, and other pertinent features, including all surface staining or other signs of contamination.

From this survey, a base map will be prepared for this site. The map will have an appropriate horizontal scale to show pertinent site features and all elevations will be referenced to MSL.

#### **4.2.4.13 Sample Analysis Summary**

At the Fleming Key South Landfill Area, the following media and number of samples will be submitted for laboratory analysis:

- Soil - 8
- Groundwater - 19
- Surface water - 10
- Sediment - 10

#### **4.3 Stage 4 - Sites Requiring Phase I Remedial Investigations**

Sites requiring Phase I Remedial Investigations are as follows:

- AOC Site A - Demolition Key Open Disposal Area
- AOC Site B - Big Coppitt Key Abandoned Civilian Disposal Area

The two sites have been included in the investigation due to the nature of activities that have occurred at the site.

Based on an assessment of the required data, the investigative process has been reduced to a specific set of objectives for the two sites to be studied:

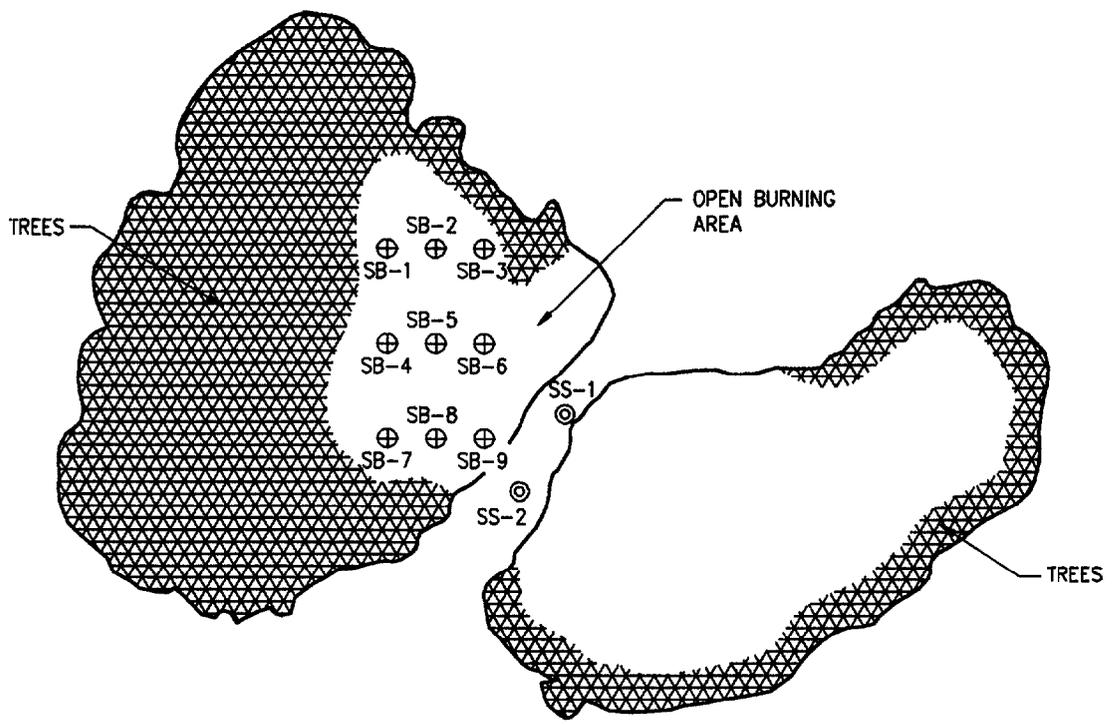
- Review existing site data and relevant regulatory guidance
- Identity contaminants which may be migrating from the sites both quantitatively and qualitatively
- Delineate the potential contaminant migration pathways at the two sites as well as the exposure and risk characteristics of the contaminants (if present) at those site.

#### **4.3.1 AOC Site A - Demolition Key Open Disposal Area**

##### **4.3.1.1 Site Description**

Demolition Key is a man-made dredge spoil island which is approximately 6 feet above mean sea level at its highest point and is shown in Figure 4-1. Figure 4-10 shows detailed aspects of Demolition Key. The Key consists of two land masses, however this investigation will address only the northern land mass where explosives disposal historically took place. The fact that the Key is constructed from dredge materials implies that the soil and subsurface is

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		APPROVED BY:	PROJ. MGR.: M. HAMPTON	PROJ. NO.: 595392	ARCHIVED:
LAST REV DATE: 1/18/93	DRAWN BY: L. NIST				



NOT TO SCALE

**LEGEND**

- ⊕ SB-1 PROPOSED SOIL BORING
- ⊙ SS-1 PROPOSED SEDIMENT/SURFACE WATER SAMPLE

**FIGURE 4-10**

**AOC SITE A  
DEMOLITION KEY  
OPEN DISPOSAL AREA**

*Prepared for:*  
**NAS - KEY WEST  
 KEY WEST, FLORIDA**

**IT** INTERNATIONAL  
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quite porous, allowing for interaction with the nearby sea water. The groundwater flow direction has not been determined at this time as no monitoring wells are in place on the Key.

Demolition Key is approximately 24 acres and is surrounded by both the Atlantic Ocean and the Gulf of Mexico. The Key is accessible only by water transportation and is an off limits restricted area. No permanent surface water features are present on the Key. All rainfall drains directly into the surrounding sea waters. The shoreline currently is supporting a mangrove community that does not appear to be affected by the disposal activities.

Demolition Key has been used by the Navy as a secure area for the disposal of out-of-date ordinance.

The Navy typically utilizes open burning and/or open detonation as the means to ensure the explosives will be burned to completion. The open burning unit is an earthen pit approximately three feet deep and eight to ten feet in diameter surrounded by a riprap apron.

No outside power sources are required to operate the units. Any resultant ash is collected into 55-gallon drums and transported to a satellite collection area where it is sampled and analyzed to determine if it is hazardous prior to final disposal. The area presently is not being used for burning or demolition.

#### ***4.3.1.2 Existing Data***

To date no assessment activities have been performed at this site.

#### ***4.3.1.3 Utility Survey***

There are no utilities present at Demolition Key. Therefore, a utility survey will not be performed at Demolition Key.

#### ***4.3.1.4 Ambient Air Monitoring***

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

#### **4.3.1.5 Waste Characterization**

Existing information indicates this site has not been used for waste disposal. However, it is suspected that the soil may have been impacted through the burning of explosives. As such a waste characterization program at this site will be conducted as part of the soil investigation phase.

#### **4.3.1.6 Soil Investigation**

To ascertain whether the soils have been impacted or not at this site, nine soil samples will be collected at the top of water table (from 0 to 2 feet BLS). Three samples will be submitted to the laboratory for analysis using TCLP procedures for metals. Four samples will be analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pesticides/PCBs
- Metals

One sample will be analyzed for the following parameters:

- Total Organic Carbon (TOC)
- Grain size, ion exchange, pH, density, moisture

One soil sample collected from the area which appears to have the most contamination will be submitted for analysis of the list of TAL/TCL parameters.

#### **4.3.1.7 Hydrogeologic Investigation**

No monitoring wells are to be installed during this phase of investigation. However, one grab sample of groundwater will be collected from the soil boring installed in the open detonation pit. The sample will be analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Pesticides/PCBs
- Metals

#### **4.3.1.8 Surface Water and Sediment Investigation**

Two sediment samples will be collected from the channel between north and south demolition key.

#### **4.3.1.9 Background Sampling**

A background sampling and analysis program was not recommended by IT at this time.

#### **4.3.1.10 Preliminary Biological Hazard Assessment**

A preliminary biological hazard assessment will not be performed at this site.

#### **4.3.1.11 Baseline Risk Assessment**

A baseline risk assessment is not proposed at this time.

#### **4.3.1.12 Topographic Mapping and Site Surveying**

A field survey is not proposed at this time because the environmental sampling is preliminary in nature.

#### **4.3.1.13 Sample Analysis**

At the Demolition Key Open Disposal Area site, the following media and number of samples will be submitted for laboratory analysis:

- Soil - 9
- Groundwater - 1
- Sediment - 2

Table A-1 lists the number of samples, media, and recommended analysis methods.

### **4.3.2 AOC Site B - Big Coppitt Key Abandoned Civilian Disposal Area**

#### **4.3.2.1 Site Description**

The Big Coppitt Key site in question is part of Big Coppitt Key. Figure 4-11 shows in detail the pertinent aspects of the Big Coppitt Key area, while the vicinity map is shown on Figure 4-1. The site encompasses approximately 10 acres, of which approximately 0.7 acres is improved and approximately 1.6 acres is occupied by a dead end canal. The ground elevations at the site vary from sea level up to approximately 4 feet above mean sea level. The

groundwater flow direction has not been determined at this time, as no monitoring wells are installed at the site. Tidal influence is evident between the site and nearby open water areas.

The area of concern is an old abandoned civilian disposal area for discarded car/truck body and frame parts. The fill area is horseshoe shaped, approximately 1 to 2 feet in thickness and 20 feet by 200 feet in size. Surface water is present in a canal which lies adjacent to the site. The shoreline and the disposal area support a mangrove community, with mangroves partially covering some of the disposal debris. Surface water exists in the mangrove wetlands. All runoff from precipitation appear to drain directly into the canal and into the mangrove wetlands.

#### ***4.3.2.2 Existing Data***

To date no assessment activities have been performed at this site.

#### ***4.3.2.3 Utility Survey***

There are no utilities present at Demolition Key. A utility survey will not be performed at Demolition Key.

#### ***4.3.2.4 Ambient Air Monitoring***

For health and safety purposes, an OVA will be used during all subsurface work as required by the HSP.

#### ***4.3.2.5 Waste Characterization***

Existing information indicates the site may have experienced a limited impact from the placement of discarded car/truck body and frame parts on a surface area at the site. As such the waste characterization program at this site will be conducted as part of the soils, surface water, and sediment investigation phase.

#### ***4.3.2.6 Soil Investigation***

To ascertain whether the soils have been impacted or not at the site, 10 soil samples will be collected at the top of water table (estimated to be 1/2 to 1 foot below grade). Soil sample locations are shown on Figure 4-11. Five samples will be submitted to the laboratory for

STARTING DATE: 2/19/91	CHECKED BY:	INITIATOR: S. PILLAI	DRAWING NO.: A102203	CAD FILE: A102203.DWG	PLOT 1=1
DRAWN BY: L. NIST	APPROVED BY:	PROJ. MGR.: M. HAMPTON	PROJ. NO.: 583392	ARCHIVED:	
LAST REV DATE: 10/28/92	DRAWN BY: L. NIST				

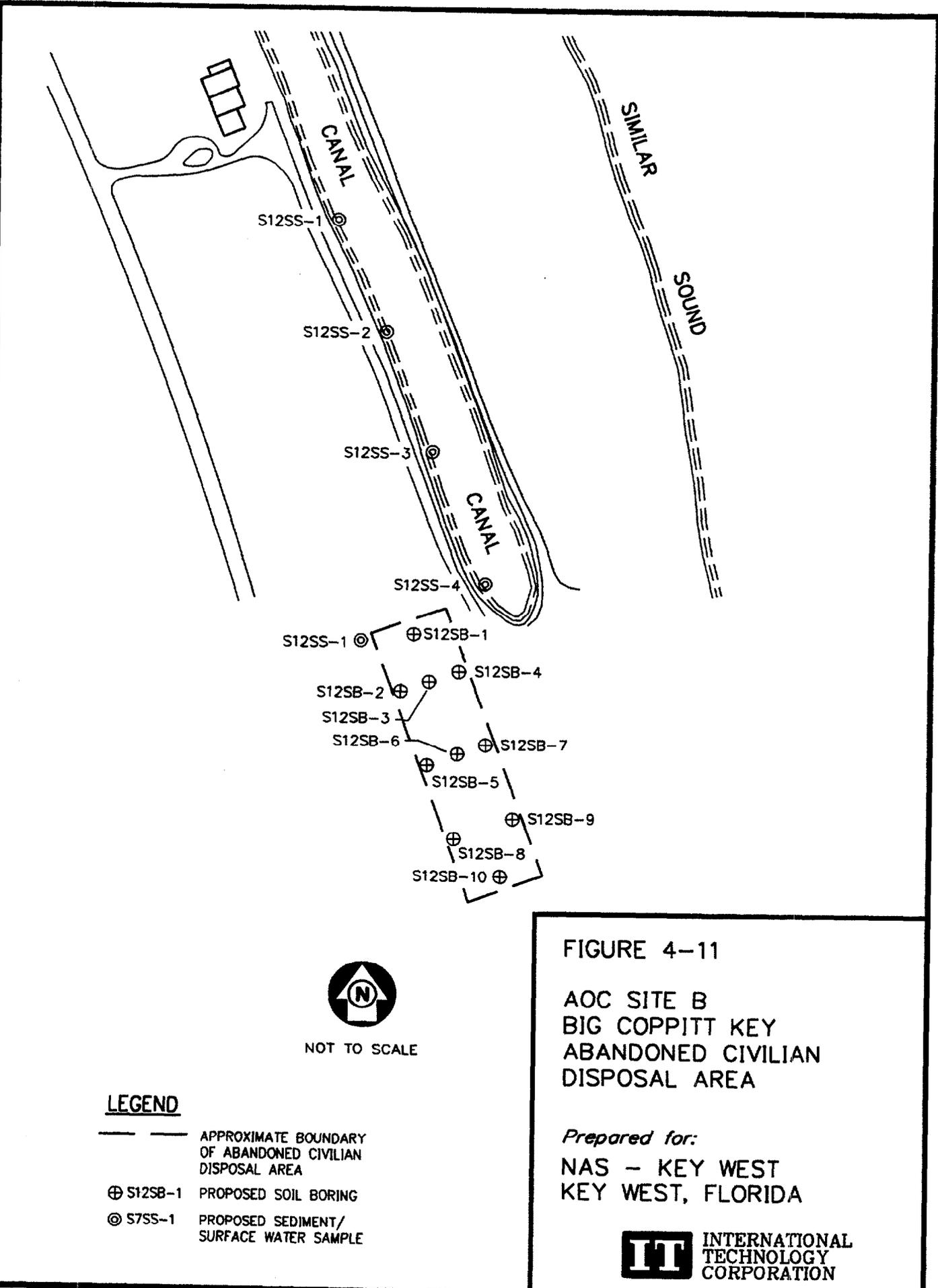


FIGURE 4-11

AOC SITE B  
 BIG COPPITT KEY  
 ABANDONED CIVILIAN  
 DISPOSAL AREA

Prepared for:  
 NAS - KEY WEST  
 KEY WEST, FLORIDA



analysis using TCLP procedures. One sample will be submitted for analysis for the list of TAL/TCL parameters. One sample will be submitted for analysis of the following parameters:

- TOC
- Grain size, ion exchange, pH, density, moisture

Three samples will be submitted for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenils
- Metals

#### ***4.3.2.7 Hydrogeologic Investigation***

No monitoring wells were proposed at the site during this phase of the investigation. Grab samples of groundwater will be collected from two boreholes and analyzed for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- PCB
- Metals

#### ***4.3.2.8 Surface Water and Sediment Investigation***

Surface water features are present at the site. Accordingly, four surface water and four sediment samples will be collected from locations along the canal (depicted on Figure 4-11) for laboratory analysis for the following parameters:

- Volatile Organic Compounds
- Polynuclear Aromatic Hydrocarbons
- Polychlorinated Biphenyls
- Metals

#### ***4.3.2.9 Background Sampling***

No background samples will be collected from this site at this time.

#### **4.3.2.10 Preliminary Biological Hazard Assessment**

A preliminary biological hazard assessment as described in Section 4.1.8 will be performed at this site.

#### **4.3.2.11 Baseline Risk Assessment**

A baseline risk assessment is not proposed at this time.

#### **4.3.2.12 Topographic Mapping and Site Surveying**

A field survey will establish the horizontal and vertical control of the new monitoring well, soil boring locations, and other pertinent features, including all surface staining or other signs of contamination.

From this survey, a base map will be prepared for this site. The map will have an appropriate horizontal scale to show pertinent site features and all elevations will be referenced to MSL.

#### **4.3.2.13 Sample Analysis Summary**

At the Big Coppitt Abandoned Civilian Disposal Area site, the following media and number of samples will be submitted for laboratory analysis:

- Soil - 10
- Groundwater - 2
- Surface water - 4
- Sediment - 4

Table A-1 lists the number of samples, media, and recommended analysis methods, while Figure 4-11 illustrates the proposed sampling locations.

## **5.0 Project Management Plan**

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### **5.1 Project Schedules**

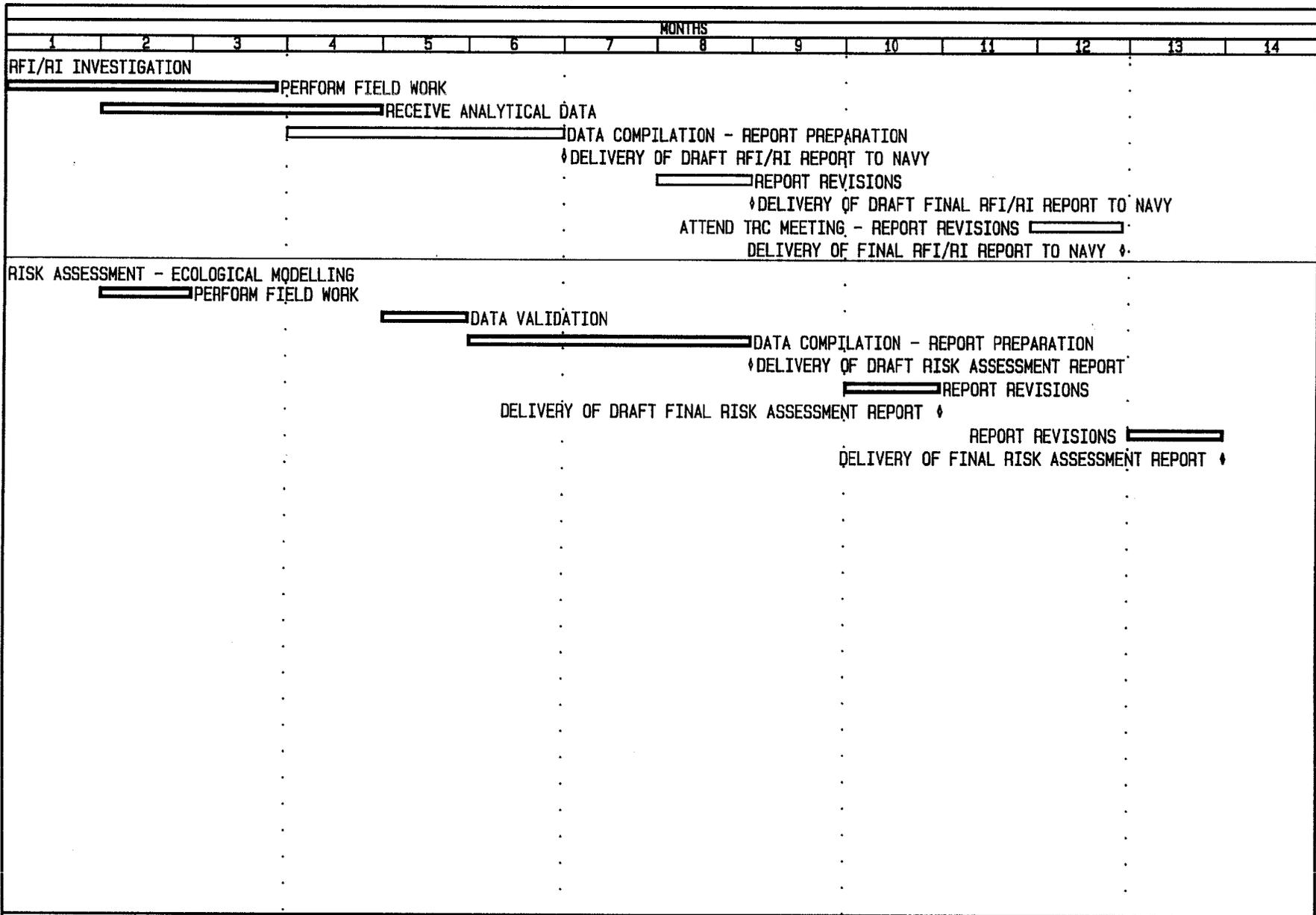
The purpose of the RFI/RI study is the characterization (nature and extent) of the suspected contamination so that options for site remediation can be investigated during a Corrective Measures Study (CMS)/Feasibility Study (FS) phase. IT has assumed that work performed in the field investigation phase will be completed before CMS/FS actions are pursued at the new sites. Project schedules will be prepared to ensure that the necessary resources are available for the project to be effectively completed.

The schedule for the RFI, which addresses the requirements of the RCRA Permit will be completed and supplied to all concerned parties after approval of the necessary documents. The schedule will be as follows.

All field work (installation of soil borings and monitoring wells, groundwater sampling, etc.) will commence immediately after approval of the Work Plan, and will be completed in a period of eight weeks. A period of six weeks is estimated for the laboratory analysis of all samples. Hence, the duration of RFI is estimated to be a total of ten weeks. The draft RFI report will be submitted to EPA within 90 days of completion of the RFI. After EPA comments on the RFI report have been received, a period of 30 days is estimated for submittal of the final RFI report. A project schedule is presented in Figure 5-1.

### **5.2 Project Organization**

The project organization is presented on the Project Organization Chart in Figure 5-2. IT will manage and direct the program from IT's Tampa, Florida office using the project team approach. This approach consolidates and streamlines communications within the project team, NAS-Key West, and Region IV EPA. This management system allows the flexibility for IT to assemble a team to meet the exact technical requirements of each task using resources from wherever they may reside within the company. The following paragraphs describe the organizational structure and the management procedures that will be utilized for the upcoming RFI phase at NAS - Key West, and briefly states the credentials of the key personnel. In assembling this management team, we have selected highly experienced professionals as the



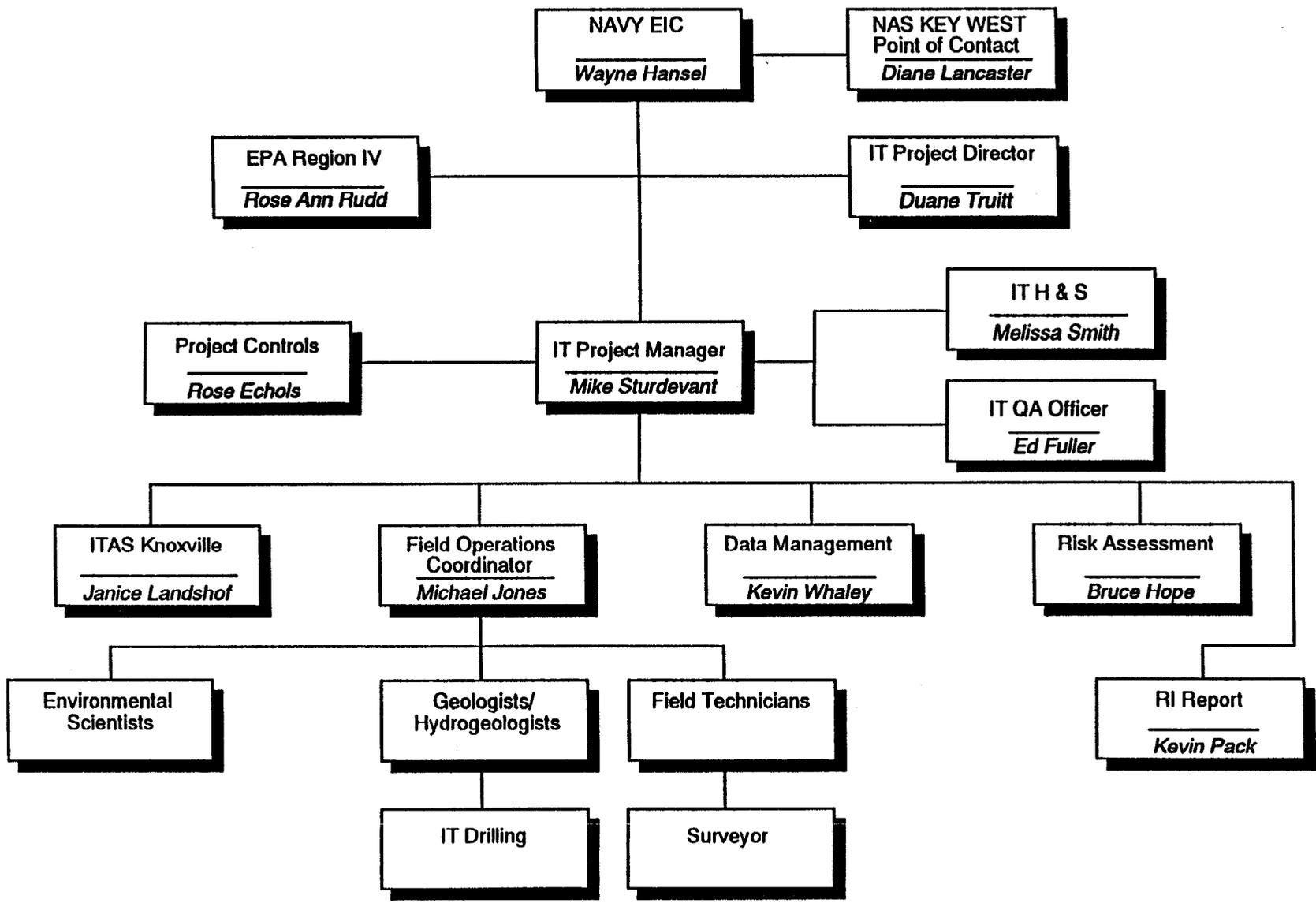
 Activity Bar/Early Dates  
 Critical Activity  
 Progress Bar

NAVAL AIR STATION - KEY WEST, FL  
 RCRA FACILITY INVESTIGATION  
 PROGRAM SCHEDULE  
 Figure 5-1

FIELD WORK PLAN - REMEDIAL INVESTIGATION

Date	Revision	Checked	Approved

**FIGURE 5-2**  
**Project Organization Chart**  
 RFI/RI  
 NAS-Key West



key managers; additional personnel will be assigned as needed from our resource pool of professionals.

The Project Director will be Mr. Duane Truitt. Mr. Truitt is a senior level project manager and general manager of the Tampa office with over 14 years of experience in the environmental field. Mr. Truitt has directed and/or managed several major RCRA, CERCLA environmental investigations, large groundwater investigations, and important remediation projects over the past few years. Mr. Truitt's role will include commitment of needed personnel, assisting in technical planning, and the review of all project documents compiled during the RFI.

Mr. Mike Sturdevant will be the Project Manager for the project. Mr. Sturdevant has over 10 years of environmental project management experience. He has been responsible for managing several major RCRA and CERCLA projects for government and commercial clients. Mr. Sturdevant will be the point contact for NAS-Key West and Region IV EPA and will be responsible for the day to day management and coordination of the project activities.

Mr. Michael Jones will be the Field Operations Coordinator and Task Manager for the project. Mr. Jones is a professional engineer with 13 years experience. Mr. Jones has worked on several RCRA and CERCLA projects. He will be responsible for coordinating all field activities and providing technical support to produce the report.

Mr. Dana Simerly will be the QA Officer.

### ***5.3 Laboratory Management***

The analytical laboratory that will perform the analysis of all samples collected at the NAS-Key West facility will be IT Analytical Services in Knoxville, Tennessee. The laboratory Project Manager/QA Officer is Ms. Janice Landshof. Laboratory project management is described in Section 3.0 of the Sampling and Analysis Plan.

## **6.0 Data Management Plan**

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The following section summarizes the activities to be performed by IT in the management of data. Described herein are the field data collection methods, data handling procedures and data reporting procedures utilized by IT. Data management performed by ITAS is included in Section 3.0 of the Sampling and Analysis Plan.

### **6.1 Data Handling/Reports**

This section covers the generation, reduction, and reporting of all data developed during the NAS-Key West RFI study.

#### **6.1.1 Data Generation**

Data will be generated by IT through field investigations and the resulting interpretation of said data. These data are generated directly as instrument readings and/or visual observations. The raw data are recorded as generated on field data forms. The field data forms which will be used during this RFI project include but are not limited to:

- Field Activity Daily Log
- Field Activity Daily Log Continuation Sheet
- Field Equipment Calibration Record
- Sample Collection Log
- Monitoring Well Installation Sheet
- Monitoring Well Installation Sketch
- Visual Classification of Soils/Soil Boring Log
- Tailgate Safety Meeting Form
- Chain of Custody Record Form
- Request for Analysis Form

Examples of these forms are included in Appendix A.

#### **6.1.2 Data Reduction**

Raw data produced in the field may require reduction to a usable format. This reduction of data involves the calculation of analytical results from output generated by following prescribed methods as presented in Section 1.0 and 2.0 of the Sampling and Analysis Plan. The input for these methods may include instrument responses or other intermediate information which

require conversion to a usable data report. The typical methods used to reduce these data are presented below.

#### **6.1.2.1 Field Data Reduction**

Field data that will be recorded includes pH, temperature, specific conductance, organic vapor concentrations, visual classification of soils and groundwater elevations. Methods used for data reduction are specified in IT's Environmental Engineering Services Comprehensive Quality Assurance Project Plan (CompQAPP).

#### **6.1.2.2 Laboratory Data Reduction**

ITAS will reduce all analytical data as stated in Section 3.0 of the Sampling and Analysis Plan.

#### **6.1.3 Data Reporting**

The draft and final report will include both relevant field and summarized tabular data. This data will be presented as described below.

##### **6.1.3.1 Field Data Reporting**

Field data will be reported in an appendix of the final report. These data will be presented on the forms shown in Appendix A. Additional field data will be provided in appendices in the draft and final report as required in order to develop a complete understanding of the site. These data will be recorded on forms listed in Section 5.1.1.

##### **6.1.3.2 Tabular Data Reporting**

Summary data tables will be included in the draft and final report. These tables will be a matrix with environmental monitoring parameters for the respective media (groundwater, surface water, and soil/sediment). These tables will show monitoring well identification and chemical water quality for those monitoring wells.

##### **6.1.3.3 Laboratory Data Reporting**

Laboratory data reports will meet the requirements as put forth in Section 3.0 of the Sampling and Analysis Plan.

## **6.2 Report Format**

All reports will conform to IT report standards subject to NAS-Key West and Region IV EPA review.

### **6.2.1 Progress Reports**

Progress reports will be sent to the attention of the NAS-Key West Environmental Manager (Ms. Diane Lancaster). The reports will be prepared in letter report format. Work progress reports will be submitted to NAS-Key West by the 15th day of the following month. These reports will present the status of all activities at the end of the previous month and activities planned for the current and following month should the project run that long in duration.

### **6.2.2 Draft and Final Report**

The draft and final report will be prepared for submittal to the Regional Administrator (RA) pursuant to Part II.E.3, of the RCRA Permit issued to NAS-Key West. A general outline and description of the RFI report is:

- Title Page
- Table of Contents
- Executive Summary
- Introduction
- Study Area Investigations
- Physical Characteristics of the Study Area
- Nature and Extent of Contamination
- Contaminant Fate and Transport
- Risk Assessment
- Summary and Conclusion
- Appendices

The title page will contain the title of the report, specifying the work performed, site number, contract number, and client.

The table of contents will list all sections contained in the report including tables, figures, and appendices, each of which will be listed on separate pages as appropriate.

The executive summary will provide a brief review of the findings of the report. This summary will be limited to a maximum of two to three pages.

The introduction provides an overview of the project sites investigated and selected scope of investigation.

The study area investigations section will include a description of the work performed under the RFI phase.

The physical characteristics of the study area will consist of a review of surface features at the site and local meteorology. Also included in this section is the surface water hydrology, geology, soils, and hydrogeology aspects of the sites.

The nature and extent of contamination section described in the results of the sites characterizations including natural chemical components and contaminants detected in the surrounding media such as groundwater/soil will be summarized in tabular format.

The contaminant fate and transport section discusses the contaminants found, and presents them in relation to transport routes and environmental persistence.

The risk assessment evaluates the potential of impact on human health and the environment associated with the sites.

The summary and conclusion section will report conclusions that can be drawn from the data including the degree to which the effort achieved the objectives of the RFI. The conclusions will report on the confirmation and quantification of the presence of suspected contaminants.

The appendices to the final report will include pertinent raw data developed during the study. This includes well installation logs, daily field activity logs, sampling logs, site safety documentation (Tailgate Safety Meetings), and field equipment calibrations reports.

### **6.3 Project Record Maintenance**

Project records will be maintained at the IT Tampa Office. The files will include both file copy and electronically stored information.

#### **6.3.1 File Copy**

All data gathered and reports prepared during the scope of the project will be placed in the NAS-Key West RFI project file. The project manager or his designee will be responsible for placing this information in the NAS-Key West RFI file.

#### **6.3.2 Electronic Data**

All reports to NAS-Key West will be prepared using a personal computer (PC). These reports will be generated using the software packages WordPerfect and Lotus 123.

#### **6.3.3 Analytical Data**

All raw data generated during the chemical analysis phase by ITAS will be kept on file at their facility. Formatted, certificates of analysis will be forwarded to IT, Tampa for inclusion and interpretation in the RFI reports.

**Appendix A**  
**Analytical Data**

**Table A-1**  
**Sample Media, Number, and Recommended Analysis**  
**NAS-Key West**  
**Key West, Florida**  
 (Page 1 of 4)

SITE	MEDIA TO BE SAMPLED	NUMBER OF SAMPLES	RECOMMENDED ANALYSIS
AIMD A-980 (SWMU 4)	Soil	20	2 surface and 2 subsurface for Appendix IX; 16 VOCs, PAHs, PCBs, metals
	Groundwater	3	2 Appendix IX; 1 VOCs, PAHs, PCBs, metals
	Sediment	4	2 samples Appendix IX; 2 VOCs, PAHs, PCBs, metals
	Surface Water	4	2 samples Appendix IX; 2 VOCs, PAHs, PCBs, metals
AIMD A-990 (SWMU 5)	Soil	12	1 surface and 1 subsurface for Appendix IX; 10 VOCs, PAHs, phenol, metals
	Groundwater	2	1 Appendix IX; 1 VOCs, PAHs, phenol, metals
	Sediment	3	2 Appendix IX; 1 VOCs, PAHs, phenol, metals
	Surface Water	3	2 Appendix IX; 1 VOCs, PAHs, phenol, metals
AIMD-824 (SWMU 7)	Soil	20	2 surface and 2 subsurface for Appendix IX; 16 VOCs, PAHs, pentachlorophenol, PCBs, metals
	Groundwater	3	2 Appendix IX; 1 VOCs, PAHs, pentachlorophenol, PCBs, metals
	Sediment	4	2 Appendix IX; 2 VOCs, PAHs, pentachlorophenol, PCBs, metals
	Surface Water	4	2 Appendix IX; 2 VOCs, PAHs, pentachlorophenol, PCBs, metals

**Table A-1**  
**Sample Media, Number, and Recommended Analysis**  
**NAS-Key West**  
**Key West, Florida**  
 (Page 2 of 4)

SITE	MEDIA TO BE SAMPLED	NUMBER OF SAMPLES	RECOMMENDED ANALYSIS
Boca Chica Open Disposal Area (SWMU 1)	Soil	5	3 samples for TCLP, 1 surface and 1 subsurface for Appendix IX
	Groundwater	11	10 samples VOCs, PAHs, pesticides, metals; 1 for Appendix IX
	Sediment	3	2 samples VOCs, PAHs, pesticides, metals; 1 for Appendix IX
	Surface Water	3	2 samples VOCs, PAHs, pesticides, metals; 1 for Appendix IX
Boca Chica DDT Mixing Area (SWMU 2)	Soil	16	2 surface and 2 subsurface samples for Appendix IX; 12 VOCs, PAHs, PCB/pesticide
	Groundwater	6	2 samples for Appendix IX; 4 VOCs, PAHs, pesticides/PCBs, metals
	Sediment	2	2 samples for Appendix IX
	Surface Water	2	2 samples for Appendix IX
Boca Chica Fire Fighting Training Area (SWMU 3)	Soil	6	2 surface and 2 subsurface for Appendix IX; 2 VOCs, PAHs, PCBs, metals
	Groundwater	8	2 Appendix IX; 6 VOCs, PAHs, PCBs, metals
	Sediment	4	2 Appendix IX; 2 VOCs, PAHs, PCBs, metals
	Surface Water	4	2 Appendix IX, 2 VOCs, PAHs, PCBs, metals

**Table A-1**  
**Sample Media, Number, and Recommended Analysis**  
**NAS-Key West**  
**Key West, Florida**  
(Page 3 of 4)

SITE	MEDIA TO BE SAMPLED	NUMBER OF SAMPLES	RECOMMENDED ANALYSIS
Truman Annex Refuse Disposal Area (IR Site 1)	Soil	14	2 TCLP; 1 surface and 1 subsurface for TCL/TAL; 2 VOCs, PAHs, pesticides/PCBs, metals; 8 metals
	Groundwater	10	1 TCL/TAL (incl. background); 9 pesticides/PCBs, metals
	Sediment	6	2 TCL/TAL; 4 pesticides/PCBs, metals
	Surface Water	6	2 TCL/TAL; 4 pesticides/PCBs, metals
Truman Annex DDT Mixing Area (IR Site 3)	Soil	20	2 surface and 2 subsurface for TCL/TAL; 5 TCLP, 11 pesticides/PCBs, metals
	Groundwater	5	2 TCL/TAL; 3 VOCs, PAHs, pesticides/PCBs, metals
Fleming Key North Landfill (IR Site 7)	Soil	8	4 TCLP; 2 surface and 2 subsurface for TCL/TAL
	Groundwater	20	2 TCL/TAL; 18 VOCs, PAHs, metals
	Sediment	10	2 TCL/TAL; 8 VOCs, PAHs, metals
	Surface Water	10	2 TCL/TAL; 8 VOCs, PAHs, metals
Fleming Key South Landfill (IR Site 8)	Soil	8	3 TCLP; 1 surface and 1 subsurface for TCL/TAL; 3 VOCs, PAHs, pesticides, metals
	Groundwater	19	1 TCL/TAL; 18 VOCs, PAHs, pesticides/PCBs, metals

**Table A-1**  
**Sample Media, Number, and Recommended Analysis**  
**NAS-Key West**  
**Key West, Florida**  
 (Page 4 of 4)

SITE	MEDIA TO BE SAMPLED	NUMBER OF SAMPLES	RECOMMENDED ANALYSIS
Fleming Key South Landfill (cont'd) (IR Site 8)	Sediment	10	2 TCL/TAL, 8 VOCs, PAHs, pesticides, metals
	Surface Water	10	2 TCL/TAL, 8 VOCs, PAHs, pesticides, metals
Demolition Key Open Disposal Area	Soil	9	1 TCL/TAL; 4 VOCs, PAHs, pesticides/PCBs, metals; 1 TOC, grain size, ion exchange, pH, density, moisture, permeability; 3 TCLP
	Groundwater	1	VOC, PAHs, Pesticides/PCBs, metals
	Sediment	2	VOC, PAHs, Pesticides/PCBs, metals
Big Coppitt Key Abandoned Civilian Disposal Area	Soil	10	4 TCLP; 1 TCL/TAL; 1 TOC, grain size, ion exchange, pH, density, moisture, permeability; 4 VOC, PAHs, metals, PCBs
	Groundwater	2	VOC, PAHs, PCB, metals
	Sediment	4	1 TCL/TAL; 3 VOCs, PAHs, metals, PCBs
	Surface Water	4	1 TCL/TAL; 3 VOCs, PAHs, metals, PCBs

**NOTE:**

Metals analyzed for will include Ag, As, Ba, Be, Cd, Co, Cr, Cu, Hg, Ni, Pb, Sb, Se, Sn, Tl, V, and Zn.

TABLE A-2a

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST  
(INORGANICS) ANALYSIS FOR SOIL SAMPLES  
Boca Chica Open Disposal Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in mg/kg (ppm)**

LABORATORY SAMPLE IDENTIFICATION:		04-03-SED	04-04-SED	04-05-SED	04-06-SED
FIELD SAMPLE LOCATION:		B-1	B-2	B-3	B-4
SAMPLE DEPTH (ft):		.5	.5	.5	.5
ASSOCIATED METHOD BLANKS:		42	42	42	42
COMPOUND	CSC				
Aluminum	NE	1,440	2,650	3,710	1,380
Arsenic	NE	ND	ND	ND	4.4
Calcium	NE	91,600	313,000	331,000	298,000
Copper	NE	51.9	17.4	36	6.9
Iron	NE	6,520	7,430	3,840	846
Lead	NE	99.4	63.3	103	4.6
Magnesium	NE	15,900	14,400	18,100	4,190
Manganese	NE	116	40.7	52.3	12.6
Mercury	NE	0.06	0.05	0.3	ND
Potassium	NE	1,720	667	806	BDL
Sodium	NE	23,800	17,300	17,800	2,890
Vanadium	NE	7.7	7.1	7.3	BDL
Zinc	NE	150	61.8	119	26.9

**NOTE:**

CSC = Concentration Standards for Comparison  
 NE = Not established  
 ND = Not detected at instrument detection limit  
 BDL = Detected, but below instrument quantitation limit  
 Note: Boring B-5 sample collected for Appendix IX analysis

TABLE A-2b

**ANALYTICAL DETECTIONS FOR APPENDIX IX INORGANIC (METALS) ANALYSIS  
IN SURFACE/SUBSURFACE SOIL SAMPLES**

Boca Chica Open Disposal Area

NAS-Key West

Key West, Florida

IT Project No. 595392

Units are in mg/kg (ppm)

LABORATORY SAMPLE IDENTIFICATION:	04-05-MW-SS	04-01-SED
FIELD SAMPLE LOCATION:	MW-4-5	B-5
SAMPLE DEPTH (ft):	2-3	0.5
ASSOCIATED METHOD BLANKS:	83	91

COMPOUND	CSC		
Arsenic	NE	6.4	11.4
Cadmium	NE	ND	10.6
Cobalt	NE	ND	7.3
Copper	NE	26.8	594.0
Lead	NE	27.1	1,140
Mercury	NE	0.15	5.5
Thallium	NE	ND	18.0
Vanadium	NE	9.1	8.6
Zinc	NE	53.8	1,300
Sulfide	NE	280.0	ND
Tin	NE	6.1	117

**NOTE:**

CSC = Concentration Standards for Comparison  
 ND = Not detected at the instrument detection limit  
 NE = Not established  
 MW = Monitoring well  
 B = Boring location

TABLE A-2c

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) FOR GROUNDWATER SAMPLES  
Boca Chica Open Disposal Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in ug/L (ppb)**

LABORATORY SAMPLE IDENTIFICATION:	04-01-GW	04-02-GW	04-02-GWD	04-05-GM-GW	04-06-GM-GW	04-07-GW	04-08-GM-GW	
FIELD SAMPLE LOCATION:	MW 4-1	MW 4-2	MW 4-2 duplicate	KWM-05	KWM-06	KWM-07	KWM-08	
ASSOCIATED METHOD BLANKS:	38	38	38	54	65	54	54	
COMPOUND	CSC							
Aluminum	NE	27,000	BDL	3,600	405	2,650	1,740	781
Arsenic	50	ND	ND	59	ND	ND	ND	ND
Calcium	NE	8,880,000	637,000	5,590,000	825,000	2,590,000	1,860,000	2,230,000
Chromium	50	106	ND	---	ND	---	---	---
Iron	300	14,300 E	-- (E)	2,790 E	3,850	7,340 E	5,890	1,110
Lead	50	---	--	ND	65.4	54.8	74.4	---
Magnesium	NE	1,330,000	673,000	695,000	693,000	948,000	1,290,000	897,000
Manganese	50	53.6	ND	---	---	---	---	ND
Potassium	NE	377,000	197,000	197,000	210,000	295,000	383,000	251,000
Sodium	160,000	11,000,000	5,530,000	5,700,000	5,850,000	8,170,000	10,700,000	7,400,000
Vanadium	NE	106.0	ND	BDL	ND	BDL	BDL	BDL

**NOTE:**

CSC = Concentration Standards for Comparison

NE = Not established

BDL = Detected, but below the instrument quantitation limit

ND = Not detected at the instrument detection limit

E = Compound exceeds calibration range of instrument

KWM/MW = Monitoring well

Note: Monitoring well (MW 4-4) sample collected for Appendix IX analysis

(---) = Below CSC

**TABLE A-2d**

**ANALYTICAL DETECTIONS FOR APPENDIX IX INORGANIC (METALS)  
ANALYSIS IN GROUND/SURFACE WATER SAMPLES  
Boca Chica Open Disposal Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in ug/L (ppb)**

<b>LABORATORY SAMPLE IDENTIFICATION:</b>	<b>04-01-SW</b>	
<b>FIELD SAMPLE LOCATION:</b>	<b>S-1</b>	
<b>ASSOCIATED METHOD BLANKS:</b>	<b>90</b>	
<b>COMPOUNDS</b>	<b>CSC</b>	
Lead	50	377
Mercury	2	8.4
<b>NOTE:</b> CSC = Concentration Standards for Comparison		

TABLE A-2e

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST  
(INORGANICS) ANALYSIS FOR SURFACE WATER SAMPLE  
Boca Chica Open Disposal Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in ug/L (ppb)**

LABORATORY SAMPLE IDENTIFICATION:	04-02-SW
FIELD SAMPLE LOCATION:	S-2
ASSOCIATED METHOD BLANKS:	54

COMPOUND	CSC	
Aluminum	NE	BDL
Cadmium	10	13.7
Calcium	NE	546,000
Magnesium	NE	1,600,000
Potassium	NE	454,000
Sodium	160,000	13,100,000

**NOTE:**

CSC = Concentration Standards for Comparison  
 NE = Not established  
 BDL = Detected, but below instrument quantitation limit  
 S = Sediment/Surface Water Location

TABLE A-2f

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST  
(INORGANICS) IN SEDIMENT SAMPLE  
Boca Chica Open Disposal Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in mg/kg (ppm)**

<b>LABORATORY SAMPLE IDENTIFICATION:</b>	<b>04-07-SED</b>	<b>04-02-SED</b>
<b>FIELD SAMPLE LOCATION:</b>	<b>S-1</b>	<b>S-2</b>
<b>ASSOCIATED METHOD BLANK:</b>	<b>42</b>	<b>71</b>

COMPOUND	CSC		
Aluminum	NE	12,700	1,990
Arsenic	NE	18.2	ND
Cadmium	NE	10.6	ND
Calcium	NE	183,000	45,100
Chromium	85*	118	---
Cobalt	NE	17.3	ND
Copper	NE	589	211
Iron	NE	141,000	794
Lead	NE	2,040	73.3
Magnesium	NE	29,100	11,200
Manganese	NE	1,080	BDL
Mercury	NE	2.7	0.4
Potassium	NE	1,090	BDL
Sodium	NE	25,300	75,700
Thallium	NE	74.3	ND
Vanadium	NE	11.5	BDL
Zinc	NE	2,610	119

**NOTE:**

CSC = Concentration Standards for Comparison  
 NE = Not established  
 \* = CSC is for Chromium VI (Soil)  
 ND = Not detected at instrument detection limit  
 BDL = Detected, but below instrument quantitation limit  
 S = Sediment/Surface Water location  
 (—) = Below CSC

**TABLE A-3a**  
**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN SURFACE/SUBSURFACE SOIL SAMPLES**  
**Boca Chica DDT Mixing Area**  
**NAS-Key West**  
**Key West, Florida**  
**IT Project No. 595392**  
**Units are in mg/kg (ppm)**

LABORATORY SAMPLE IDENTIFICATION:	Site 5, Plot 1	Site 5, Plot 2	Site 5, Plot 3	Site 5, Plot 4	Site 5, Plot 5	Site 5, Plot 6	Site 5, MW-2	Site 5, MW-3	
SAMPLE TYPE:	Composite	Composite	Composite	Composite	Composite	Composite	Discrete	Discrete	
FIELD SAMPLE LOCATION:	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	MW 5-2	MW 5-3	
ASSOCIATED METHOD BLANKS:	17	31	31	31	31	31	26	26	
COMPOUND	CSC								
Aluminum	NE	882	1,000 E	1,560 E	1,560 E	3,510 E	1,170 E	2,070	119
Arsenic	NE	3.5	14.3	3.2	3.1	1.5	1.9	BDL	BDL
Cadmium	NE	3.9	ND	ND	ND	ND	ND	ND	ND
Calcium	NE	323,000	378,000	310,000	437,000	278,000	397,000	284,000	405,000
Chromium	NE	4.3	4.8	5.6	4.6	8.50	4.4	4.8	2.2
Copper	NE	10.7	5.8	3.7	BDL	13.1	5.3	ND	ND
Iron	NE	1,480 E	819 E	1,230 E	814 E	2,100 E	737 E	1,160	133
Lead	NE	57.1	34.7	82.1	5.7	102	4.9	5.5	0.4
Magnesium	NE	8,900 E	2,690 E	2,920 E	3,740 E	6,230 E	3,040 E	7,530	1,110
Manganese	NE	14.7 E	7.5	10.3	15.5	17.30	9.2	10	2.0
Mercury	NE	ND	ND	ND	ND	0.03	ND	ND	ND
Silver	51	ND	---	ND	ND	ND	ND	ND	386
Sodium	NE	735	909	1,050	1,600	1,770	1,130	1,660	1,230

TABLE A-3a

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN SURFACE/SUBSURFACE SOIL SAMPLES**  
**Boca Chica DDT Mixing Area**  
**NAS-Key West**  
**Key West, Florida**  
**IT Project No. 595392**  
**Units are in mg/kg (ppm)**

LABORATORY SAMPLE IDENTIFICATION:	Site 5, Plot 1	Site 5, Plot 2	Site 5, Plot 3	Site 5, Plot 4	Site 5, Plot 5	Site 5, Plot 6	Site 5, MW-2	Site 5, MW-3	
SAMPLE TYPE:	Composite	Composite	Composite	Composite	Composite	Composite	Discrete	Discrete	
FIELD SAMPLE LOCATION:	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	MW 5-2	MW 5-3	
ASSOCIATED METHOD BLANKS:	17	31	31	31	31	31	26	26	
COMPOUND	CSC								
Vanadium	NE	BDL	BDL	BDL	BDL	BDL	BDL	BDL	ND
Zinc	NE	50.9 E	30.7	30.7	20.3	38.8	11.5	11.9	9.9

**NOTE:**

CSC = Concentration Standards for Comparison  
 BDL = Detected but below the instrument quantitation limit  
 NE = Not established  
 ND = Not detected to the instrument detection limit  
 E = The reported value is estimated because of the presence of interference  
 MW = Monitoring well  
 (---) = Below CSC

**TABLE A-3b**

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)  
FOR GROUNDWATER SAMPLES  
Boca Chica DDT Mixing Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in ug/L (ppb)**

<b>LABORATORY SAMPLE IDENTIFICATION:</b>	<b>05-01-GWD</b>	<b>05-01-GWO</b>	<b>05-02-GW</b>	<b>05-03-GW</b>
<b>FIELD SAMPLE LOCATION:</b>	<b>MW 5-1 duplicate</b>	<b>MW 5-1</b>	<b>MW 5-2</b>	<b>MW 5-3</b>
<b>ASSOCIATED METHOD BLANKS:</b>	<b>47</b>	<b>47</b>	<b>54</b>	<b>54</b>

<b>COMPOUND</b>	<b>CSC</b>				
Aluminum	NE	682	717	3,000	1,010
Calcium	NE	94,000	1,210,000	1,460,000	1,410,000
Iron	300	465	497	1,700	524
Magnesium	NE	163,000	163,000	159,000	190,000
Potassium	NE	60,500	60,500	51,500	63,900
Sodium	160,000	1,570,000	1,570,000	1,460,000	1,620,000

**NOTE:**

CSC = Concentration Standards for Comparison  
NE = Not established  
MW = Monitoring well

**TABLE A-3c**

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (METALS)  
FOR SURFACE WATER SAMPLES  
Boca Chica DDT Mixing Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in ug/L (ppb)**

<b>LABORATORY SAMPLE IDENTIFICATION:</b>		<b>05-SW-D</b>	<b>05-SW-U</b>
<b>FIELD SAMPLE LOCATION:</b>		<b>S-1</b>	<b>S-2</b>
<b>ASSOCIATED METHOD BLANKS:</b>		<b>65</b>	<b>65</b>
<b>COMPOUND</b>	<b>CSC</b>		
Aluminum	NE	BDL	1,510
Calcium	NE	246,000	242,000
Iron	300	112*	236*
Lead	50	53.6	ND
Magnesium	NE	819,000	792,000
Potassium	NE	232,000	220,000
Sodium	160,000	6,590,000	6,410,000

**NOTE:**

CSC = Concentration Standards for Comparison

NE = Not established

\* = Reported value estimated due to the presence of an interference

ND = Not detected to the instrument detection limit

TABLE A-3d

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)  
 FOR SEDIMENT SAMPLES  
 Boca Chica DDT Mixing Area  
 NAS-Key West  
 Key West, Florida  
 IT Project No. 595392  
 Units are in mg/kg (ppm)**

LABORATORY SAMPLE IDENTIFICATION:	05-SED-U	05-SED-D
FIELD SAMPLE LOCATION:	S-2	S-1
ASSOCIATED METHOD BLANKS:	66	66

COMPOUND	CSC		
Aluminum	NE	928	459
Cadmium	NE	1.8	1.9
Calcium	NE	317,000	325,000
Copper	NE	18.6	11
Iron	NE	1,230	1,140
Lead	NE	23.3	29.9
Magnesium	NE	3,100	1,970
Manganese	NE	10	7.3
Sodium	NE	7,310	7,580
Zinc	NE	46.5 E	58.6

**NOTE:**

CSC = Concentration Standards for Comparison  
 NE = Not established  
 E = The reported value is estimated due to an interference  
 S = Sediment/Surface Water location

TABLE A-4a

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) FOR GROUNDWATER SAMPLES**  
**Boca Chica Fire Fighting Training Area**  
**NAS-Key West**  
**Key West, Florida**  
**Units are in ug/L (ppb)**

<b>LABORATORY SAMPLE IDENTIFICATION:</b>	<b>10-02-GW</b>	<b>10-03-GW</b>	<b>10-18-GM-GW</b>	<b>10-19-GW</b>
<b>FIELD SAMPLE LOCATION:</b>	<b>MW 10-2</b>	<b>MW 10-3</b>	<b>KWM-18</b>	<b>KWM-19</b>
<b>ASSOCIATED METHOD BLANK:</b>	<b>47</b>	<b>47</b>	<b>54</b>	<b>47</b>

COMPOUND	CSC	10-02-GW	10-03-GW	10-18-GM-GW	10-19-GW
Aluminum	NE	11,500	12,300	67	2,590
Cadmium	10	ND	ND	ND	ND
Calcium	NE	12,700,000	10,200,000	229,000	4,920,000
Chromium	50	73.5	53	ND	---
Iron	300	2,490	4,940	1,230	2,210
Magnesium	NE	651,000	1,180,000	152,000	848,000
Manganese	50	---	62.2	ND	BDL
Potassium	NE	196,000	343,000	70,900	256,000
Sodium	160,000	5,300,000	9,340,000	1,330,000	7,180,000
Vanadium	NE	58.1	BDL	ND	BDL

**NOTE:**

CSC = Concentration Standards for Comparison  
 NE = Not established  
 BDL = Detected, but below instrument quantitation limit  
 ND = Not detected at instrument detection limit  
 KWM/MW = Monitoring well  
 (---) = Below CSC

**TABLE A-4b**

**ANALYTICAL DETECTIONS FOR APPENDIX IX INORGANIC (METALS)  
ANALYSIS IN SOIL SAMPLE  
Boca Chica Fire Fighting Training Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in mg/kg (ppm)**

<b>LABORATORY SAMPLE IDENTIFICATION:</b>	10-MW-01-SS
<b>FIELD SAMPLE LOCATION:</b>	MW:10-1
<b>DEPTH OF SAMPLE (ft)</b>	.5
<b>ASSOCIATED METHOD: BLANK:</b>	83

COMPOUND	CSC	
Copper	NE	32.9
Lead	NE	14.4
Zinc	NE	54.3
Tin	NE	3.1

**NOTE:**

CSC = Concentration Standards for Comparison  
NE = Not established

**TABLE A-5a**  
**ANALYTICAL DETECTION FOR TARGET ANALYTE LIST (INORGANICS)**  
**IN GROUNDWATER SAMPLES**  
**Truman Annex Refuse Disposal Area**  
**NAS-Key West**  
**Key West, Florida**  
**IT Project No. 595392**  
**Units are in ug/L (ppb)**

LABORATORY SAMPLE IDENTIFICATION:	01-01-GW	01-02-GW	01-03-GW	01-01-GM-GW	01-02-GM-GW	01-03-GM-GW	01-04-GWO	01-04-GWD	
FIELD SAMPLE LOCATION:	MW 1-1	MW 1-2	MW 1-3	KWM-01	KWM-02	KWM-03	KWM-04	KWM-04 duplicate	
ASSOCIATED METHOD BLANKS:	38	38	38	65	65	65	65	65	
COMPOUNDS	CSC								
Aluminum	NE	5,870	34,900	46,500	BDL	12,800	2,120	1,520	6,210
Antimony	14	ND	557	313	ND	427	95.2	ND	ND
Arsenic	50	ND	62.2	---	ND	ND	ND	ND	ND
Barium	1,000	--- (E)	1,380 E	1,310 E	NDL	ND	BDL	BDL	BDL
Cadmium	10	ND	54.5	33.2	ND	22.2	ND	ND	ND
Calcium	NE	11,200,000	1,720,000	2,150,000	431,000	10,300,000	5,140,000	4,980,000	4,290,000
Chromium	50	92.2	351	657	ND	142	---	61.2	61.1
Copper	1,000	---	9,520	10,200	---	3,360	---	BDL	---
Iron	300	5,100 E	155,000 E	81,000 E	--- (E)	89,500 E	3,790 E	793 E	3,040 E
Lead	50	57.1	5,700	4,360	---	4,140	219	ND	86.1
Magnesium	NE	128,000	922,000	964,000	718,000	811,000	693,000	157,000	159,000

TABLE A-5a

**ANALYTICAL DETECTION FOR TARGET ANALYTE LIST (INORGANICS)  
IN GROUNDWATER SAMPLES  
Truman Annex Refuse Disposal Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in ug/L (ppb)**

LABORATORY SAMPLE IDENTIFICATION:	01-01-GW	01-02-GW	01-03-GW	01-01-GM-GW	01-02-GM-GW	01-03-GM-GW	01-04-GWO	01-04-GWD	
FIELD SAMPLE LOCATION:	MW 1-1	MW 1-2	MW 1-3	KWM-01	KWM-02	KWM-03	KWM-04	KWM-04 duplicate	
ASSOCIATED METHOD BLANKS:	38	38	38	65	65	65	65	65	
Manganese	50	134	2,940	921	BDL	1,360	---	---	65.6
Mercury	2	ND	16.2	11.1	ND	2.4	---	ND	ND
Nickel	70	ND	303	277	ND	88.2	BDL	ND	ND
Potassium	NE	47,000	287,000	281,000	208,000	244,000	201,000	55,200	56,200
Sodium	160,000	800,000	7,840,000	7,830,000	5,720,000	6,340,000	5,590,000	1,140,000	1,210,000
Vanadium	NE	55.4	116	114	ND	96.8	63.3	BDL	BDL
Zinc	5,000	---	15,200	10,400	---	7,320	---	---	---

**NOTE:**

CSC = Concentration Standards for Comparison

BDL = Below Detection Limit

NE = Not Established

ND = Not detected at instrument quantitation limit

E = Compound exceeded calibration range of instrument

(-) = Below CSC

**TABLE A-5b**

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST  
(INORGANICS) IN SEDIMENT SAMPLES  
Truman Annex Refuse Disposal Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in mg/kg (ppm)**

<b>LABORATORY SAMPLE IDENTIFICATION:</b>	<b>01-01-SED</b>	<b>01-02-SED</b>	<b>01-03-SED</b>
<b>FIELD SAMPLE LOCATION:</b>	<b>S-1</b>	<b>S-2</b>	<b>S-3</b>
<b>ASSOCIATED METHOD BLANKS:</b>	<b>42</b>	<b>42</b>	<b>42</b>

COMPOUND	CSC			
Aluminum	NE	546	6,170	1,960
Arsenic	NE	4.0	3.9	ND
Cadmium	NE	1.1	ND	ND
Calcium	NE	301,000	156,000	206,000
Copper	NE	132	18.3	72.5
Iron	NE	1,790	4,480	1,860
Lead	NE	134	30.1	43.1
Magnesium	NE	3,420	21,500	12,500
Manganese	NE	24.9	295	146
Mercury	NE	0.09	0.06	0.15
Potassium	NE	ND	958	ND
Sodium	NE	3,510	2,320	1,010
Vanadium	NE	6.7	14.0	4.3
Zinc	NE	131	24.1	45.9

**NOTE:**

CSC = Concentration Standards for Comparison  
 NE = Not established  
 ND = Not detected at instrument quantitation limit  
 S = Sediment/Surface water location

**TABLE A-6a**  
**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)**  
**IN SURFACE/SUBSURFACE SOIL SAMPLES**  
**Truman Annex DDT Mixing Area**  
**NAS-Key West**  
**Key West, Florida**  
**IT Project No. 595392**  
**Units are in mg/kg (ppm)**

LABORATORY SAMPLE IDENTIFICATION:	Site 3, Plot 1	Site 3, Plot 2	Site 3, Plot 3	Site 3, Plot 4	Site 3, Plot 5	Site 3, Plot 6	Plot 2, NAS Site 3	Plot 4, NAS Site 3	
SAMPLE TYPE:	Composite	Composite	Composite	Composite	Composite	Composite	Discrete	Discrete	
FIELD SAMPLE LOCATION:	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	MW 3-2	MW 3-1	
ASSOCIATED METHOD BLANKS:	21	21	21	21	21	21	31	31	
COMPOUND	CSC								
Aluminum	NE	263	560	949	115	921	1,790	116*	863
Arsenic	NE	27.4	6.6	16.6	27.9	12.8	3.7+	BDL	7.3
Cadmium	NE	BDL	1.3	ND	ND	ND	ND	ND	ND
Calcium	NE	356,000	392,000	613,000	290,000	335,000	333,000	317,000	359,000
Chromium	NE	4	4.6	6.9	2.7	4.9	6.3	2.4	3.9
Copper	NE	24.2	26.8	17.3	10.1	14	11.8	BDL	4.2
Iron	NE	732*	1,050*	779*	745*	1,340*	1,200*	117*	825
Lead	NE	110	87.1	85.2	76.3	115	50.2	6.2	30.4
Magnesium	NE	1,540*	1,830*	2,590*	784*	1,640	2,410*	664*	1,040
Manganese	NE	9.6	14.7	15.3	5	13.7	16.4	2	10.8
Mercury	NE	0.05	0.15	0.11	ND	0.08	0.04	0.04	0.04

TABLE A-6a

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)  
IN SURFACE/SUBSURFACE SOIL SAMPLES**

Truman Annex DDT Mixing Area

NAS-Key West

Key West, Florida

IT Project No. 595392

Units are in mg/kg (ppm)

LABORATORY SAMPLE IDENTIFICATION:	Site 3, Plot 1	Site 3, Plot 2	Site 3, Plot 3	Site 3, Plot 4	Site 3, Plot 5	Site 3, Plot 6	Plot 2, NAS Site 3	Plot 4, NAS Site 3	
SAMPLE TYPE:	Composite	Composite	Composite	Composite	Composite	Composite	Discrete	Discrete	
FIELD SAMPLE LOCATION:	Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	MW 3-2	MW 3-1	
ASSOCIATED METHOD BLANKS:	21	21	21	21	21	21	31	31	
COMPOUND	CSC								
Potassium	NE	ND	ND	ND	116	ND	BDL	ND	ND
Sodium	NE	BDL	BDL	1,310	1,140	BDL	1,030	919	1,060
Zinc	NE	89.9*	114*	129	35.0*	106*	70.3*	12.3	20.5

NOTE:

- \* = Values estimated due to interference
- + = Post digestion spike out of control limits, while adsorbance was less than 50% of spike adsorbance
- CSC = Concentration Standards for Comparison
- ND = Not detected at instrument detection limit
- BDL = Detected, but below instrument quantitation limit
- NE = Not established
- MW = Monitoring well

**TABLE A-6b**

**ANALYTICAL DETECTION FOR TARGET ANALYTE LIST (INORGANICS)  
FOR GROUNDWATER SAMPLES  
Truman Annex DDT Mixing Area  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in ug/L (ppb)**

LABORATORY SAMPLE IDENTIFICATION:	03-01-GW	03-02-GW	03-03-GW	
FIELD SAMPLE LOCATION:	MW 3-1	MW 3-2	MW 3-3	
ASSOCIATED METHOD BLANKS:	7	7	7	
COMPOUND	CSC			
Aluminum	NE	711	BDL	981
Cadmium	10	11.4	ND	13.6
Calcium	NE	1,670,000	455,000	1,150,000
Iron	300	425	895	540
Magnesium	NE	74,200	143,000	63,600
Potassium	NE	21,900	49,700	22,700
Sodium	160,000	534,000	1,140,000	567,000
<b>NOTE:</b>				
CSC = Concentration Standards for Comparison				
NE = Not established				
ND = Not detected at the instrument detection limit				
BDL = Detected but below instrument quantitation limit				
MW = Monitoring well				

**TABLE A-7a**  
**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES**  
**Fleming Key North Landfill**  
**NAS-Key West**  
**Key West, Florida**  
**IT Project No. 595392**  
**Units are in ug/L (ppb)**

LABORATORY SAMPLE IDENTIFICATION:	07-01-GW	07-02-GW	07-02-GWD	07-03-GW	07-04-GW	07-05-GW	07-06-GW	07-KWM-09-GW	07-KWM-11-GW	07-KWM-12-GW	07-13-ER	
FIELD SAMPLE LOCATION:	MW 7-1	MW 7-2	MW 7-2 duplicate	MW 7-3	MW 7-4	MW 7-5	MW 7-6	KWM-09	KWM-11	KWM-12	equipment rinsate	
ASSOCIATED METHOD BLANKS:	7	7	7	7	7	7	7	54	65	65	65	
COMPOUND	CSC											
Aluminum	NE	35,000	424	118	21,000	9,980	368	630	6,470	1,930	5,930	ND
Antimony	29	141	ND	ND	BDL	90.4	ND	ND	ND	ND	116	ND
Cadmium	10	21.7	14.3	10.4	12	14.9	10.3	---	ND	ND	ND	ND
Calcium	NE	2,880,000	435,000	354,000	3,570,000	2,590,000	377,000	634,000	8,710,000	677,000	14,400,000	BDL
Chromium	50	384	---	ND	---	115	ND	ND	---	ND	---	ND
Iron	300	121,000	1,840	549	10,600	44,800	3,620	1,560	14,600	21,600 E	32,300 E	BDL
Lead	50	1,430	---	ND	---	746	---	---	125	462	718	ND
Magnesium	NE	877,000	1,120,000	1,110,000	1,170,000	765,000	1,250,000	863,000	1,050,000	1,430,000	1,230,000	BDL
Manganese	50	656 E	ND	ND	105 E	380 E	109 E	75.6 E	165	56.9	106	ND
Mercury	2	12.4	---	---	---	13.6	---	---	73	BDL	---	ND

TABLE A-7a

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES**  
**Fleming Key North Landfill**  
**NAS-Key West**  
**Key West, Florida**  
**IT Project No. 595392**  
**Units are in ug/L (ppb)**

LABORATORY SAMPLE IDENTIFICATION:	07-01-GW	07-02-GW	07-02-GWD	07-03-GW	07-04-GW	07-05-GW	07-06-GW	07-KWM-09-GW	07-KWM-11-GW	07-KWM-12-GW	07-13-ER	
FIELD SAMPLE LOCATION:	MW 7-1	MW 7-2	MW 7-2 duplicate	MW 7-3	MW 7-4	MW 7-5	MW 7-6	KWM-09	KWM-11	KWM-12	equipment rinsate	
ASSOCIATED METHOD BLANKS:	7	7	7	7	7	7	7	54	65	65	65	
COMPOUND	CSC											
Potassium	NE	255,000	336,000	330,000	335,000	221,000	409,000	259,000	292,000	379,000	356,000	ND
Sodium	160,000	7,090,000	9,360,000	9,310,000	9,530,000	6,190,000	10,500,000	14,300,000	8,510,000	10,700,000	9,850,000	BDL
Vanadium	NE	74.2	ND	ND	BDL	ND	ND	ND	BDL	ND	BDL	ND

**NOTE:**

CSC = Concentration Standards for Comparison

NE = Not established

E = The reported value is estimated due to the presence of an interference

ND = Not detected at the instrument detection limit

BDL = Detected but below instrument quantitation limit

MW = Monitoring well

(---) = Below CSC

**TABLE A-7b**

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE (INORGANIC)  
ANALYSIS FOR SURFACE WATER  
Fleming Key North Landfill  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in ug/L (ppb)**

<b>LABORATORY SAMPLE IDENTIFICATION:</b>		<b>07-02-SW</b>
<b>FIELD SAMPLE LOCATION:</b>		<b>S-2 (Tidal Creek)</b>
<b>ASSOCIATED METHOD BLANK:</b>		<b>54</b>
<b>COMPOUND</b>	<b>CSC</b>	
Aluminum	NE	447
Calcium	NE	420,000
Iron	300	556
Lead	50	72.2
Magnesium	NE	1,370,000
Potassium	NE	454,000
Sodium	160,000	11,400,000
<b>NOTE:</b>		
CSC = Concentration Standards for Comparison		
NE = Not established		

TABLE A-7c

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)  
IN SEDIMENT SAMPLES  
Fleming Key North Landfill  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in mg/kg (ppm)**

LABORATORY SAMPLE IDENTIFICATION:		07-01-SED	07-02-SED	07-03-SED	07-04-SED
FIELD SAMPLE LOCATION:		S-1	S-2 (Tidal Creek)	S-3	S-4
ASSOCIATED METHOD BLANKS:		71	71	71	71
COMPOUND	CSC				
Aluminum	NE	242	415	452	531
Arsenic	NE	ND	ND	3.6	ND
Cadmium	NE	ND	1.1	ND	ND
Calcium	NE	301,000	247,000	380,000	241,000
Copper	NE	23.8	21.1	7.5	15.9
Iron	NE	949	772	342	1,140
Lead	NE	38	27.2	ND	15.8
Magnesium	NE	2,700	5,350	2,560	4,970
Manganese	NE	8.2	29.2	6.4	21.6
Mercury	NE	0.06	0.09	ND	0.07
Sodium	NE	3,960	4,940	1,920	8,110
Vanadium	NE	BDL	BDL	BDL	BDL
Zinc	NE	18.5	46.6	13.0	43.1

**NOTE:**

CSC = Concentration Standards for Comparison  
 NE = Not established  
 BDL = Detected, but below instrument quantitation limit  
 ND = Not detected at instrument detection limit  
 S = Sediment/Surface Water location

**TABLE A-8a**  
**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES**  
**Fleming Key South Landfill**  
**NAS-Key West**  
**Key West, Florida**  
**IT Project No. 595392**  
**Units are in ug/L (ppb)**

LABORATORY SAMPLE IDENTIFICATION:	08-01-GW	08-02-GW	08-03-GW	08-04-GW	08-05-GW	08-06-GW	08-06-GWD	08-14-GW	08-15-GW	
FIELD SAMPLE LOCATION:	MW 8-1	MW 8-2	MW 8-3	MW 8-4	MW 8-5	MW 8-6	MW 8-6 duplicate	KWM-14	KWM-15	
ASSOCIATED METHOD BLANK:	7	38	7	7	7	7	7	65	65	
COMPOUND	CSC									
Aluminum	NE	14,500	72,000	11,200	8,050	3,380	38,000	24,600	2,530	BDL
Antimony	14	ND	BDL	95.4	BDL	ND	BDL	BDL	ND	ND
Arsenic	50	---	50.5	---	---	ND	109	53.3	ND	ND
Cadmium	10	13	ND	11.4	12	15.60	31	21.8	24	ND
Calcium	NE	4,100,000	2,440,000	3,090,000	810,000	3,180,000	7,220,000	4,570,000	369,000	353,000
Chromium	50	---	---	55.9	ND	14.80	115	77	ND	ND
Copper	1,000	---	---	---	BDL	---	---	---	1,780	ND
Iron	300	14,600 E	30,400 E	23,400	5,920	3,500	70,600	43,800	3,340 E	---
Lead	50	90.9	497	1,870	---	59.00	598	395	ND	---
Magnesium	NE	852,000	1,090,000	1,270,000	1,210,000	869,000	1,030,000	932,000	999,000	933,000
Manganese	50	167	195	161	96 E	---(E)	508 E	337 E	85	ND
Mercury	2	---	---	11.50	---	---	5.00	2.20	---	ND
Potassium	NE	274,000	315,000	361,000	360,000	265,000	366,000	359,000	281,000	260,000
Sodium	160,000	7,430,000	9,110,000	10,400,000	10,100,000	7,090,000	8,520,000	7,940,000	7,850,000	7,410,000

TABLE A-8a

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES**  
**Fleming Key South Landfill**  
**NAS-Key West**  
**Key West, Florida**  
**IT Project No. 595392**  
**Units are in ug/L (ppb)**

LABORATORY SAMPLE IDENTIFICATION:	08-01-GW	08-02-GW	08-03-GW	08-04-GW	08-05-GW	08-06-GW	08-06-GWD	08-14-GW	08-15-GW	
FIELD SAMPLE LOCATION:	MW 8-1	MW 8-2	MW 8-3	MW 8-4	MW 8-5	MW 8-6	MW 8-6 duplicate	KWM-14	KWM-15	
ASSOCIATED METHOD BLANK:	7	38	7	7	7	7	7	65	65	
COMPOUND	CSC									
Vanadium	NE	BDL	BDL	BDL	BDL	BDL	54.5	BDL	ND	ND

**NOTE:**

CSC = Concentration Standards for Comparison

NE = Not established

MW/KWM = Monitoring well

E = The reported value is estimated due to the presene of interference

ND = Not detected at the instrument dectection limit

BDL = Detected, but below the instrument quantitation limit

(-- ) = Below CSC

**TABLE A-8b**

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST  
(INORGANIC) ANALYSIS FOR SURFACE WATER SAMPLE  
Fleming Key South Landfill  
NAS-Key West  
Key West, Florida  
Units are in ug/L (ppb)**

<b>LABORATORY SAMPLE IDENTIFICATION:</b>		<b>08-01-SW</b>
<b>FIELD SAMPLE LOCATION:</b>		<b>SW-1</b>
<b>ASSOCIATED METHOD BLANK:</b>		<b>54</b>
<b>COMPOUND</b>	<b>CSC</b>	
Aluminum	NE	2,030
Arsenic	50	57.3
Cadmium	10	19.8
Calcium	NE	331,000
Iron	300	305,000
Lead	50	155
Magnesium	NE	1,100,000
Manganese	50	294
Potassium	NE	325,000
Sodium	160,000	9,390,000
<b>NOTE:</b>		
CSC = Concentration Standards for Comparison		
NE = Not established		
SW = Surface water location		

TABLE A-8c

**ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)  
FOR SEDIMENT SAMPLES  
Fleming Key South Landfill  
NAS-Key West  
Key West, Florida  
IT Project No. 595392  
Units are in mg/kg (ppm)**

LABORATORY SAMPLE IDENTIFICATION:	08-01-SED	08-02-SED	08-03-SED
FIELD SAMPLE LOCATION:	S-1	S-2	S-3
ASSOCIATED METHOD BLANKS:	71	71	71

COMPOUND	CSC	08-01-SED	08-02-SED	08-03-SED
Aluminum	NE	1,840	17,400	3,850
Antimony	6.8	ND	20.3	20.7
Arsenic	NE	6.7	43.5	15.8
Cadmium	NE	1.0	11.4	3.3
Calcium	NE	247,000	180,00	251,000
Cobalt	NE	ND	10.1	BDL
Copper	NE	121	685	1,100
Iron	NE	4,060	ND	27,100
Lead	NE	252	1,680	597
Magnesium	NE	4,220	2,320	4,120
Manganese	NE	54	524	210
Mercury	NE	ND	1.6	0.1
Potassium	NE	716	609	BDL
Sodium	NE	17,200	2,790	4,700
Thallium	NE	ND	168	46.7
Vanadium	NE	20.1	15.2	12.1
Zinc	NE	420	1,620	1,370

**NOTE:**

CSC = Concentration Standard for Comparison  
 NE = Not established  
 BDL = Detected, but below instrument quantitation limit  
 ND = Not detected to the instrument detection limit  
 S = Sediment/Surface Water location

**Appendix B**  
**MSDS Sheets**

TURCO

DOD HAZARDOUS MATERIALS INFORMATION SYSTEM

=====  
=====; MSDS-LR PRINTOUT ;=====

NIIN: 012350872  
FSC: 6850  
Manufacturers CAGE: 82925  
Part No. Indicator: A  
Part Number/Trade Name: MIL-C-85570B AM.1 TYPE II;CLEANING COMPOUND

=====  
=====; General Information ;=====

Safety Focal Point: D  
Record No. for this Safety Entry: 006  
Total Safety Entries, This No.: 006  
Status: SM  
Date MSDS Prepared: 25SEP86  
Safety Data Review Date: 13SEP89  
Supply Item Manager: CX  
Item Name: CLEANING COMPOUND, AIRCRAFT SURFACE

---[Manufacturer]-----

Name: OCTAGON PROCESS INC.  
Street: 596 RIVER ROAD  
P.O. Box: N/R  
City: EDGEWATER  
State: NJ  
Country: US  
Zip Code: 07020-1105  
Emergency Phone No.: 201-945-9400  
Information Phone No.: 201-945-9400

---[MSDS Preparer]-----

Name: N/K

Distributor/Vendor No.1: N/R

Other MSDS Number: N/A  
MSDS Serial Number: BGRCR  
Specification Number: MIL-C-85570B  
Specification Type, Grade, Class: TYPE II  
Hazard Characteristic Code: L1  
Unit of Issue: CN  
Unit of Issue Container Quantity: 5 GL  
Type of Container: PPPP704;TI,C3  
Net Unit Weight: 42 LBS  
NRC/State License Number: N/R  
Net Propellant Weight-Ammo: N/R

=====  
=====; Ingredients/Identity Information ;=====

ISN : 01  
Proprietary : NO

IFP : D  
NIOSH (RTECS): JM1575000  
CAS : 34390-94-8  
Ingredient : DIPROPYLENE GLYCOL, MONOMETHYL ETHER (DOWANOL DPM)  
Percent : 10.0  
OSHA PEL : 100 PPM  
ACGIH TLV : 100 PPM  
Other Recommended Limits: N/R

ISN : 02  
Proprietary : NO

IFP : D  
NIOSH (RTECS): SA0810000  
CAS : 107-41-5  
Ingredient : 2,4-PENTANEDIOL, 2-METHYL (HEXYLENE GLYCOL)  
Percent : 8.0  
OSHA PEL : 25 PPM (C)  
ACGIH TLV : 25 PPM (C)  
Other Recommended Limits: NOT ESTABLISHED

ISN : 03  
Proprietary : NO

IFP : D  
NIOSH (RTECS): QD6475000  
CAS : 110-91-8  
Ingredient : MORPHOLINE  
Percent : 1.0  
OSHA PEL : 20 PPM (S)  
ACGIH TLV : 20 PPM (S)  
Other Recommended Limits: NOT ESTABLISHED

=====: Physical/Chemical Characteristics :=====

Appearance and Odor: PALE YELLOW LIQUID, MILD ODOR  
Boiling Point: 212F, 100C  
Vapor Pressure (MM Hg/70 F): N/K  
Vapor Density (Air=1): N/K  
Specific Gravity: 1.015  
Evaporation Rate & Reference: N/K  
Solubility in Water: COMPLETE  
Percent Volatiles by Volume: N/K  
Autoignition Temperature: N/K

=====: Fire and Explosion Hazard Data :=====

Flash Point: NONE  
Lower Explosive Limit: N/K  
Upper Explosive Limit: N/K

[Extinguishing Media]  
CO\*2, DRY CHEMICAL, FOAM, WATER

[Special Fire Fighting Procedures]  
WEAR SCBA AND PROTECTIVE CLOTHING. USE WATER SPRAY TO KEEP FIRE EXPOSED  
CONTAINERS COOL.

[Unusual Fire & Explosion Hazards]

NONE

=====Reactivity Data=====

Stability - YES

[Conditions to Avoid(Stability)]

NONE SPECIFIED BY MFR

[Materials to Avoid]

STRONG OXIDIZERS

[Hazardous Decomposition Products]

CARBON MONOXIDE,CARBON DIOXIDE,UNIDENTIFIED CARBON PRODUCTS.

[Hazardous Polymerization Occur]

NO

[Conditions to Avoid(Polymerization)]

N/R

=====Health Hazard Data=====

LD50-LC50 - Mixture: N/K

Route of Entry - Inhalation: NO

Route of Entry - Skin: YES

Route of Entry - Ingestion: YES

[Health Hazards - Acute & Chronic]

ACUTE:IRRITATION OF EYES,SKIN OR BURNING/REDNESS OF EYES OR SKIN. CHRONIC:  
FLAKING OR DRYING OR DERMATITIS.

Carcinogenity - NTP: NO

Carcinogenity - IARC: NO

Carcinogenity - OSHA: NO

[Explanation of Carcinogenity]

N/R

[Signs and Symptoms of Overexposure]

TEMP EYE IRRIT. FLAKE/DRYNESS OF SKIN. PROLONGED SKIN CONTACT MAY CAUSE  
DERMATITIS.

[Med. Conditions Aggravated/Exposure]

NO DATA AVAILABLE.

[Emergency and First Aid Procedures]

INHAL:RMV TO FRESH AIR. IF NOT BRTHNG GIVE CPR; IF BRTHNG DIFF GIVE OXYGEN.  
EYE:IMMED FLUSH W/PLENTY OF WATER. SKIN:WASH W/SOAP&WATER. RMV CONTAM CLTHG&  
SHOES. INGEST:INDUCE VOMIT. RPT UNTIL VOMIT IS CLEAR. NOTHG BY MOUTH IF  
UNCONSC. GET MEDICAL ATTN.

=====Precautions for Safe Handling and Use=====

[Steps if Matl. Released or Spilled]

DIKE AREA TO RETAIN SPILL. ABSORB SM QTY. LG AMT SHOULD BE VACUUMED UP &  
RECOVERED IF POSSIBLE. DO NOT GET INTO SEWERS,DRAINS OR WATERWAYS.

[Waste Disposal Method]

DISPOSE I/A/W ALL LOCAL, STATE & FEDERAL REGULATIONS.

[Handling and Storing Precautions]

STORE IN COOL, DRY PLACE. KEEP CONTAINER CLOSED WHEN NOT IN USE. DO NOT MIX W/STRONG ACIDS OR OXIDIZERS.

[Other Precautions]

NONE

=====; Control Measures ;=====

[Respiratory Protection]

NOT NORMALLY NEEDED; USE NIOSH/MSHA APPROVED RESPIRATOR FOR ORGANIC VAPORS/MIST IF ABOVE PEL/TLV.

[Ventilation]

LOCAL/GENERAL TO MAINTAIN PEL/TLV.

[Protective Gloves]

CHEM RESISTANT

[Eye Protection]

GOGGLES/FACE SHIELD

[Other Protective Equipment]

APRON, LAB COAT, EYE-WASH FACILITIES.

[Work Hygienic Practices]

AVOID CONTACT WITH EYES AND SKIN; DO NOT BREATHE VAPORS/MIST; WASH THOROUGHLY AFTER USE; DO NOT USE CONTAMINATED CLOTHES.

DOD HAZARDOUS MATERIALS INFORMATION SYSTEM

=====| MSDS-LR PRINTOUT |=====

NIIN: 012377482  
FSC: 6850  
Manufacturers CAGE: 82925  
Part No. Indicator: A  
Part Number/Trade Name: MIL-C-85570A AM. 1 TYPE 1

=====| General Information |=====

Safety Data Action Code: C  
Safety Focal Point: D  
Record No. for this Safety Entry: 002  
Total Safety Entries, This No.: 002  
Status: SE  
Date MSDS Prepared: 08MAR89  
Safety Data Review Date: 05JAN90  
Supply Item Manager: CX  
Item Name: CLEANING COMPOUND, AIRCRAFT SURFACE

---[Manufacturer]-----

Name: OCTAGON PROCESS INC.  
Street: 596 RIVER ROAD  
City: EDGEWATER  
State: NJ  
Country: US  
Zip Code: 07020-1105  
Emergency Phone No.: 201-945-9400  
Information Phone No.: 201-945-9400

---[MSDS Preparer]-----

Other MSDS Number: N/A  
MSDS Serial Number: BGRDG  
Specification Number: MIL-C-85570  
Specification Type, Grade, Class: TYPE I  
Hazard Characteristic Code: L1  
Unit of Issue: CN  
Unit of Issue Container Quantity: 1  
Type of Container: CAN  
Net Unit Weight: 42.03 LBS.

=====| Ingredients/Identity Information |=====

ISN : 01  
Proprietary : NO  
-----  
IFP : D  
NIOSH (RTECS): JM1575000  
CAS : 34590-94-8  
Ingredient : DIPROPYLENE GLYCOL METHYL ETHER

Percent : 10.0  
OSHA PEL : 100PPM  
ACGIH TLV : 100PPM  
Other Recommended Limits: N/K

ISN : 02  
Proprietary : NO

IFP : D  
NIOSH (RTECS): SA0810000  
CAS : 107-41-5  
Ingredient : HEXYLENE GLYCOL  
Percent : 08.0  
OSHA PEL : (C) 25PPM  
ACGIH TLV : (C) 25PPM  
Other Recommended Limits: N/K

ISN : 03  
Proprietary : NO

IFP : D  
NIOSH (RTECS): QD6475000  
CAS : 110-91-8  
Ingredient : MORPHOLINE  
Percent : 01.0  
OSHA PEL : (S) 20PPM  
ACGIH TLV : (S) 20PPM  
Other Recommended Limits: N/K

=====**Physical/Chemical Characteristics**=====

Appearance and Odor: MILDLY ODOROUS PALE YELLOW LIQUID  
POWDER.  
Boiling Point: 212F/100C  
Melting Point: N/K  
Vapor Density (Air=1): N/K  
Specific Gravity: 1.008  
Decomposition Temperature: N/K  
Evaporation Rate & Reference: N/K  
Solubility in Water: COMPLETE  
Percent Volatiles by Volume: N/K  
Corrosion Rate (IPY): N/K

=====**Fire and Explosion Hazard Data**=====

Flash Point: NONE  
Flash Point Method: N/R  
Lower Explosive Limit: N/K  
Upper Explosive Limit: N/K

[Extinguishing Media]

USE CARBON DIOXIDE, FOAM, DRY CHEMICAL, OR WATER FOG.

[Special Fire Fighting Procedures]

FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT  
WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO COOL NEARBY CONTAINERS  
EXPOSED TO FIRE.

[Unusual Fire & Explosion Hazards]

FIRE OR EXCESSIVE HEAT MAY CAUSE PRODUCTION OF HAZARDOUS DECOMPOSITION PRODUCTS.

=====| Reactivity Data |=====

Stability - YES

[Conditions to Avoid(Stability)]

HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES

[Materials to Avoid]

STRONG OXIDIZING AGENTS

[Hazardous Decomposition Products]

NONE GIVEN

[Hazardous Polymerization Occur]

NO

=====| Health Hazard Data |=====

LD50-LC50 - Mixture: N/K

Route of Entry - Inhalation: NO

Route of Entry - Skin: YES

Route of Entry - Ingestion: YES

[Health Hazards - Acute & Chronic]

Carcinogenity - NTP: NO

Carcinogenity - IARC: NO

Carcinogenity - OSHA: NO

[Explanation of Carcinogenity]

N/R

[Signs and Symptoms of Overexposure]

[Med. Conditions Aggravated/Exposure]

[Emergency and First Aid Procedures]

INHAL:RMV TO FRESH AIR. IF NOT BRTHNG GIVE CPR; IF BRTHNG DIFF GIVE OXYGEN.  
EYE:IMMED FLUSH W/PLENTHY OF WATER. SKIN:WASH W/SOAP & WATER. RMV CONTAM  
CLTHG & SHOES. INGEST:DO NOT INDUCE VOMIT. NOTHG BY MOUTH IF UNCONSC. GET  
MEDICAL ATTN.

=====| Precautions for Safe Handling and Use |=====

[Steps if Matl. Released or Spilled]

DIKE SPILL AREA. COLLECT SMALL SPILLS W/ABSORBENT, PLACE IN CLOSABLE  
CONTAINERS. COLLECT LARGE SPILLS W/VACUUM SWEEPER, RECLAIM LIQUID IF POSS.  
MILDLY ALKALINE. DO NOT ALLOW ENTRY INTO SEWERS OR WATERWAYS.

[Waste Disposal Method]

LANDFILL OR INCINERATE IAW ALL LAWS & REGS.

[Handling and Storing Precautions]

MILDLY ALKALINE. STORE IN COOL DRY AREA. KEEP CONTAINERS CLOSED. AVOID STRONG ACIDS & OXIDIZERS.

[Other Precautions]

WASH SKIN AFTER USE. LAUNDRY CONTAM CLOTHING BEFORE REUSE.

=====| Control Measures |=====

[Respiratory Protection]

NONE

[Ventilation]

LOCAL OR MECHANICAL

[Protective Gloves]

CHEM RESISTANT

[Eye Protection]

GOGGLES AND FACE SHIELD

[Other Protective Equipment]

FULL SKIN PROTECTION, EYEWASH FOUNTAIN.

[Supplemental Safety and Health Data]

MSDS DTD 25SEP86. TYPE I IS GENERAL PURPOSE.

DOD HAZARDOUS MATERIALS INFORMATION SYSTEM

=====  
=====; MSDS-LR PRINTOUT ;=====

NIIN: 010457929  
FSC: 6850  
Manufacturers CAGE: 82925  
Part No. Indicator: A  
Part Number/Trade Name: MIL-C-43616C AM 2 CLASS I AND IA CLEAN COMP

=====  
=====; General Information ;=====

Safety Focal Point: D  
Record No. for this Safety Entry: 010  
Total Safety Entries, This No.: 013  
Status: SM  
Date MSDS Prepared: 01JAN87  
Safety Data Review Date: 23AUG89  
Supply Item Manager: CX  
Item Name: CLEANING COMPOUND,AIRCRAFT SURFACE.

---[Manufacturer]-----

Name: OCTAGON PROCESS,INC.  
Street: 596 RIVER ROAD  
P.O. Box: N/K  
City: EDGEWATER  
State: NJ  
Country: US  
Zip Code: 07020  
Emergency Phone No.: 201-945-9400  
Information Phone No.: 201-945-9400

---[MSDS Preparer]-----

Name: N/K

Distributor/Vendor No.1: N/R

Other MSDS Number: N/A  
MSDS Serial Number: BGHMC  
Specification Number: MIL-C-43616  
Specification Type, Grade, Class: CLASS I  
Hazard Characteristic Code: F5  
Unit of Issue: CN  
Unit of Issue Container Quantity: 5 GAL  
Type of Container: CAN,METAL  
Net Unit Weight: N/K  
NRC/State License Number: N/R  
Net Propellant Weight-Ammo: N/R

=====  
=====; Ingredients/Identity Information ;=====

ISN : 01  
Proprietary : NO

IFP : D  
NIOSH (RTECS): KJ8575000  
CAS : 111-76-2  
Ingredient : 2-BUTOXYETHANOL (BUTYL CELLOSOLVE)  
Percent : 5.0  
OSHA PEL : 25 PPM,SKIN  
ACGIH TLV : 25 PPM,SKIN  
Other Recommended Limits: N/R

ISN : 02  
Proprietary : NO

IFP : D  
NIOSH (RTECS): ZC0110000  
CAS : 7732-18-5  
Ingredient : WATER  
Percent : N/K  
OSHA PEL : NOT ESTABLISHED  
ACGIH TLV : NOT ESTABLISHED  
Other Recommended Limits: N/R

ISN : 03  
Proprietary : NO

IFP : D  
NIOSH (RTECS): 1001272UC  
CAS : N/K  
Ingredient : UNIDENTIFIED COMPONENTS  
Percent : N/K  
OSHA PEL : N/K  
ACGIH TLV : N/K  
Other Recommended Limits: N/K

=====**Physical/Chemical Characteristics**=====

Appearance and Odor: LIGHT AMBER LIQUID,MILD ODOR  
Boiling Point: 212F/100C  
Vapor Pressure (MM Hg/70 F): N/K  
Vapor Density (Air=1): N/K  
Specific Gravity: 0.99  
Evaporation Rate & Reference: N/K  
Solubility in Water: COMPLETE  
Percent Volatiles by Volume: UNK

=====**Fire and Explosion Hazard Data**=====

Flash Point: 152F/67C TCC  
Lower Explosive Limit: N/K  
Upper Explosive Limit: N/K

[Extinguishing Media]  
CO\*2, DRY CHEM, FOAM, WATER

[Special Fire Fighting Procedures]  
WEAR SELF-CNTD BRTHG,APP H\*20 SPRAY TO COOL CONTR.

[Unusual Fire & Explosion Hazards]  
NONE NOTED BY MANUFACTURER.

=====| Reactivity Data |=====

Stability - YES

[Conditions to Avoid(Stability)]

OPEN FLAMES,EXTREME HEAT,SPARKS,ARC WELDING OR OTHER HIGH ENERGY SOURCES.

[Materials to Avoid]

NONE

[Hazardous Decomposition Products]

AMMONIA,CO, CO\*2

[Conditions to Avoid(Polymerization)]

NOT KNOWN

=====| Health Hazard Data |=====

LD50-LC50 - Mixture: N/K

Route of Entry - Inhalation: YES

Route of Entry - Skin: YES

Route of Entry - Ingestion: YES

[Health Hazards - Acute & Chronic]

ACUTE:IRRITATING TO EYES,SKIN,MUCOUS MEMBRANES AND RESPIRATORY TRACT.

CHRONIC:DEFATING OF SKIN,HEADACHE,DIZZINESS.

Carcinogenity - NTP: N/K

Carcinogenity - IARC: N/K

Carcinogenity - OSHA: N/K

[Explanation of Carcinogenity]

N/R

[Signs and Symptoms of Overexposure]

EYES:TEARING,BURNING;SKIN:DEFAT,REDNESS;INHAL:IRRIT.TO RESP.TRACT,MUCOUS  
MEMBRANCE;INGEST:DIZZ,NAUSA

[Med. Conditions Aggravated/Exposure]

NO DATA AVAILABLE.

[Emergency and First Aid Procedures]

SKIN:WASH W.SOAP & H\*20. EYES:FLUSH W. H\*20. INGESTED:DON'T INDUCE VOMITING.

INHALED:REMOVE TO FRESH AIR. GIVE CPR/OXYGEN IF NEED. KEEP WARM & QUIET.

REMOVE CONTAMINATED CLOTHING. NEVER GIVE ANYTHING BY MOUTH TO UNCONSCIOUS  
PERSON.

=====| Precautions for Safe Handling and Use |=====

[Steps if Matl. Released or Spilled]

USE PROTECTIVE EQUIPMENT.MFR SPECIFIED NEUTRALIZE W DIL HCL,DIL H\*2SO\*4 OR  
SOD BISULFITE SOLUTION.FLUSH AREA W/LG AMTS OF WATER.DO NOT ALLOW TO GET  
INTO WATERWAYS OR LOCAL RESERVOIRS FOR DRINGING,WATER.IF SPILL IS V.LG,  
SCOOP UP FOR DISPOSAL.

[Waste Disposal Method]

KEEP IN COVERED DRUMS, PENDING DISPOSAL. HANDLE & DISPOSE IN FULL COMPLIANCE WITH ALL APPLICABLE INTERNATIONAL, FEDERAL, STATE, & LOCAL REGULATIONS.

[Handling and Storing Precautions]

STORE IN COOL, DRY, WELL VENTILATED AREA. PROTECT FROM PHYSICAL DAMAGE. AVOID ANY PHYSICAL CONTACT. KEEP CONTAINERS TIGHTLY CLOSED

[Other Precautions]

WASH HANDS THOROUGHLY AFTER HANDLING/USE. AVOID CONTACT W/SKIN, EYES & CLOTHING.

=====; Control Measures ;=====

[Respiratory Protection]

NO SPECIAL REQMENTS UNDER ORDINARY CONDITIONS/ADEQUATE VENT.

[Ventilation]

MECH(GEN)OR LOCAL EXHAUST THAT PROVIDES ADEQUATE VENTILATION

[Protective Gloves]

RUBBER

[Eye Protection]

GOGGLES/FACE SHIELD

[Other Protective Equipment]

EYE WASH FOUNTAIN

[Supplemental Safety and Health Data]

MSDS DATED: 01/87

DoD Hazardous Materials Information System  
DoD 6050.5-LR  
AS OF 1 Feb 91  
For U.S. Government Use Only

MSC: 6850  
NIN: 002856056 Manufacturer's CAGE: 82925  
Part No. Indicator: A  
Part Number/Trade Name: CLEANING COMPOUND,GREASE EMULSIFIER

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: D  
Record No. for this Safety Entry: 002  
Total Safety Entries-This Stock No.: 002  
Status:  
Date MSDS Prepared: PRE-HCS  
Safety Data Review Date: 04DEC84  
Supply Item Manager: CX  
Item Name: CLEANING COMPOUND,SOLVENT SOLUBLE,GREASE EMULSIF  
Manufacturer's Name: OCTAGON PROCESS, INC.  
Manufacturer's Street: 596 RIVER ROAD  
Manufacturer's P.O. Box:  
Manufacturer's City: EDGEWATER  
Manufacturer's State: NJ  
Manufacturer's Country: US  
Manufacturer's Zip Code: 07020-1105  
Manufacturer's Emergency Telephone Number: 201-945-9400  
Manufacturer's Information Telephone Number: 201-945-9400  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTRH  
Specification Number: FED SPEC P-C-444  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F5  
Unit Of Issue: CN  
Unit Of Issue Container Quantity: 5 GAL  
Of Container:  
Unit Weight:  
ARC/State License Number:  
Net Explosive Weight:

Net Propellant Weight-Ammo:  
Cast Guard Ammunition Code:

=====

Ingredients/Identity Information

=====

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 01  
IOSH (RTECS) No.: 1002025F0  
CAS NO.:  
Ingredient: FUEL OIL (TYPE NOT SPECIFIED)  
Percent: UNK  
SHA PEL:  
CGIH TLV: UNKNOWN  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 02  
IOSH (RTECS) No.: G05950000  
CAS NO.: 1319-77-3  
Ingredient: CRESOL, ALL ISOMERS (CRESYLIC ACID)  
Percent: UNK  
SHA PEL: S, 5 PPM  
CGIH TLV: S, 5 PPM; 8990  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 03  
IOSH (RTECS) No.: 1000001AL  
CAS NO.:  
Ingredient: ALCOHOL (TYPE NOT SPECIFIED)  
Percent: UNK  
SHA PEL:  
CGIH TLV: UNKNOWN  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 04  
IOSH (RTECS) No.: 1000066DT  
AS NO.:  
Ingredient: DETERGENT  
Percent: UNK  
SHA PEL:  
OSIH TLV: UNKNOWN  
Other Recommended Limit:

=====

Physical/Chemical Characteristics

=====

Appearance And Odor: DARK LIQUID- SLIGHT PHENOL ODOR.  
Boiling Point:  
Melting Point:  
Vapor Pressure (MM Hg/70 F):  
Vapor Density (Air=1):  
Specific Gravity: 0.98  
Decomposition Temperature:  
Evaporation Rate & Reference:  
Solubility In Water: COMPLETE  
Percent Volatiles By Volume: -10  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: 140F CC  
Flash Point Method:  
Lower Explosive Limit:  
Upper Explosive Limit:  
Extinguishing Media: WATER  
Special Fire Fighting Procedures: NONE  
Unusual Fire and Explosion Hazards: NONE

=====

Reactivity Data

=====

Stability: YES  
Conditions To Avoid (Stability):  
Materials To Avoid:  
Hazardous Decomposition Products:  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization):

=====

Health Hazard Data

=====

LD50-LC50 - Mixture:  
Route Of Entry - Inhalation:  
Route Of Entry - Skin:  
Route Of Entry - Ingestion:

Signs and Symptoms Of Overexposure:

Medical Conditions Aggravated By Exposure:

Emergency And First Aid Procedures: WASH OFF AFFECTED AREAS WITH COPIOUS AMOUNTS OF WATER. IN CASE OF CONTACT WITH EYES, WASH WITH WATER, GET MEDICAL ATTENTION.

=====

Precautions for Safe Handling and Use

=====

Steps if Material is Released or Spilled: FLUSH WITH PLENTY OF WATER & PUT INTO APPROVED STORAGE CONTAINERS.

Neutralizing Agent:

Waste Disposal Method: SPRAY INTO AN INCINERATOR UNDER APPROVED CONTROLLED PROCEDURES.

Precautions to be Taken in Handling and Storing: PROTECT CONTAINERS FROM PHYSICAL DAMAGE. STORE IN COOL, DRY AREA. WEAR SAFETY GOGGLES, RUBBER GLOVES, APRONS, BOOTS. STORE AWAY FROM ANY FIRE HAZARDS.

Other Precautions:

=====

Control Measures

=====

Respiratory Protection: NONE

Ventilation: AS REQUIRED TO CONTROL MIST IN AIR.

Protective Gloves: RUBBER

Eye Protection: SAFETY GOGGLES

Other Protective Equipment:

Work Hygienic Practices:

Supplemental Safety and Health Data: ITEM IS TYPE II OF FEDERAL SPECIFICATION P-C-444.

Health Hazards - Acute And Chronic:

carcinogenicity - NTP:

carcinogenicity - IARC:

carcinogenicity - OSHA:

Explanation Of Carcinogenicity:

DoD Hazardous Materials Information System

DoD 6050.5-LR

AS OF 1 Feb 91

For U.C. Government Use Only

SC: 6850

IIN: 002856056 Manufacturer's CAGE: 55208

Part No. Indicator: A

Part Number/Trade Name: ELDORADO ED-371

General Information

Safety Data Action Code:

Safety Focal Point: D

Record No. for this Safety Entry: 001

Total Safety Entries-This Stock No.: 002

Status:

Date MSDS Prepared: 04AUG86

Safety Data Review Date: 12DEC87

Supply Item Manager: CX

Item Name: CLEANING COMPOUND, SOLVENT

Manufacturer's Name: ELDORADO CHEMICAL CO., INC.

Manufacturer's Street: 14350 LOOKOUT ROAD

Manufacturer's P.O. Box: 34837

Manufacturer's City: SAN ANTONIO

Manufacturer's State: TX

Manufacturer's Country: US

Manufacturer's Zip Code: 78265

Manufacturer's Emergency Telephone Number: 512-653-9323

Manufacturer's Information Telephone Number: 512-653-9323

MSDS Preparer's Name: PAT E. SMITH

Preparer's Company:

Preparer's Street or P.O. Box:

Preparer's City:

Preparer's State:

Preparer's Zip Code:

Distributor/Vendor No. 1:

Distributor/Vendor No. 1 CAGE:

Distributor/Vendor No. 2:

Distributor/Vendor No. 2 CAGE:

Distributor/Vendor No. 3:

Distributor/Vendor No. 3 CAGE:

Distributor/Vendor No. 4:

Distributor/Vendor No. 4 CAGE:

Other MSDS Number:

MSDS Serial Number: BDTRG

Specification Number: F-C-444

Specification Type, Grade, Class: TYPE II

Hazard Characteristic Code: C1

Date Of Issue: CN

Volume Of Issue Container Quantity: 5.0 GL

Type Of Container: CAN

Net Unit Weight:

ARC/State License Number: N/K

Net Explosive Weight:

Net Propellant Weight-Ammo: N/K

Cast Guard Ammunition Code:

=====

Ingredients/Identity Information

=====

Proprietary: NO

Ingredient Action Code:

Ingredient Focal Point: D

Ingredient Sequence No.: 01

IOSH (RTECS) No.: KJ5775000

AS NO.: 141-43-5

Ingredient: ETHANOLAMINE

Percent: 5.0

SHA PEL: 3 PPM/6 STEL

CGIH TLV: 3 PPM/6 STEL; 8990

Other Recommended Limit: N/R

Proprietary: NO

Ingredient Action Code:

Ingredient Focal Point: D

Ingredient Sequence No.: 02

IOSH (RTECS) No.: G05950000

AS NO.: 1319-77-3

Ingredient: CRESOL, ALL ISOMERS (CRESYLIC ACID)

Percent: 17.0

SHA PEL: S, 5 PPM

CGIH TLV: S, 5 PPM; 8990

Other Recommended Limit: N/R

Proprietary: NO

Ingredient Action Code:

Ingredient Focal Point: D

Ingredient Sequence No.: 03

IOSH (RTECS) No.: KJ8575000

AS NO.: 111-76-2

Ingredient: 2-BUTOXYETHANOL

Percent: 3.0

SHA PEL: S, 25 PPM

CGIH TLV: S, 25 PPM; 8990

Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 04  
IOSH (RTECS) No.: 1003693SN  
AS NO.: 64742-95-6  
Ingredient: AROMATIC HIGH FLASH NAPHTHA  
Percent: 65.0  
SHA PEL: N/K  
CGIH TLV: N/K  
Other Recommended Limit: 100 PPM

=====

Physical/Chemical Characteristics

=====

Appearance And Odor: THIN AMBER LIQUID;CRESOL ODOR  
Boiling Point: 220F/104C  
Melting Point: N/K  
Vapor Pressure (MM Hg/70 F): 20MM HG  
Vapor Density (Air=1):  
Specific Gravity: 1.0  
Decomposition Temperature: N/K  
Evaporation Rate & Reference: 1.0 (WATER=1)  
Solubility In Water: EMULSIFIES  
Percent Volatiles By Volume: 60  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY): N/K  
Autoignition Temperature: 850F

=====

Fire and Explosion Hazard Data

=====

Flash Point: 270F/132C  
Flash Point Method: N/K  
Lower Explosive Limit: 2.0  
Upper Explosive Limit: 15.0  
Extinguishing Media: CO\*2, FOAM  
Special Fire Fighting Procedures: NONE  
Unusual Fire and Explosion Hazards: NONE

=====

Reactivity Data

=====

Stability: YES  
Conditions To Avoid (Stability):  
Materials To Avoid: NONE  
Hazardous Decomposition Products: NONE  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization):

=====

Health Hazard Data

=====

LD50-LC50 - Mixture: N/K  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: YES  
Route Of Entry - Ingestion: YES

Health Hazards - Acute And Chronic: ACUTE: CORROSIVE TO SKIN AND  
YES; RESPIRATORY OR G.I. TRACT IRRITATION.

carcinogenicity - NTP: N/K

carcinogenicity - IARC: N/K

carcinogenicity - OSHA: N/K

Explanation Of Carcinogenicity:

Signs and Symptoms Of Overexposure: INH: NAUSEA; SKIN: DEFATTING/AMINE-RASH;  
YES: IRRITATION.

Medical Conditions Aggravated By Exposure: NO DATA AVAILABLE.

Emergency And First Aid Procedures: INH: REMOVE TO FRESH AIR. SKIN: WASH W/ SOAP &  
WATER. EYES: FLUSH W/ WATER FOR 15 MIN, SEE MD.

=====

Precautions for Safe Handling and Use

=====

Steps if Material is Released or Spilled: TAKE UP W/ OIL ABSORBENT MATERIAL &  
BURY IN SANITARY LANDFILL. SMALL AMOUNTS MAY BE FLUSHED TO SEWAGE SYSTEM  
/WATER.

Neutralizing Agent:

Waste Disposal Method: MFR RECOMMENDS: TREATING MATERIAL TO REMOVE NON-VOLATILE  
HYDROCARBONS & PHENOLICS; FLUSH REMAINDER TO SEWAGE SYSTEM. DISPOSAL METHOD MUST  
BE IN ACCORDANCE WITH FEDERAL, STATE & LOCAL CODES.

Precautions to be Taken in Handling and Storing:

Other Precautions:

=====

Control Measures

=====

Respiratory Protection: NOT REQUIRED (MFR)

Ventilation: LOCAL EXHAUST-200 CFM TO KEEP BELOW TLV.

Protective Gloves: RUBBER

Eye Protection: FACE SHIELD

Other Protective Equipment: RUBBER APRONS & BOOTS.

Work Hygienic Practices:

Supplemental Safety and Health Data: OTHER EMERGENCY PHONE: 512-494-5337.

SPEC: TYPE II. CONTAINER: 5 GAL CAN.

DoD Hazardous Materials Information System  
EOD 6050.5-LR  
AS OF 1 Feb 91  
For U.S. Government Use Only

SC: 6850  
IIN: 005592838 Manufacturer's CAGE: 55208  
Part No. Indicator: A  
Part Number/Trade Name: ED-371

=====

General Information

=====

Safety Data Action Code:  
Safety Focal Point: N  
Record No. for this Safety Entry: 001  
Total Safety Entries-This Stock No.: 001  
Status:  
Date MSDS Prepared: PRE-HCS  
Safety Data Review Date: 09MAY84  
Supply Item Manager:  
Item Name: CLEANING COMPOUND,SOLVENT  
Manufacturer's Name: ELDORADO CHEMICAL CO., INC.  
Manufacturer's Street: 14350 LOOKOUT ROAD  
Manufacturer's P.O. Box: 34837  
Manufacturer's City: SAN ANTONIO  
Manufacturer's State: TX  
Manufacturer's Country: US  
Manufacturer's Zip Code: 78265  
Manufacturer's Emergency Telephone Number: 800-531-1088  
Manufacturer's Information Telephone Number: 512-653-9323  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BFFKT  
Specification Number: P-C-444  
Specification Type, Grade, Class:  
Hazard Characteristic Code: B1  
Unit Of Issue:  
Unit Of Issue Container Quantity:  
Type Of Container:  
Net Unit Weight:  
ARC/State License Number: N/A  
Net Explosive Weight:

Net Propellant Weight-Ammo: N/A  
Cast Guard Ammunition Code:

=====

Ingredients/Identity Information

=====

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 01  
IOSH (RTECS) No.: KJ5775000  
AS NO.: 141-43-5  
Ingredient: ETHANOLAMINE  
Percent: 5  
SHA PEL: 3 PPM/6 STEL  
CGIH TLV: 3 PPM/6 STEL; 8990  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 02  
IOSH (RTECS) No.: G05950000  
AS NO.: 1319-77-3  
Ingredient: CRESOL, ALL ISOMERS (CRESYLIC ACID)  
Percent:  
SHA PEL: 8, 5 PPM  
CGIH TLV: 8, 5 PPM; 8990  
Other Recommended Limit:

=====

Physical/Chemical Characteristics

=====

Appearance And Odor: THIN, AMBER LIQUID  
Boiling Point: 270F; 132C  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 1  
Vapor Density (Air=1):  
Specific Gravity: 0.9  
Decomposition Temperature:  
Evaporation Rate & Reference: SAME AS WATER  
Solubility In Water: EMULSIFIES  
Percent Volatiles By Volume: 60  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: 235F;113C (COC)  
Flash Point Method:  
Lower Explosive Limit:  
Upper Explosive Limit:  
Extinguishing Media: CO\*2,FOAM  
Special Fire Fighting Procedures: NONE  
Unusual Fire and Explosion Hazards: NONE

=====  
Reactivity Data  
=====

Stability: YES  
Conditions To Avoid (Stability):  
Materials To Avoid: NONE  
Hazardous Decomposition Products: NONE  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization):

=====  
Health Hazard Data  
=====

LD50-LC50 - Mixture:  
Route Of Entry - Inhalation:  
Route Of Entry - Skin:  
Route Of Entry - Ingestion:  
Health Hazards - Acute And Chronic:  
Carcinogenicity - NTP:  
Carcinogenicity - IARC:  
Carcinogenicity - OSHA:  
Explanation Of Carcinogenicity:  
Signs and Symptoms Of Overexposure: INH:NAUSEA. SKIN:DEFATING/AMINE RASH.  
YES:IRRIT.  
Medical Conditions Aggrevated By Exposure:  
Emergency And First Aid Procedures: INH:REMOVE TO FRESH AIR. SKIN:WASH W/ SOAP  
WATER. EYES:FLUSH W/ WATER FOR 15 MIN;SEE MD.

=====  
Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: TAKE UP W/ OIL ABSORBENT MATERIAL &  
BURY IN SANITARY LANDFILL.SMALL AMOUNTS MAY BE FLUSHED TO SEWAGE SYSTEM W/  
WATER.  
Neutralizing Agent:  
Waste Disposal Method: MFR RECOMMENDS: TREATING MATERIAL TO REMOVE NON-VOLATILE  
HYDROCARBONS & PHENOLICS;FLUSH REMAINDER TO SEWAGE SYSTEM. DISPOSAL METHOD MUST  
BE IAW FEDERAL, STATE & LOCAL CODES.  
Precautions to be Taken in Handling and Storing:  
Other Precautions:

=====  
Control Measures  
=====

Respiratory Protection: NOT REQUIRED(MFR)  
Ventilation: LOCAL EXHAUST-200 CFM TO KEEP BELOW TLV  
Protective Gloves: RUBBER  
Eye Protection: FACE SHIELD  
Other Protective Equipment: RUBBER APRONS & BOOTS  
Work Hygienic Practices:

Supplemental Safety and Health Data: OTHER EMERGENCY PHONE: 512-494-5337.  
SPEC: TYPE II. CONTAINER: 1 GAL CAN

DoD Hazardous Materials Information System  
DoD 6050.5-LR  
AS OF 1 Feb 91  
For U.S. Government Use Only

EO: 6850  
EIN: 005592837 Manufacturer's CAGE: 57042  
Part No. Indicator: A  
Part Number/Trade Name: COREM 5-1

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: N  
Record No. for this Safety Entry: 001  
Total Safety Entries-This Stock No.: 001  
Status:  
Date MSDS Prepared: PRE-HCS  
Safety Data Review Date: 10JUL81  
Supply Item Manager:  
Item Name:  
Manufacturer's Name: CORAL CHEMICAL COMPANY  
Manufacturer's Street:  
Manufacturer's P.O. Box:  
Manufacturer's City:  
Manufacturer's State:  
Manufacturer's Country:  
Manufacturer's Zip Code:  
Manufacturer's Emergency Telephone Number: (312) 336-8100  
Manufacturer's Information Telephone Number:  
SDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
SDS Serial Number: BFFKS  
Specification Number: P-C-444  
Specification Type, Grade, Class:  
Hazard Characteristic Code: FE  
Unit Of Issue: CN  
Unit Of Issue Container Quantity: 5 GL.  
Unit Of Container:  
Net Unit Weight:  
RC/State License Number: N/A  
Net Explosive Weight:

Net Propellant Weight-Ammo: N/A  
Fast Guard Ammunition Code:

=====

Ingredients/Identity Information

=====

Proprietary: YES  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 01  
IOSH (RTECS) No.: 1000005HY  
CAS NO.:  
Ingredient: HYDROCARBON SOLVENT PERCENT IS APPROXIMATE  
Percent: 90.  
SHA PEL:  
CGIH TLV:  
Other Recommended Limit:

Proprietary: YES  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 02  
IOSH (RTECS) No.: 10007337E  
CAS NO.:  
Ingredient: DISTILLED TALL OIL  
Percent: <5.  
SHA PEL:  
CGIH TLV:  
Other Recommended Limit:

Proprietary: YES  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 03  
IOSH (RTECS) No.: 1000893DS  
CAS NO.:  
Ingredient: DODECYLBENZENE SULFONIC ACID  
Percent: <5.  
SHA PEL:  
CGIH TLV:  
Other Recommended Limit:

Proprietary: YES  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 04  
IOSH (RTECS) No.: KJ5775000  
CAS NO.: 141-43-5  
Ingredient: ETHANOLAMINE  
Concentration: <1.  
SHA PEL: 3 PPM/6 STEL  
CGIH TLV: 3 PPM/6 STEL; 8990  
Other Recommended Limit:

Proprietary: YES  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 05  
IOSH (RTECS) No.: TT2100000  
CAS NO.: 1310-58-3  
Ingredient: POTASSIUM HYDROXIDE  
Concentration: <1.  
SHA PEL: C, 2 MG/M3  
CGIH TLV: C, 2 MG/M3; 8990  
Other Recommended Limit:

=====

Physical/Chemical Characteristics

=====

Appearance And Odor: CLEAR, AMBER LIQUID  
Boiling Point: APPROX 220F  
Melting Point:  
Vapor Pressure (MM Hg/70 F):  
Vapor Density (Air=1):  
Specific Gravity: 0.86  
Decomposition Temperature:  
Evaporation Rate & Reference:  
Solubility In Water: SLIGHT  
Percent Volatiles By Volume:  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: 160 F  
Flash Point Method:  
Lower Explosive Limit: 1.0  
Upper Explosive Limit: 8.0  
Extinguishing Media: FOAM, ALCOHOL FOAM, CO\*2, DRY CHEMICAL  
Special Fire Fighting Procedures: WATER UNSUITABLE EXCEPT AS A COOLING MEDIUM.  
Unusual Fire and Explosion Hazards:

=====

Reactivity Data

=====

Stability: YES

Conditions To Avoid (Stability): SOURCES OF IGNITION, TEMPERATURES > FLASH  
POINT

Materials To Avoid: STRONG OXIDIZING AGENTS

Hazardous Decomposition Products: CO\*2

azardous Polymerization Occur: NO  
onditions To Avoid (Polymerization):

=====  
Health Hazard Data  
=====

D50-L050 - Mixture:

oute Of Entry - Inhalation:

oute Of Entry - Skin:

oute Of Entry - Ingestion:

Health Hazards - Acute And Chronic:

arcinogenity - NTP:

arcinogenity - IARC:

arcinogenity - OSHA:

Explanation Of Carcinogenity:

Signs and Symptoms Of Overexposure: SKIN IRRITATION. DYE IRRITATN & BURNING  
SENSATION. INHALATION:CONFUSION, HEADACHE, DIZZINESS.

Medical Conditions Aggrevated By Exposure:

Emergency And First Aid Procedures: SKIN:FLUSH W/PLENTY OF WATER AT LEAST 15  
MIN. EYE:IMMEDIATELY FLUSH W/WATER AT LEAST 15 MIN; ENSURE WATER CONTACT  
VENTIRE SURFACE OF EYE & LID. INHALATION:REMOVE TO FRESH AIR; GIVE O\*2 IF  
BREATHING IS DIFFICULT. KEEP WARM. CALL MD.

=====  
Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: COVER W/INERT ABSORBENT MATERIAL,  
W/ P UP, AND PLACE IN SUITABLE CONTAINER. FLUSH AREA WELL W/WATER.

Neutralizing Agent:

Waste Disposal Method: MATERIAL COLLECTED ON ABSORBENT MATERIAL MAY BE  
DEPOSITED IN A POSTED TOXIC SUBSTANCE LANDFILL IN ACORDANCE W/LOCAL, STATE, &  
FEDERAL REGULATIONS.

Precautions to be Taken in Handling and Storing: KEEP CONTAINER TIGHTLY CLOSED.  
STORE IN A COOL, DRY LOCATION.

Other Precautions: KEEP FROM FREEZING.

=====  
Control Measures  
=====

Respiratory Protection: NIOSH/MSHA APPRVD RESP PROTECTION IF TLV EXCEEDED

Ventilation: LOCAL EXHAUST-YES MECHANICAL-YES

Protective Gloves: IMPERVIOUS

Eye Protection: CHEM.GOGS OR FACE SHIELD

Other Protective Equipment: APRON OR PROTECTIVE CLOTHING

Work Hygienic Practices:

Supplemental Safety and Health Data: PRODUCT ALSO CONTAINS APPROX 1% MIXED  
TERPENE ALCOHOLS & HYDROCARBONS;APPROX 1% ETHOXYLATED OCTYL PHENOL;APPROX 1%  
ETHOXYLATED NONYL PHENOL;LESS THAN 1% WATER.

PD680

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 4W432  
Part No. Indicator: A  
Part Number/Trade Name: PETROLEUM SOLVENTS

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: D  
Record No. for this Safety Entry: 002  
Total Safety Entries-This Stock No.: 013  
Status: SM  
Date MSDS Prepared: N/K  
Safety Data Review Date: 02MAY89  
Supply Item Manager: CX  
Item Name: DRYCLEANING SOLVENT  
Manufacturer's Name: SOLVENTS & CHEMICALS, INC.  
Manufacturer's Street: 4704 SHAWK ROAD  
Manufacturer's P.O. Box: 490  
Manufacturer's City: PEARLAND  
Manufacturer's State: TX  
Manufacturer's Country: US  
Manufacturer's Zip Code: 77581  
Manufacturer's Emergency Telephone Number: 713-485-5377  
Manufacturer's Information Telephone Number: 713-485-5377  
MSDS Preparer's Name: N/K  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1: N/K  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: 86V08  
Specification Number: P-D-680  
Specification Type, Grade, Class: TYPE I  
Hazard Characteristic Code: F4  
Lot Of Issue: DR  
Lot Of Issue Container Quantity: 55.0 GL  
Type Of Container: DRUM  
Net Unit Weight: 55.0 GL  
NRC/State License Number: N/K  
Net Explosive Weight:

Net Propellant Weight-Ammo: N/K  
Coast Guard Ammunition Code:

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: 1004191MS  
CAS NO.: MIXTURE  
Ingredient: MINERAL SPIRITS RULE 66  
Percent: 100.0  
OSHA PEL: N/K  
ACGIH TLV: N/K  
Other Recommended Limit: 100 FPM

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: WATER LIKE LIQUID;MINERAL SPIRITS ODOR.  
Boiling Point: 316-383F  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 10 MMHG  
Vapor Density (Air=1): 5.0  
Specific Gravity: 0.77  
Decomposition Temperature:  
Evaporation Rate & Reference:  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: 99.6  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature: N/K

=====  
Fire and Explosion Hazard Data  
=====

Flash Point: 107F/42C  
Flash Point Method: T.C.C.  
Lower Explosive Limit: 1.0  
Upper Explosive Limit: 6.0  
Extinguishing Media: FOAM, DRY CHEMICAL, CO\*2, WATER FOG OR SPRAY.  
Special Fire Fighting Procedures: USE NIOSH/MSHA APPROVED SCBA IN AN ENCLOSED AREA. COOL EXPOSED CONTAINERS WITH WATER.  
Unusual Fire and Explosion Hazards: COMBUSTIBLE LIQUID. DO NOT MIX OR STORE WITH STRONG OXIDANTS.

=====  
Reactivity Data  
=====

Stability: YES

Conditions To Avoid (Stability): EXTREME HEAT.  
Materials To Avoid: STRONG OXIDANTS.  
Hazardous Decomposition Products: FUMES, SMOKE, CO AND/OR CO\*2.  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization): N/R

=====  
Health Hazard Data  
=====

LD50-LC50 - Mixture: N/K  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: YES  
Route Of Entry - Ingestion: YES  
Health Hazards - Acute And Chronic: ACUTE: IRRITATION OF EYES, SKIN AND RESPIRATORY TRACT, HEADACHE, DIZZINESS, POSSIBLE UNCONSCIOUSNESS IN HIGH CONCENTRATIONS. CHRONIC: DEFATTING, IRRITATION OR DERMATITIS.  
Carcinogenity - NTP: N/K  
Carcinogenity - IARC: N/K  
Carcinogenity - OSHA: N/K  
Explanation Of Carcinogenity: NO DATA AVAILABLE.  
Signs and Symptoms Of Overexposure: SEE HEALTH HAZARDS DATA.  
Medical Conditions Aggravated By Exposure: PRE-EXISTING CONDITIONS MAY BE WORSEN.  
Emergency And First Aid Procedures: INHALATION: REMOVE TO FRESH AIR; SEEK MEDICAL HELP. SKIN & EYES: FLUSH WITH PLENTY OF WATER FOR ABOUT 15 MINUTES, CALL A PHYSICIAN IF NEEDED. INGESTION: DO NOT INDUCE VOMITING; CALL A PHYSICIAN IMMEDIATELY.

=====  
Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: USE PROPER PERSONAL PROTECTION; REMOVE ALL IGNITION SOURCES. CONTAIN FREE LIQUID IF POSSIBLE. USE SUITABLE INERT ABSORBENT MATERIAL AND RECOVER FOR PROPER DISPOSAL.  
Neutralizing Agent: N/R  
Waste Disposal Method: DISPOSAL OR INCINERATION MUST BE IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.  
Precautions to be Taken in Handling and Storing: STORE IN COOL, DRY AND WELL VENTILATED AREA. KEEP AWAY FROM HEAT, OPEN FLAMES AND SPARK; DO NOT SMOKE IN WORK AREA.  
Other Precautions:

=====  
Control Measures  
=====

Respiratory Protection: USE NIOSH/MSHA APPROVED RESPIRATOR FOR ORGANIC VAPORS/MIST IF ABOVE PEL/TLV.  
Ventilation: LOCAL EXHAUST; FACE VELOCITY >60 FPM AND USE EXPLOSION PROOF EQUIPMENT.  
Protective Gloves: IMPERVIUOUS.  
Eye Protection: GOGGLES/FADESHIELD.  
Other Protective Equipment: APRON, EYE-WASH FOUNTAIN, PROTECTIVE CLOTHING.  
Work Hygienic Practices: AVOID CONTACT WITH SKIN AND EYES; DO NOT BREATHE VAPOR MIST; DO NOT USE CONTAMINATED CLOTHES.

Supplemental Safety and Health Data:

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 5A188  
Part No. Indicator: A  
Part Number/Trade Name: MINERAL SPIRITS 66

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: K  
Record No. for this Safety Entry: 003  
Total Safety Entries-This Stock No.: 013  
Status:  
Date MSDS Prepared: INTERIM  
Safety Data Review Date: 10OCT86  
Supply Item Manager: CX  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: ASHLAND CHEMICAL CO  
Manufacturer's Street:  
Manufacturer's P.O. Box: 2219  
Manufacturer's City: COLUMBUS  
Manufacturer's State: OH  
Manufacturer's Country: US  
Manufacturer's Zip Code: 43216  
Manufacturer's Emergency Telephone Number: 606-324-1133  
Manufacturer's Information Telephone Number: 614-889-3333  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSD  
Specification Number: P-D-680  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F4  
Unit Of Issue: DR  
Unit Of Issue Container Quantity: 55 GAL  
Type Of Container: PPPD729 TY II  
Net Unit Weight: 353 LBS  
NRC/State License Number:  
Net Explosive Weight:

Net Propellant Weight-Ammo:  
Coast Guard Ammunition Code:

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: K  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: 1003307AP  
CAS NO.: N/K  
Ingredient: ALIPHATIC PETROLEUM DISTILLATES.  
Percent: >95  
OSHA PEL: 500 PPM  
ACGIH TLV: 100 PPM  
Other Recommended Limit:

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: LIQUID,COLORLESS.  
Boiling Point: 300F,149C  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 2.0  
Vapor Density (Air=1): 4.9  
Specific Gravity: 0.770  
Decomposition Temperature:  
Evaporation Rate & Reference: 70.0%(ETHER=1)  
Solubility In Water: UNK  
Percent Volatiles By Volume: 100  
Viscosity: N/K  
pH: N/R  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY): N/K  
Autoignition Temperature: N/K

=====  
Fire and Explosion Hazard Data  
=====

Flash Point: 100F,37.8C  
Flash Point Method: CC  
Lower Explosive Limit: 0.7  
Upper Explosive Limit: 6.0  
Extinguishing Media: USE CARBON DIOXIDE, FOAM, DRY CHEMICAL.  
Special Fire Fighting Procedures: WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE GEAR. USE WATER SPRAY TO COOL FIRE EXPOSED CONTAINERS.  
Unusual Fire and Explosion Hazards: VAPORS ARE HEAVIER THAN AIR & MAY TRAVEL LONG THE GROUND OR BE MOVED BY VENTILATION AND IGNITED BY HEAT, PILOT LIGHTS, OTHER FLAMES & IGNITION SOURCES.

=====  
Reactivity Data  
=====

Stability: YES  
Conditions To Avoid (Stability): HIGH TEMPERATURES.  
Materials To Avoid: STRONG OXIDIZERS.  
Hazardous Decomposition Products: CARBON MONOXIDE, CARBON DIOXIDE, AND OTHER TOXIC HYDROCARBON VAPORS.  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization): N/R

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Health Hazard Data

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LD50-LC50 - Mixture: LD50 (ORAL RAT) IS NOT SPECIFIED.  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: YES  
Route Of Entry - Ingestion: YES  
Health Hazards - Acute And Chronic: CAN CAUSE SEVERE EYE IRRITATION, REDNESS, TEARING AND BLURRED VISION. CAN CAUSE MODERATE SKIN IRRITATION, DEFATTING & DERMATITIS, VAPORS CAN CAUSE NASAL & RESPIRATORY IRRITATION, DIZZINESS, WEAKNESS, FATIGUE, NAUSEA, HEADACHE, UNCONSCIOUSNESS AND EVEN ASPHYXIATION. CAN CAUSE GASTROINTESTINAL IRRITATION & VOMITING.  
Carcinogenity - NTP: NO  
Carcinogenity - IARC: NO  
Carcinogenity - OSHA: NO  
Explanation Of Carcinogenity: NONE OF THE COMPONENTS IN THIS PRODUCT EXCEEDING 1% BY WT IS LISTED BY IARC, NTP, OR OSHA AS A CARCINOGEN.  
Signs and Symptoms Of Overexposure: EYE, SKIN, RESPIRATORY TRACT AND GASTROINTESTINAL IRRITATION. CAN CAUSE TEARING, DIZZINESS, WEAKNESS, FATIGUE, NAUSEA, HEADACHE, POSSIBLE UNCONSCIOUSNESS, ASPHYXIATION, VOMITING, AND DIARRHEA. ASPIRATION OF MATERIAL INTO THE LUNGS CAN CAUSE CHEMICAL PNEUMONITIS WHICH CAN BE FATAL.  
Medical Conditions Aggrevated By Exposure: PERSONS WITH A HISTORY OF EYE, SKIN OR RESPIRATORY DISEASE MAY BE AT INCREASED RISK FROM EXPOSURE.  
Emergency And First Aid Procedures: INHALATION: REMOVE VICTIM TO FRESH AIR. IF NOT BREATHING, GIVE CPR. CALL A PHYSICIAN. EYES: IMMEDIATELY FLUSH WITH PLENTY OF WATER FOR 15 MINUTES. CALL A PHYSICIAN. SKIN: WASH WITH PLENTY OF SOAP AND WATER. REMOVE CONTAMINATED CLOTHING & SHOES. INGESTION: DO NOT INDUCE VOMITING. IF CONSCIOUS, GIVE A PINT OF WATER TO DRINK. GIVE NOTHING BY MOUTH IF UNCONSCIOUS. CALL A PHYSICIAN.

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Precautions for Safe Handling and Use

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Steps if Material is Released or Spilled: SMALL SPILL: WIPE/SOAK UP WITH PAPER TOWEL OR INERT ABSORBANT. PUT IN DISPOSAL CONTAINER. REMOVE RESIDUE WITH SOLVENT. LARGE SPILL: EVACUATE AND VENTILATE AREA. IF POSSIBLE, STOP LEAK. DIKE TO RETAIN RUN OFF. VACUUM UP FREE LIQUID. ABSORB RESIDUE.  
Neutralizing Agent: NONE  
Waste Disposal Method: DISPOSAL SHOULD BE MADE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE AND LOCAL LAWS AND REGULATIONS. INCINERATION IS RECOMMENDED.  
Precautions to be Taken in Handling and Storing: STORE IN A COOL, DRY, WELL VENTILATED AREA. KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE. PROTECT CONTAINERS FROM PHYSICAL DAMAGE & IGNITION SOURCES.  
Other Precautions: DRUMS OF THIS MATERIAL MAY BE HAZARDOUS WHEN EMPTIED. SINCE EMPTIED CONTAINERS RETAIN PRODUCT RESIDUES (VAPORS, LIQUID), ALL HAZARD PRECAUTIONS GIVEN IN THE DATA SHEET MUST BE OBSERVED.

=====  
Control Measures  
=====

Respiratory Protection: IF VENTILATION DOES NOT MAINTAIN INHALATION EXPOSURES BELOW PEL (TLV), USE NIOSH/MSHA APPROVED RESPIRATORS AS PER CURRENT 29 CFR 1910.134. INSTRUCTIONS/WARNINGS AND NIOSH-RESPIRATOR DECISION LOGIC-PUB.#87.108.

Ventilation: PROVIDE SUFFICIENT GENERAL/LOCAL EXHAUST VENTILATION IN PATTERN/VOLUME TO CONTROL INHALATION EXPOSURES BELOW OSHA'S PEL.

Protective Gloves: HEAVY DUTY NITRILE, RUBBER IS REQUIRED.

Eye Protection: SAFETY GLASSES/GOGGLES AND/OR FACESHIELD

Other Protective Equipment: EYE WASH STATION & SAFETY SHOWER. INDUSTRIAL-TYPE WORK CLOTHING, COVERALLS, APRONS, BOOTS & PROTECTIVE GARMENTS AS REQD.

Work Hygienic Practices: OBSERVE GOOD PERSONAL HYGIENE PRACTICE AND RECOMMENDED PROCEDURES. DO NOT WEAR CONTAMINATED CLOTHING OR FOOTWEAR.

Supplemental Safety and Health Data: DO NOT GET ON SKIN, IN EYES OR ON CLOTHING. DO NOT BREATHE VAPORS OR MISTS. NEVER USE WELDING OR CUTTING TORCH ON OR NEAR DRUM (EVEN EMPTY) BECAUSE PRODUCT (EVEN JUST RESIDUE) CAN IGNITE EXPLOSIVELY.

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 5A188  
Part No. Indicator: B  
Part Number/Trade Name: MINERAL SPIRITS 66

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: K  
Record No. for this Safety Entry: 004  
Total Safety Entries-This Stock No.: 013  
Status: SM  
Date MSDS Prepared: 01MAR86  
Safety Data Review Date: 13FEB89  
Supply Item Manager: CX  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: ASHLAND CHEMICAL COMPANY  
Manufacturer's Street:  
Manufacturer's P.O. Box: 2219  
Manufacturer's City: COLUMBUS  
Manufacturer's State: OH  
Manufacturer's Country: US  
Manufacturer's Zip Code: 43216  
Manufacturer's Emergency Telephone Number: 606-324-1133  
Manufacturer's Information Telephone Number: 614-889-3333  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1: AMERICA FUTURE TECH  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSF  
Specification Number: P-D-680  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F4  
Unit Of Issue: DR  
~~Unit Of Issue Container Quantity: 55.0 GL~~  
Type Of Container: DRUM  
Net Unit Weight: 55.0 GL  
NRC/State License Number: N/R  
Net Explosive Weight:

Net Propellant Weight-Ammo: N/R  
Coast Guard Ammunition Code:

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Ingredients/Identity Information

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Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: K  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: WJ8925000  
CAS NO.: 8052-41-3  
Ingredient: STODDARD SOLVENT  
Percent: >95.0  
OSHA PEL: 100 PPM  
ACGIH TLV: 100 PPM; 8990  
Other Recommended Limit:

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Physical/Chemical Characteristics

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Appearance And Odor: LIQUID PETROLEUM PRODUCT  
Boiling Point: 300F/149C  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 2.0  
Vapor Density (Air=1): 4.9  
Specific Gravity: 0.78  
Decomposition Temperature:  
Evaporation Rate & Reference: 70.0 (ETHER=1)  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: 100  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature: N/K

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Fire and Explosion Hazard Data

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Flash Point: 100F/37.8C  
Flash Point Method:  
Lower Explosive Limit: 1.0  
Upper Explosive Limit: N/K  
Extinguishing Media: FOAM,CO\*2,DRY CHEMICALS  
Special Fire Fighting Procedures: USE NIOSH APPROVED SC3A  
Unusual Fire and Explosion Hazards: VAPORS ARE HEAVIER THAN AIR WILL TRAVEL  
ALONG THE GROUND;MAY BE IGNITED BY HEAT,FLAMES,MAY EXPLODE.

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Reactivity Data

=====

Stability: YES  
Conditions To Avoid (Stability): EXTREME HEAT

Materials To Avoid: STRONG OXIDIZERS/AGENTS  
Hazardous Decomposition Products: DECOMPOSITION: TOXIC MATERIALS, CO\*2, CO, VARIOUS HYDROCARBON.

Hazardous Polymerization Occur: NO

Conditions To Avoid (Polymerization): NONE NOTED

=====  
Health Hazard Data  
=====

LD50-LC50 - Mixture:

Route Of Entry - Inhalation: YES

Route Of Entry - Skin: N/K

Route Of Entry - Ingestion: YES

Health Hazards - Acute And Chronic:

Carcinogenity - NTP: N/R

Carcinogenity - IARC: N/R

Carcinogenity - OSHA: N/R

Explanation Of Carcinogenity: N/R

Signs and Symptoms Of Overexposure: NASAL & RESPIRATORY IRRITATION, DIZZINESS, WEAKNESS, FATIGUE, NAUSEA, HEADACHE, UNCONSCIOUSNESS, ASPHYXIATION, VOMITING, DIARRHEA OR CHEMICAL PNEUMONITIS.

Medical Conditions Aggravated By Exposure:

Emergency And First Aid Procedures: INHALE: REMOVE TO FRESH AIR, GIVE CPR/O\*2 IF NEED; EYES/SKIN: FLUSH W LG AMTS H\*20 FOR 15 MIN; INGEST: RINSE MOUTH; GET MEDICAL ATTENTION FOR EYES, BREATHING DIFFICULTY, OR OTHER SYMPTOMS OF OVEREXPOSURE.

=====  
Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: USE PROPER PERSONAL PROTECTION; USE SUITABLE ABSORBENT MATERIAL AND RECOVER FOR PROPER DISPOSAL.

Neutralizing Agent:

Waste Disposal Method: DISPOSE OF COLLECTED MATERIAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

Precautions to be Taken in Handling and Storing: STORE IN COOL, DRY AND WELL VENTILATED AREA. KEEP AWAY FROM HEAT AND OPEN FLAMES. KEEP CONTAINER CLOSED WHEN NOT IN USE.

Other Precautions: AVOID CONTACT WITH EYES AND SKIN. DO NOT BREATHE VAPORS/MIST. WASH THOROUGHLY AFTER EACH USE.

=====  
Control Measures  
=====

Respiratory Protection: IF TLV IS EXCEEDED, USE NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR.

Ventilation: PROVIDE MECHAN (GEN/LOCAL EXHAUST) VENT TO MAINTN <TLV

Protective Gloves: IMPERVIOUS

Eye Protection: GOGGLES/FACE SHIELD

Other Protective Equipment: FULL WORK CLOTHING TO PREVENT REPEATED OR PROLONGED CONTACT.

Work Hygienic Practices:

Supplemental Safety and Health Data:

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 5V280  
Part No. Indicator: A  
Part Number/Trade Name: PD 680 TYPE I

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: F  
Record No. for this Safety Entry: 005  
Total Safety Entries-This Stock No.: 013  
Status:  
Date MSDS Prepared: INTERIM  
Safety Data Review Date: 19AUG86  
Supply Item Manager:  
Item Name:  
Manufacturer's Name: CHEMCENTRAL/OKLAHOMA CITY/OKLAHOMA CITY, OK 73144  
Manufacturer's Street:  
Manufacturer's P.O. Box:  
Manufacturer's City:  
Manufacturer's State:  
Manufacturer's Country:  
Manufacturer's Zip Code:  
Manufacturer's Emergency Telephone Number: N/K  
Manufacturer's Information Telephone Number:  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSB  
Specification Number:  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F4  
Unit Of Issue:  
Unit Of Issue Container Quantity:  
Type Of Container:  
Net Unit Weight:  
NRC/State License Number:  
Net Explosive Weight:

Net Propellant Weight-Ammo:  
Coast Guard Ammunition Code:

=====

Ingredients/Identity Information

=====

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: F  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: 1002134PD  
CAS NO.:  
Ingredient: PD680  
Percent: 100%  
OSHA PEL:  
ACGIH TLV: 250 PPM  
Other Recommended Limit:

=====

Physical/Chemical Characteristics

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Appearance And Odor: CLEAR, WATER WHITE MILD NAPHTHA, NON-RESIDUAL  
Boiling Point: 353F  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 3  
Vapor Density (Air=1): 4.6  
Specific Gravity: 0.779  
Decomposition Temperature:  
Evaporation Rate & Reference: 32.0 (ETHER = 1)  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: 100%  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: 103F TCC  
Flash Point Method:  
Lower Explosive Limit: 1.0%  
Upper Explosive Limit: 6.2%  
Extinguishing Media: FOAM, CO2  
Special Fire Fighting Procedures: WATER MAY BE INEFFECTIVE.  
Unusual Fire and Explosion Hazards: NONE

=====

Reactivity Data

=====

Stability: YES  
Conditions To Avoid (Stability): HEAT OR OPEN FLAME  
Materials To Avoid: STRONG OXIDIZERS

Hazardous Decomposition Products: NONE  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization): N/K

=====  
Health Hazard Data  
=====

LD50-LC50 - Mixture:  
Route Of Entry - Inhalation:  
Route Of Entry - Skin:  
Route Of Entry - Ingestion:  
Health Hazards - Acute And Chronic:  
Carcinogenity - NTP:  
Carcinogenity - IARC:  
Carcinogenity - OSHA:  
Explanation Of Carcinogenity:  
Signs and Symptoms Of Overexposure: SLIGHT IRRITATION TO MUCOUS MEMBRANES.  
Medical Conditions Aggrevated By Exposure:  
Emergency And First Aid Procedures: SKIN: WASH W/SOAP & WATER. BREATHING:  
REMOVE PATIENT TO FRESH AIR. EYES: FLUSH THOROUGHLY W/WATER FOR AT LEAST 15  
MINUTES. SWALLOWING: DON'T INDUCE VOMITING. CALL PHYSICIAN IMMEDIATELY. PUMP  
STOMACH.

=====  
Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: DON'T ALLOW SPILLED LIQUID TO GET  
NEAR VERY STRONG OXIDIZERS OR SOURCES OF HEAT OR ON FLAME. MOP UP AND DISCARD.  
Neutralizing Agent:  
Waste Disposal Method: INCINERATION ACCORDING TO AIR POLLUTION REGULATIONS.  
Precautions to be Taken in Handling and Storing: IF SWALLOWED, DON'T INDUCE  
VOMITING. CALL PHYSICIAN. KEEP AWAY FROM HEAT & OPEN FLAME. AVOID PLONGED  
CONTACT W/SKIN/BREATHING OF VAPOR OR SPRAY.  
Other Precautions: DON'T STORE IN OPEN OR UNLABELED CONTAINERS. USE ONLY WITH  
ADEQUATE VENTILATION. FOR INDUSTRIAL USE ONLY KEEP OUT OF THE REA OF CHILDREN.

=====  
Control Measures  
=====

Respiratory Protection: NONE  
Ventilation: LOCAL EXHAUST: PREFERABLE. MECHANICAL: ACCEPTABLE  
Protective Gloves: SOL RESISTANT  
Eye Protection: SAFETY GLASSES  
Other Protective Equipment: NONE  
Work Hygienic Practices:  
Supplemental Safety and Health Data:

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 68367  
Part No. Indicator: A  
Part Number/Trade Name: LOW FLASH STODDARD SOLVENT

=====  
General Information  
=====

Safety Data Action Code: C  
Safety Focal Point: D  
Record No. for this Safety Entry: 006  
Total Safety Entries-This Stock No.: 013  
Status:  
Date MSDS Prepared: INTERIM  
Safety Data Review Date: 10OCT86  
Supply Item Manager: CX  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: TRIANGLE REFINERIES, INC.  
Manufacturer's Street: 2211 NORFOLK SUITE 1100  
Manufacturer's P.O. Box: 3367  
Manufacturer's City: HOUSTON  
Manufacturer's State: TX  
Manufacturer's Country: US  
Manufacturer's Zip Code: 77253  
Manufacturer's Emergency Telephone Number:  
Manufacturer's Information Telephone Number:  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSG  
Specification Number: P-D-680  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F4  
Unit Of Issue: DR  
Unit Of Issue Container Quantity: 55.0 GL  
Type Of Container:  
Net Unit Weight:  
NRC/State License Number:  
Net Explosive Weight:

Net Propellant Weight-Ammo:  
Coast Guard Ammunition Code:

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: 1000796AB  
CAS NO.:  
Ingredient: AROMATICS  
Percent: 13.4  
OSHA PEL:  
ACGIH TLV: NOT SPECIFIED  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 02  
NIOSH (RTECS) No.: 1001292PD  
CAS NO.:  
Ingredient: PETROLEUM DISTILLATES (SATURATES)  
Percent: 86.6  
OSHA PEL:  
ACGIH TLV: NOT SPECIFIED  
Other Recommended Limit:

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: CLEAR LIQUID, ODOR LIKE HYDROCARBON.  
Boiling Point: 300-400F  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 11  
Vapor Density (Air=1): UNKN  
Specific Gravity: 0.7686  
Decomposition Temperature:  
Evaporation Rate & Reference: UNKNOWN  
Solubility In Water: INSOLUBLE  
Percent Volatiles By Volume: 100  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature:

=====  
Fire and Explosion Hazard Data  
=====

Flash Point: 106F ASTM D56  
Flash Point Method:  
Lower Explosive Limit: UNKN  
Upper Explosive Limit: UNKN  
Extinguishing Media: CO\*2, DRY CHEMICAL, FOAM  
Special Fire Fighting Procedures: USE SCBA FOR FIREFIGHTING IN CONFINED AREAS  
Unusual Fire and Explosion Hazards: THE MATERIAL WILL IGNITE ON CONTACT WITH OPEN FLAMES.

=====  
Reactivity Data  
=====

Stability: YES  
Conditions To Avoid (Stability): AVOID EXCESSIVE HEAT AND OPEN FLAMES.  
Materials To Avoid: NOT SPECIFIED  
Hazardous Decomposition Products: NONE SPECIFIED  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization): NON SPECIFIED  
=====

Health Hazard Data  
=====

LD50-LC50 - Mixture:  
Route Of Entry - Inhalation:  
Route Of Entry - Skin:  
Route Of Entry - Ingestion:  
Health Hazards - Acute And Chronic:  
Carcinogenity - NTP:  
Carcinogenity - IARC:  
Carcinogenity - OSHA:  
Explanation Of Carcinogenity:  
Signs and Symptoms Of Overexposure: SKIN AND EYE IRRITANT ONCONTACT. INHAL: MAY CAUSE L. IRRITATION, DROWSINESS, COLLAPSE, HEADACHE, DERMATITIS  
Medical Conditions Aggravated By Exposure:  
Emergency And First Aid Procedures: INHALE: REMOVE TO FRESH AIR, GIVE CPR/O\*2 IF NEED; EYES/SKIN: FLUSH W LG AMTS H\*20 FOR 15 MIN; INGEST: RINSE MOUTH; GET MEDICAL ATTENTION FOR EYES, BREATHING DIFFICULTY, OR OTHER SYMPTOMS OF OVEREXPOSURE.  
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Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: CLEAN IT UP. DISPOSE OF SOLVENT CONTAINING WIPING CLOTHS OR ABSORBENT PAPER IN A SUITABLE MANNER. COLLECT THE MATERIAL INTO A CONTAINER FOR PROPER DISPOSAL. DO NOT DUMP IN WATER COURSES, RIVERS AND STREAMS/SEWERS.  
Neutralizing Agent:  
Waste Disposal Method: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.  
Precautions to be Taken in Handling and Storing: KEEP AWAY FROM HEAT AND OPEN FLAMES. KEEP THE CONTAINER CLOSED WHEN NOT IN USE.  
Other Precautions: AVOID EYE AND SKIN EXPOSURE. WASH HANDS BEFORE EATING AND SMOKING.  
=====

Control Measures  
=====

Respiratory Protection: IF EXPOS D TLV, NIOSH/MESA APPR SELF-CONTND BRTHG APP (POS PR MODE)

Ventilation: PROVIDE MECHAN(GEN/LOCAL EXHAUST)VENT TO MAINTN <TLV

Protective Gloves: RUBBER

Eye Protection: SAFETY/CHEM GOGGLES

Other Protective Equipment: EYE WASH STATION. APRONS. SPECIAL IMPERVIOUS CLOTHING.

Work Hygienic Practices:

Supplemental Safety and Health Data: MSDS DATED 4/1/81. THIS PRODUCT IS A COMPLEX MIXTURE OF PARAFFIN, ISOPARAFFIN, NAPHTHENE AND AROMATIC HYDROCARBONS IN THE C\*8 TO C\*12 CARBON NUMBER RANGE

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 60776  
Part No. Indicator: A  
Part Number/Trade Name: CHARTERSOL 306

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: N  
Record No. for this Safety Entry: 007  
Total Safety Entries-This Stock No.: 013  
Status:  
Date MSDS Prepared: PRE-HCS  
Safety Data Review Date: 18JUL84  
Supply Item Manager:  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: CHARTER CHEMICALS/CHARTER INTERNATIONAL OIL CO.  
Manufacturer's Street: 8938 MANCHESTER ST  
Manufacturer's P.O. Box: 5008  
Manufacturer's City: HOUSTON  
Manufacturer's State: TX  
Manufacturer's Country: US  
Manufacturer's Zip Code: 77012-2149  
Manufacturer's Emergency Telephone Number:  
Manufacturer's Information Telephone Number:  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSH  
Specification Number: P-D-680  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F4  
Unit Of Issue:  
Unit Of Issue Container Quantity:  
Type Of Container:  
Net Unit Weight:  
NRC/State License Number: N/A  
Net Explosive Weight:

Net Propellant Weight-Ammo: N/A  
Coast Guard Ammunition Code:

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Ingredients/Identity Information

=====

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: SE7555000  
CAS NO.: 8030-30-6  
Ingredient: NAPHTHA (PETROLEUM SPIRITS OR BENZIN)  
Percent: 98  
OSHA PEL: 100 FPM  
ACGIH TLV: NOT ESTABLISHED  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 02  
NIOSH (RTECS) No.: 100191880  
CAS NO.:  
Ingredient: SOLVENT(100 DEGREE F FLASH POINT)D  
Percent: 2  
OSHA PEL:  
ACGIH TLV:  
Other Recommended Limit:

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Physical/Chemical Characteristics

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Appearance And Odor: WHITE WATER LIQUID, MILD HYDROCARBON ODOR.  
Boiling Point: 317-370F  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 1.8.  
Vapor Density (Air=1): 4.9  
Specific Gravity: 0.7632  
Decomposition Temperature:  
Evaporation Rate & Reference: 0.212, N-3U AC=1  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: 100  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature:

=====

Fire and Explosion Hazard Data

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Flash Point: 105F;41C, TCC  
Flash Point Method:  
Lower Explosive Limit: 1.1-  
Upper Explosive Limit: 6.0  
Extinguishing Media: MECHANICAL FOAM, DRY CHEMICAL, WATER FOG, CO\*2  
Special Fire Fighting Procedures: WATER STREAM WILL SPREAD FIRE. USE FRESH AIR RESPIRATORS.  
Unusual Fire and Explosion Hazards: A VAPOR ACCUMULATION WOULD FLASH AND/OR EXPLODE IF IGNITED. COMBUSTIBLE LIQUID.

=====  
Reactivity Data  
=====

Stability: YES  
Conditions To Avoid (Stability): AVOID HEAT, SPARKS, FLAME & OTHER IGNITION SOURCES.  
Materials To Avoid: AVOID STRONG OXIDIZING AGENTS.  
Hazardous Decomposition Products: CARBON MONOXIDE IF BURNED WITH INSUFFICIENT AIR.  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization):

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Health Hazard Data:  
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LD50-LC50 - Mixture:  
Route Of Entry - Inhalation:  
Route Of Entry - Skin:  
Route Of Entry - Ingestion:  
Health Hazards - Acute And Chronic:  
Carcinogenity - NTP:  
Carcinogenity - IARC:  
Carcinogenity - OSHA:  
Explanation Of Carcinogenity:  
Signs and Symptoms Of Overexposure: INHAL:CNS DAMAGE;RESP IRRIT;MUSCULAR WEAKNESS;CONFUSION;IMPAIRED COORDINATION;HEADACHE;NAUSEA.  
Medical Conditions Aggrevated By Exposure:  
Emergency And First Aid Procedures: SKIN:WASH IMMEDIATELY WITH SOAP & WATER. EYE:WASH IMMEDIATELY WITH WATER FOR 15 MINUTES. INHAL;REMOVE FROM EXPOSURE. PROVIDE FRESH AIR & REST. INGEST:DO NOT INDUCE VOMITING, CALL MD IMMEDIATELY.

=====  
Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: REMOVE ALL IGNITION SOURCES, AVOID BREATHING VAPORS, PROVIDE ADEQUATE VENTILATION, ABSORB SPILLAGE. CALL EMERGENCY NUMBER IS SPILLAGE POSES THREAT TO MAN OR ENVIRONMENT.  
Neutralizing Agent:  
Waste Disposal Method: MFR RECOMMENDS USING A QUALIFIED DISPOSAL COMPANY TO INCINERATE OR OTHERWISE DISCARD AT AN APPROVED FACILITY. DISPOSAL METHOD MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL CODES. DO NOT INCINERATE CLOSED CONTAINERS.  
Precautions to be Taken in Handling and Storing: STORE IN COOL, WELL VENTILATED AREA. KEEP CLOSURES TIGHT AND UPRIGHT TO PREVENT LEAKAGE. KEEP CLOSED WHEN NOT IN USE. READ ALL WARNING LABELS.  
Other Precautions: DO NOT TRANSFER TO UNMARKED CONTAINER. GROUND CONTAINERS WHEN FILLING OR EMPTYING. USE ONLY WITH ADEQUATE VENTILATION (EQUIVALENT TO OUTDOORS VENTILATION. AVOID POTENTIAL IGNITION SOURCES.

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 60776  
Part No. Indicator: B  
Part Number/Trade Name: P-D-680 TY I

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: N  
Record No. for this Safety Entry: 008  
Total Safety Entries-This Stock No.: 013  
Status:  
Date MSDS Prepared: PRE-HCS  
Safety Data Review Date: 18JUL84  
Supply Item Manager:  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: CHARTER CHEMICALS/CHARTER INTERNATIONAL OIL CO.  
Manufacturer's Street: 8938 MANCHESTER ST  
Manufacturer's P.O. Box: 5008  
Manufacturer's City: HOUSTON  
Manufacturer's State: TX  
Manufacturer's Country: US  
Manufacturer's Zip Code: 77012-2149  
Manufacturer's Emergency Telephone Number:  
Manufacturer's Information Telephone Number:  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSJ  
Specification Number: P-D-680  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F4  
Unit Of Issue:  
Unit Of Issue Container Quantity:  
Type Of Container:  
Net Unit Weight:  
NRC/State License Number: N/A  
Net Explosive Weight:

=====  
Control Measures  
=====

Respiratory Protection: NIOSH/MSHA APPROVED SELF-CONTAINED BREATH APPAR IF TLV IS EXCEEDED.

Ventilation: LOCAL/MECH RECOMND;USE EXPLOSION-PROOF EQUIP. SEE SUP DATA

Protective Gloves: CHEMICAL RESIST

Eye Protection: SAFETY GOGGLES

Other Protective Equipment: AS REQUIRED TO AVOID SKIN CONTACT OR BREATHING VAPORS.

Work Hygienic Practices:

Supplemental Safety and Health Data: VP & SPECIFIC GRAVITY VALUES ARE AT 60F.  
VENTILATION: EXHAUST TO NON-DANGEROUS SPARK-FREE AREAS. AVOID POTENTIAL IGNITION SOURCES. CONTAINER: 55 GALLON SPEC: TYPE I.

Net Propellant Weight-Ammo: N/A  
Coast Guard Ammunition Code:

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Ingredients/Identity Information

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Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: SE7555000  
CAS NO.: 8030-30-6  
Ingredient: NAPHTHA (PETROLEUM SPIRITS OR BENZIN)  
Percent: 98  
OSHA PEL: 100 PPM  
ACGIH TLV: NOT ESTABLISHED  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: N  
Ingredient Sequence No.: 02  
NIOSH (RTECS) No.: 100191850  
CAS NO.:  
Ingredient: SOLVENT(100 DEGREE F FLASH POINT)  
Percent: 2  
OSHA PEL:  
ACGIH TLV:  
Other Recommended Limit:

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Physical/Chemical Characteristics

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Appearance And Odor: WHITE WATER LIQUID, MILD HYDROCARBON ODOR  
Boiling Point: 317-370F  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 1.8  
Vapor Density (Air=1): 4.9  
Specific Gravity: 0.7632  
Decomposition Temperature:  
Evaporation Rate & Reference: 0.12, N-BU AC=1  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: 100  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
~~Autoignition Temperature:~~

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Fire and Explosion Hazard Data

=====

Flash Point: 105F;41,TCC  
Flash Point Method:  
Lower Explosive Limit: 1.1  
Upper Explosive Limit: 6.0  
Extinguishing Media: MECHANICAL FOAM, DRY CHEMICAL, WATER FOG, CO\*2  
Special Fire Fighting Procedures: WATER STREAM WILL SPREAD FIRE. USE FRESH AIR RESPIRATORS.  
Unusual Fire and Explosion Hazards: A VAPOR ACCUMULATION WOULD FLASH AND/OR EXPLODE IF IGNITED. COMBUSTIBLE LIQUID.

=====  
Reactivity Data  
=====

Stability: YES  
Conditions To Avoid (Stability): AVOID HEAT, SPARKS, FLAME & OTHER IGNITION SOURCES.  
Materials To Avoid: AVOID STRONG OXIDIZING AGENTS.  
Hazardous Decomposition Products: CARBON MONOXIDE IF BURNED WITH INSUFFICIENT AIR.  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization):

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Health Hazard Data  
=====

LD50-LC50 - Mixture:  
Route Of Entry - Inhalation:  
Route Of Entry - Skin:  
Route Of Entry - Ingestion:  
Health Hazards - Acute And Chronic:  
Carcinogenity - NTP:  
Carcinogenity - IARC:  
Carcinogenity - OSHA:  
Explanation Of Carcinogenity:  
Signs and Symptoms Of Overexposure: INHAL CNS DAMAGE;RESP IRRIT;MUSCULAR WEAKNESS;CONFUSION;IMPAIRED COORDINATION;HEADACHE;NAUSEA.  
Medical Conditions Aggravated By Exposure:  
Emergency And First Aid Procedures: SKIN:WASH IMMEDIATELY WITH SOAP & WATER. EYE: WASH IMMEDIATELY WITH WATER FOR 15 MINUTES. INHAL:REMOVE FROM EXPOSURE .PROVIDE FRESH AIR & REST. INGEST:DO NOT INDUCE VOMITING, CALL MD IMMEDIATE.

=====  
Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: REMOVE ALL IGNITION SOURCES, AVOID BREATHING VAPORS, PROVIDE ADEQUATE VENTILATION, ABSORB SPILLAGE.CALL EMERGENCY NUMBER IF SPILLAGE POSES THREAT TO MAN OR ENVIRONMENT.  
Neutralizing Agent:  
Waste Disposal Method: MFR RECOMMENDS USING A QUALIFIED DISPOSAL COMPANY TO INCINERATE OR OTHERWISE DISCARD AT AN APPROVED FACILITY. DISPOSAL METHOD MUST BE IAW FEDERAL, STATE AND LOCAL CODES. DO NOT INCINERATE CLOSED CONTAINERS.  
Precautions to be Taken in Handling and Storing: STORE IN COOL, WELL VENTILATED AREA. KEEP CLOSURES TIGHT AND UPRIGHT TO PREVENT LEAKAGE. KEEP CLOSED WHEN NOT IN USE. READ ALL WARNING LABELS.  
Other Precautions: DO NOT TRANSFER TO UNMARKED CONTAINER. GROUND CONTAINERS WHEN FILLING OR EMPTYING. USE ONLY WITH ADEQUATE VENTILATION. (EQUIVALENT TO OUTDOORS VENTILATION. AVOID POTENTIAL IGNITION SOURCES.

=====  
Control Measures  
=====

Respiratory Protection: NIOSH/MSHA APPROVED SELF-CONTAINED BREATH APPAR IF TLV IS EXCEEDED.

Ventilation: LOCAL/MECH RECOMND;USE EXPLOSION.PROOF EQUIP SEE SUP DATA.

Protective Gloves: CHEMICAL RESIST

Eye Protection: SAFETY GOGGLES

Other Protective Equipment: AS REQUIRED TO AVOID SKIN CONTACT BREATHING VAPORS.

Work Hygienic Practices:

Supplemental Safety and Health Data: VP & SPECIFIC GRAVITY VALUES ARE AT 60F.  
VENTILATION:EXHAUST TO NON-DANGEROUS SPARK-FREE AREAS. AVOID POTENTIAL IGNITION SOURCES. CONTAINER: 55 GALLON

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 78628  
Part No. Indicator: A  
Part Number/Trade Name: SUN T MINERAL SPIRITS

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: D  
Record No. for this Safety Entry: 009  
Total Safety Entries-This Stock No.: 013  
Status:  
Date MSDS Prepared: PRE-HCS  
Safety Data Review Date: 15JUN85  
Supply Item Manager: CX  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: SUN OIL COMPANY OF PENNSYLVANIA  
Manufacturer's Street: 100 MATSONFORD RD  
Manufacturer's P.O. Box:  
Manufacturer's City: RADNOR  
Manufacturer's State: PA  
Manufacturer's Country: US  
Manufacturer's Zip Code: 19067-4514  
Manufacturer's Emergency Telephone Number:  
Manufacturer's Information Telephone Number:  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSK  
Specification Number: P-D-680  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F4  
Unit Of Issue: DR  
Unit Of Issue Container Quantity: 55.0GL  
Type Of Container:  
Net Unit Weight:  
NRC/State License Number:  
Net Explosive Weight:

t Propellant Weight-Ammo:  
Coast Guard Ammunition Code:

=====  
Ingredients/Identity Information  
=====

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: SE7555000  
CAS NO.: 8030-30-6  
Ingredient: NAPHTHA (PETROLEUM SPIRITS OR BENZIN)  
Percent: 85.0  
OSHA PEL: 100 PPM  
ACGIH TLV: NOT ESTABLISHED  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 02  
NIOSH (RTECS) No.: 1000796AB  
CAS NO.:  
Ingredient: AROMATICS  
Percent: 15.0  
OSHA PEL:  
ACGIH TLV: NOT SPECIFIED  
Other Recommended Limit:

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: CLEAR LIQUID, MINERAL SPIRITS ODOR  
Boiling Point: 315 TO 385F  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 6.0  
Vapor Density (Air=1): 3.9  
Specific Gravity: 0.79  
Decomposition Temperature:  
Evaporation Rate & Reference: <1 (ETHYL ETHER=1)  
Solubility In Water: INSOLUBLE  
Percent Volatiles By Volume: 100  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature: 540F

=====  
Fire and Explosion Hazard Data  
=====

Flash Point: 106F MIN T.C.C.  
Flash Point Method:  
Lower Explosive Limit: 0.8  
Upper Explosive Limit: 5.0  
Extinguishing Media: WATERFOG,CHEMICAL FOAM,DRY CHEMICAL,CO\*2  
Special Fire Fighting Procedures: USE SCBA FOR FIREFIGHTING IN CONFINED SPACES.  
Unusual Fire and Explosion Hazards: NONE SPECIFIED BY THE MFR.

=====  
Reactivity Data  
=====

Stability: YES  
Conditions To Avoid (Stability): NONE  
Materials To Avoid: STRONG OXIDIZERS  
Hazardous Decomposition Products: CO AND ASPHYXIANTS  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization): NONE

=====  
Health Hazard Data  
=====

LD50-LC50 - Mixture:  
Route Of Entry - Inhalation:  
Route Of Entry - Skin:  
Route Of Entry - Ingestion:  
Health Hazards - Acute And Chronic:  
Carcinogeny - NTP:  
Carcinogeny - IARC:  
Carcinogeny - OSHA:  
Explanation Of Carcinogeny:  
Signs and Symptoms Of Overexposure: MODERATELY IRRITANT TO SKIN AND EYES ON REPEATED CONTACT,VAPORS MAY CAUSE IRRITATION TO RESPRY TRACT  
Medical Conditions Aggrevated By Exposure:  
Emergency And First Aid Procedures: INHALE:REMOVE TO FRESH AIR, GIVE O<sub>2</sub> IF NEED;EYES/SKIN:FLUSH W LG AMTS H<sub>2</sub>O FOR 15 MIN;INGEST:RINSE MOUTH; GET MEDICAL ATTENTION FOR EYES, BREATHING DIFFICULTY, OR OTHER SYMPTOMS OF OVEREXPOSURE.

=====  
Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: REMOVE IGNITION SOURCES,VENTILATE AREA WELL.ABSORB WITH VERMICULITE OR OTHER MATERIALS, SUCH AS SAWDUST,RAGS,PAPER & PLACE IN CLOSED CONTAINER. USE NON SPARKING TOOLS. WEAR PROPER PROTECTIVE EQUIPMENT DURING CLEAN UP.  
Neutralizing Agent:  
Waste Disposal Method: INCINERATE IN APPROVED INCINERATOR OR DISPOSE OF IN APPROVED CHEMICAL DUMP IN ACCORDANCE WITH LOCAL,STATE & FEDERAL REGULATIONS.  
Precautions to be Taken in Handling and Storing: KEEP AWAY FROM FIRE,SPARKS AND FLAMES.WASH THOROUGHLY AFTER HANDLING.STORE IN COOL AND DRY PLACE.KEEP THE CONTAINER CLOSED WHEN NOT IN USE.  
Other Precautions: AVOID CONTACT WITH SKIN AND EYES.DO NOT BREATH VAPORS OR MIST IF CREATED

=====  
Control Measures  
=====

Respiratory Protection: IF EXPOS TLV,NIOSH/MESA APPR SELF-CONTND BRTHG APP (FO

PR MODE)

Ventilation: PROVIDE MECHAN(GEN/LOCAL EXHAUST)VENT TO MAINTN <TLV

Protective Gloves: IMPERVIOUS

Eye Protection: CHEM SPLASH GOGGLES

Other Protective Equipment: EYE WASH STATION. APRONS. SPECIAL IMPERVIOUS CLOTHING.

Work Hygienic Practices:

Supplemental Safety and Health Data: MSDS HAS REV DATE AS 03/10/81

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 8P578  
Part No. Indicator: A  
Part Number/Trade Name: STODDARD SOLVENT

=====  
General Information  
=====

Safety Data Action Code:  
Safety Focal Point: D  
Record No. for this Safety Entry: 010  
Total Safety Entries-This Stock No.: 013  
Status: SE  
Date MSDS Prepared: 04OCT86  
Safety Data Review Date: 29JUN89  
Supply Item Manager: KY  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: CHASE CHEMICAL CO, INC.  
Manufacturer's Street: 13546 DESMOND ST.  
Manufacturer's P.O. Box:  
Manufacturer's City: PACOIMA  
Manufacturer's State: CA  
Manufacturer's Country:  
Manufacturer's Zip Code: 9133A-2315  
Manufacturer's Emergency Telephone Number: 818-899-7411  
Manufacturer's Information Telephone Number: 213-875-0881  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BGXGM  
Specification Number: P-D-680  
Specification Type, Grade, Class: TYPE I  
Hazard Characteristic Code: F4  
Unit Of Issue: DR  
Unit Of Issue Container Quantity: 66 GAL  
Type Of Container: DRUM  
Net Unit Weight:  
NRC/State License Number: N/R  
Net Explosive Weight:

Net Propellant Weight-Ammo: N/R  
Coast Guard Ammunition Code:

=====

Ingredients/Identity Information

=====

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: 1003497PN  
CAS NO.: 64742-88-7  
Ingredient: SOLVENT NAPHTHA, MEDIUM ALIPHATIC  
Percent: >90  
OSHA PEL: 100 PPM  
ACGIH TLV: 100 PPM STEL 200 PPM  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 02  
NIOSH (RTECS) No.: 1002591PD  
CAS NO.: 64742-95-6  
Ingredient: SOLVENT NAPHTHA, LIGHT AROMATIC  
Percent: <10  
OSHA PEL:  
ACGIH TLV:  
Other Recommended Limit:

=====

Physical/Chemical Characteristics

=====

Appearance And Odor: CLEAR, COLORLESS TO AMBER LIQUID, KEROSENE ODOR  
Boiling Point: 317-388 F  
Melting Point: N/K  
Vapor Pressure (MM Hg/70 F): <5 MM  
Vapor Density (Air=1): 4.8  
Specific Gravity: 0.78  
Decomposition Temperature: N/K  
Evaporation Rate & Reference: <0.1 BUAC  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: N/K  
Viscosity:  
pH: N/K  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Ignition Temperature:

=====

Fire and Explosion Hazard Data

=====

Flash Point: 112 F  
Flash Point Method: TCC  
Lower Explosive Limit: 1  
Upper Explosive Limit: 6  
Extinguishing Media: FOAM,CARBON DIOXIDE,DRY CHEMICAL,WATER FOG. WATER MAY BE INEFFECTIVE AND MAY SPREAD FIRE IF IMPROPERLY USED.  
Special Fire Fighting Procedures: USE SELF CONTAINED BREATHING APPARATUS, ESPECIALLY IN ENCLOSED AREAS. WATER SPRAY MAY BE USED TO COOL FIRE EXPOSED CONTAINERS AND EQUIPMENT.  
Unusual Fire and Explosion Hazards: WHEN HEATED SUFFICIENTLY,VAPORS MAY FORM EXPLOSIVE MIXTURES WITH AIR. SATURATED NEWSPAPER,RAGS,ETC. MAY UNDERGO SPONTANEOUS CONMBUSTION

=====  
Reactivity Data  
=====

Stability: YES  
Conditions To Avoid (Stability): HEAT,IGNITION SOURCES  
Materials To Avoid: STRONG OXIDIZERS.  
Hazardous Decomposition Products: CSRBON DIOXIDE,CARBIN MONOXIDE  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization): N/R

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Health Hazard Data  
=====

D50-LC50 - Mixture: N/R  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: NO  
Route Of Entry - Ingestion: YES  
Health Hazards - Acute And Chronic: PRODUCT IS A MILD IRRITANT. MOST HAZARDOUS EXPOSURE;EXPOSURE IS TO AIRBORN MIST OR OTHER ASPIRATION OF LIQUID INTO LUNGS.PROLONGED/REAPATED OVEREXPOSURE MAY CAUSE LIVER OR KIDNEY DAMAGE.  
Carcinogenity - NTP: NO  
Carcinogenity - IARC: NO  
Carcinogenity - OSHA: NO  
Explanation Of Carcinogenity:  
Signs and Symptoms Of Overexposure: EYE:MILD IRRITATION. SKIN:DRYING,DEFATTING WITH PROLONGED/REPEATED CONTACT. INHALED:HEADACHE,NAUSEA,CONFUSION,DROWSINESS. ASPIRATION OF LIQUID MAY CAUSE CHEMICAL PNEUMONITIS. INGESTED:G/I IRRITATION, NAUSEA,POSSIBLE VOMITING.  
Medical Conditions Aggravated By Exposure: NONE EXPECTED  
Emergency And First Aid Procedures: EYE:FLUSH WITH WATER 15 MIN. SKIN:REMOVE CONTAMINATED CLOTHING (LAUNDER BEFORE REUSE) AND THOROUGHLY WASH OF CONTACT WIT SOAP AND WATER. INHALED:REMOVE FROM EXPOSURE. RESUSCIATE OR GIVE OXYGEN IF NEEDED THEN GET MEDICL ATTENTION. INGESTED:DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION. IF ANY IRRITATION PERSISTS OR IS SEVERE,GET MEDICAL CARE.

=====  
Precautions for Safe Handling and Use  
=====

Steps if Material is Released or Spilled: ELIMINAT4 IGNITION SOURCES. USE APPROPRIATE PROTECTIVE EQUIPMENT. CONTAIN LEAK. PREVENT LEAK FROM ENTERING LEWER, WATER WAY,ETC. RECOVER AS LIQUID. REPORT SPILL IF APPROPRIATE.  
Neutralizing Agent: NONE  
Waste Disposal Method: DISPOSE I/A/W FEDERAL,STATE,LOCAL REGULATIONS. INCINERATION IS RECOMMENDED FOR DISPOSAL.

Precautions to be Taken in Handling and Storing: STORE IN COOL AREA AWAY FROM OXIDIZERS AND IGNITION SOURCES. DETACHED STORAGE PREFERRED. GROUND CONTAINERS DURING TRANSFER.

Other Precautions: "EMPTY" CONTAINERS MAY CONTAIN RESIDUE AND/OR FUMES WHICH ARE EXPLOSIVE. DO NOT CUT, WELD, ETC.

=====  
Control Measures  
=====

Respiratory Protection: NOT EXPECTED TO BE NECESSARY. USE NIOSH/MSHA RESPIRATOR IF PRODUCT IS MISTED OR IF TLV/PEL IS EXCEEDED.

Ventilation: USE LOCAL EXHAUSTED TO MAINTAIN EXPOSURE BELOW TLV/PEL IF NORMAL ROOM VENTILATION IS INSUFFICIENT.

Protective Gloves: RUBBER PLASTIC, OR OTHER IMPERVIOUS

Eye Protection: SAFETY GLASSES OR SPLASH GOGGLES.

Other Protective Equipment: AS REQUIRED TO MINIMIZE CONTACT.

Work Hygienic Practices: USE GOOD INDUSTRIAL HYGIENE PRACTICE. AVOID UNNECESSARY CONTACT.

Supplemental Safety and Health Data: MSDS NO 9853 HMIS:MSDS WAS IDENTICAL TO A SHELL OIL MSDS EXCEPT AREA OF COMPANY IDENTIFICATION HAD BEEN OVERLAID BY CHASE CHEMICAL.

DoD Hazardous Materials Information System.  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 81230  
Part No. Indicator: A  
Part Number/Trade Name: CHEVRON THINNER 325

=====  
General Information  
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Safety Data Action Code:  
Safety Focal Point: D  
Record No. for this Safety Entry: 011  
Total Safety Entries-This Stock No.: 013  
Status:  
Date MSDS Prepared: INTERIM  
Safety Data Review Date: 10OCT86  
Supply Item Manager: CX  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: CHEVRON  
Manufacturer's Street: 575 MARKET ST  
Manufacturer's P.O. Box: 7643  
Manufacturer's City: SAN FRANCISCO  
Manufacturer's State: CA  
Manufacturer's Country: US  
Manufacturer's Zip Code: 94120  
Manufacturer's Emergency Telephone Number:  
Manufacturer's Information Telephone Number:  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSL  
Specification Number: P-D-680  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F4  
Unit Of Issue: DR  
Unit Of Issue Container Quantity: 55.0 GL  
Type Of Container: DRUM  
Net Unit Weight: 55.0 GL  
NRC/State License Number:  
Net Explosive Weight:

Net Propellant Weight-Ammo:  
Coast Guard Ammunition Code:

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Ingredients/Identity Information  
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Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: 1000919PN  
CAS NO.:  
Ingredient: PARAFFINS(INCL.NAPTHENES) (TLV AS OIL MIST)5MG/CUM  
Percent: 99.0  
OSHA PEL:  
ACGIH TLV: NOT SPECIFIED  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 02  
NIOSH (RTECS) No.: 1000796AB  
CAS NO.:  
Ingredient: AROMATICS(C-8)  
Percent: 1.0  
OSHA PEL:  
ACGIH TLV: NOT SPECIFIED  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 03  
NIOSH (RTECS) No.: CY1400000  
CAS NO.: 71-43-2  
Ingredient: BENZENE  
Percent: <.02  
OSHA PEL: 1PPM/5STEL;1910.1028  
ACGIH TLV: 10 PPM; A2;8990  
Other Recommended Limit:

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Physical/Chemical Characteristics  
=====

Appearance And Odor: COLORLESS LIQUID  
Boiling Point: 340F/171C  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 5.0  
Vapor Density (Air=1): 4.8  
Specific Gravity: 0.78  
Decomposition Temperature:

Evaporation Rate & Reference: 0.22 (BA.ACET=1)  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: 99+  
Viscosity:  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature: 500F

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Fire and Explosion Hazard Data

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Flash Point: 101F/38C (T.C.C)  
Flash Point Method:  
Lower Explosive Limit: 1.0  
Upper Explosive Limit: 6.0  
Extinguishing Media: CO\*2, DRY CHEMICAL, FOAM, WATER SPRAY  
Special Fire Fighting Procedures: USE NIOSH APPROVED SCBA IN FIRES AND CONFINED AREA  
Unusual Fire and Explosion Hazards: NONE SPECIFIED. USE REASONABLE CARE. COMBUSTIBLE MATERIAL.

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Reactivity Data

=====

Stability: YES  
Conditions To Avoid (Stability): HEAT, OPEN FLAMES  
Materials To Avoid: STRONG OXIDIZING MATERIAL  
Hazardous Decomposition Products: CO AND/OR CO\*2 ON COMBUSTION  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization): NONE SPECIFIED

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Health Hazard Data

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LD50-LD50 - Mixture:  
Route Of Entry - Inhalation:  
Route Of Entry - Skin:  
Route Of Entry - Ingestion:  
Health Hazards - Acute And Chronic:  
Carcinogeny - NTP:  
Carcinogeny - IARC:  
Carcinogeny - OSHA:  
Explanation Of Carcinogeny:  
Signs and Symptoms Of Overexposure: EYES: IRRITATION; SKIN: IRRITATION OR DERMATITIS; INHAL: CNS DEPRESSION, HEAD, DIZZINESS, WEAKNESS. ING: VOMI  
Medical Conditions Aggrevated By Exposure:  
Emergency And First Aid Procedures: INHALE: REMOVE TO FRESH AIR, GIVE CPR/O\*2 IF NEED; EYES/SKIN: FLUSH W LG AMTS H\*20 FOR 15 MIN; INGEST: RINSE MOUTH; GET MEDICAL ATTENTION FOR EYES, BREATHING DIFFICULTY, OR OTHER SYMPTOMS OF OVEREXPOSURE.

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Precautions for Safe Handling and Use

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Steps if Material is Released or Spilled: USE PROPER PERSONAL PROTECTION. ELIMINATE ALL IGNITION SOURCES. USE ABSORBENT MATERIALS AND RECOVER

FOR PROPER DISPOSAL.

Neutralizing Agent:

Waste Disposal Method: DISPOSE OF COLLECTED MATERIAL IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS.

Precautions to be Taken in Handling and Storing: STORE IN COOL, DRY AND WELL VENTILATED AREA. KEEP AWAY FROM HEAT AND OPEN FLAMES. KEEP CONTAINER TIGHTLY CLOSED WHEN NOT IN USE.

Other Precautions: AVOID SKIN AND EYES CONTACT. DO NOT BREATHE VAPORS.

=====  
Control Measures  
=====

Respiratory Protection: USE NIOSH APPROVED RESPIRATOR FOR ORGANIC VAPORS.

Ventilation: MECHANICAL (GENERAL) RECOMMENDED, LOCAL EXHAUST IF NEEDED

Protective Gloves: IMPERVIOUS

Eye Protection: SAFETY/CHEM GOGGLES

Other Protective Equipment: FULL PROTECTIVE CLOTHING, SAFETY SHOWER, EYE WASH STATION

Work Hygienic Practices:

Supplemental Safety and Health Data: MSDS REVISED 11/83

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 82925  
Part No. Indicator: A  
Part Number/Trade Name: DRY CLEANING SOLVENT,F-D-680

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General Information

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Safety Data Action Code:  
Safety Focal Point: D  
Record No. for this Safety Entry: 012  
Total Safety Entries-This Stock No.: 013  
Status:  
Date MSDS Prepared: INTERIM  
Safety Data Review Date: 11APR87  
Supply Item Manager: CX  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: OCTAGON PROCESS INC.  
Manufacturer's Street: 596 RIVER ROAD  
Manufacturer's P.O. Box:  
Manufacturer's City: EDGEWATER  
Manufacturer's State: NJ  
Manufacturer's Country: US  
Manufacturer's Zip Code: 07020-1105  
Manufacturer's Emergency Telephone Number: 201-945-9400  
Manufacturer's Information Telephone Number: 201-945-9400  
MSDS Preparer's Name:  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1:  
Distributor/Vendor No. 1 CAGE:  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSM  
Specification Number: F-D-680  
Specification Type, Grade, Class:  
Hazard Characteristic Code: F4  
Unit Of Issue: DR  
~~Unit Of Issue Container Quantity: 55 GAL~~  
Type Of Container: DRUM  
Net Unit Weight: 362 LBS  
NRC/State License Number:  
Net Explosive Weight:

Net Propellant Weight-Ammo:  
Coast Guard Ammunition Code:

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Ingredients/Identity Information

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Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: WJ8925000  
CAS NO.: 8052-41-3  
Ingredient: STODDARD SOLVENT  
Percent: 100  
OSHA PEL: 100 PPM  
ACGIH TLV: 100 PPM; 8990  
Other Recommended Limit:

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Physical/Chemical Characteristics

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Appearance And Odor: LIGHT COLORED LIQUID W/CHARAC HYDROCARBON ODOR  
Boiling Point: 323F-390F  
Melting Point:  
Vapor Pressure (MM Hg/70 F): 5  
Vapor Density (Air=1): 4.8  
Specific Gravity: 0.786  
Decomposition Temperature:  
Evaporation Rate & Reference: 0.08(N-BUT ACET=1)  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: 100  
Viscosity: N/K  
pH:  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY):  
Autoignition Temperature: N/K

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Fire and Explosion Hazard Data

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Flash Point: 113F/45C/TCC  
Flash Point Method:  
Lower Explosive Limit: 1.0  
Upper Explosive Limit: 6.0  
Extinguishing Media: FOAM,CARBON DIOXIDE, DRY CHEM, WATER-FOG, STEAM  
Special Fire Fighting Procedures: DO NOT USE WATER. EXCLUDE AIR. CONSULT LOCAL  
FIRE MARSHALL  
Unusual Fire and Explosion Hazards: HANDLE AS A COMBUSTIBLE MATL.

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Reactivity Data

=====

Stability: YES  
Conditions To Avoid (Stability): HIGH IGNIT SOURCES, OPEN FLAME, SPARKS, ETC.

Materials To Avoid: STRONG OXIDIZING MATLS.  
Hazardous Decomposition Products: CARBON MONOXIDE & CARBON DIOXIDE  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization):

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Health Hazard Data

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LD50-LC50 - Mixture:  
Route Of Entry - Inhalation:  
Route Of Entry - Skin:  
Route Of Entry - Ingestion:  
Health Hazards - Acute And Chronic:  
Carcinogenity - NTP:  
Carcinogenity - IARC:  
Carcinogenity - OSHA:  
Explanation Of Carcinogenity:  
Signs and Symptoms Of Overexposure: ANESTHESIA, HEADACHE, NAUSEA, DIZZINESS, ETC.  
IRRITATING TO SKIN & EYES.  
Medical Conditions Aggravated By Exposure:  
Emergency And First Aid Procedures: INHAL-GET TO FRESH AIR. EYES-FLOOD  
W/WATER; SEEK MED ASSIST. SKIN-WASH W/MILD SOAP & WATER. INGEST-CALL DOC. REMOVE  
ALL CONTAM CLOTHING & WASH BEFORE REUSE.

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Precautions for Safe Handling and Use

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Steps if Material is Released or Spilled: FLUSH W/WATER INTO RETAINING AREA OR  
CONTAINER. AVOID SPARKS, FIRE OR HOT METAL. SML QTY MAY BE ABSORBED ONTO  
APPROPRIATE ABSORBENT.  
Neutralizing Agent:  
Waste Disposal Method: INCINERATE UNDER SAFE CONDITIONS OR DISPOSE OF IAW  
LOCAL, STATE & FED. REGS.  
Precautions to be Taken in Handling and Storing: STORE IN COOL PLACE AWAY FROM  
SOURCES OF IGNITION. USE ONLY W/ADEQUATE VENT. AVOID PROLONGED OR REPEATED  
BREATH OF VAPORS & CONTACT.  
Other Precautions: HANDLE AS A COMBUSTIBLE MATL.

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Control Measures

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Respiratory Protection: ABOVE TLV-USE CARTRIDGE RESPIRATOR OR GAS MASK.  
Ventilation: LOCAL EXH OR MECHAN W/APPRVD CLASS D EXPLOS-PROOF MOTOR, SWIT  
Protective Gloves: IMPERMEABLE  
Eye Protection: CHEM GOGGLES  
Other Protective Equipment: APRON, SKIN BARRIER CREAM  
Work Hygienic Practices:  
Supplemental Safety and Health Data: P-D-680, TYPE I. MSDS NOT DTD.

DoD Hazardous Materials Information System  
DoD 6050.5-L  
AS OF 1 Feb 91

FSC: 6850  
NIIN: 002858012 Manufacturer's CAGE: 94684  
Part No. Indicator: A  
Part Number/Trade Name: AMSCO SOLV 1005 \* REGULAR MINERAL SPIRITS

=====  
General Information  
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Safety Data Action Code:  
Safety Focal Point: D  
Record No. for this Safety Entry: 013  
Total Safety Entries-This Stock No.: 013  
Status:  
Date MSDS Prepared: 16JUN87  
Safety Data Review Date: 31AUG88  
Supply Item Manager: CX  
Item Name: DRY CLEANING SOLVENT  
Manufacturer's Name: UNOCAL CHEMICALS DIV., UNION OIL OF CALIFORNIA  
Manufacturer's Street: 1345 N MEACHAM  
Manufacturer's P.O. Box: N/K  
Manufacturer's City: SCHAUMBURG  
Manufacturer's State: IL  
Manufacturer's Country: US  
Manufacturer's Zip Code: 60196  
Manufacturer's Emergency Telephone Number: 312-490-2500  
Manufacturer's Information Telephone Number: 312-490-2500  
MSDS Preparer's Name: N/K  
Preparer's Company:  
Preparer's Street or P.O. Box:  
Preparer's City:  
Preparer's State:  
Preparer's Zip Code:  
Distributor/Vendor No. 1: Phipps Products Corp., Boston, MA 02111  
Distributor/Vendor No. 1 CAGE: 86511  
Distributor/Vendor No. 2:  
Distributor/Vendor No. 2 CAGE:  
Distributor/Vendor No. 3:  
Distributor/Vendor No. 3 CAGE:  
Distributor/Vendor No. 4:  
Distributor/Vendor No. 4 CAGE:  
Other MSDS Number:  
MSDS Serial Number: BDTSN  
Specification Number: F-D-680  
Specification Type, Grade, Class: TYPE I  
Hazard Characteristic Code: F4  
Unit Of Issue: DR  
Unit Of Issue Container Quantity: 55 GAL  
Type Of Container: DRUM  
Net Unit Weight: 55.0 GL  
NRC/State License Number: N/R  
Net Explosive Weight:

Net Propellant Weight-Ammo: N/R  
Coast Guard Ammunition Code:

=====  
Ingredients/Identity Information  
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Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 01  
NIOSH (RTECS) No.: 1003045AP  
CAS NO.: 64741-41-9  
Ingredient: PETROLEUM NAPHTHA (MINERAL SPIRITS) MFR IDENTIFIES PRODUCT AS THIS.  
ALSO LISTS INGREDIENT 02 WITHOUT PERCENTAGE.  
Percent: 100  
OSHA PEL: N/K  
ACGIH TLV: N/K  
Other Recommended Limit:

Proprietary: NO  
Ingredient Action Code:  
Ingredient Focal Point: D  
Ingredient Sequence No.: 02  
NIOSH (RTECS) No.: WJ8925000  
CAS NO.: 8052-41-3  
Ingredient: STODDARD SOLVENT  
Percent: N/K  
OSHA PEL: 100 PPM  
ACGIH TLV: 100 PPM; 8990  
Other Recommended Limit:

=====  
Physical/Chemical Characteristics  
=====

Appearance And Odor: CLEAR,ALMDSOT COLORLESS LIQUID,HYDROCARBON ODOR  
Boiling Point: 310-405F  
Melting Point: N/K  
Vapor Pressure (MM Hg/70 F): 3.1 MM@20C  
Vapor Density (Air=1): 4.9 (AIR)  
Specific Gravity: 0.788  
Decomposition Temperature: N/K  
Evaporation Rate & Reference: 0.12 (BUAC)  
Solubility In Water: NEGLIGIBLE  
Percent Volatiles By Volume: 100  
Viscosity:  
pH: N/K  
Radioactivity:  
Form (Radioactive Matl):  
Magnetism (milligauss):  
Corrosion Rate (IPY): N/K  
Autoignition Temperature:

=====  
Fire and Explosion Hazard Data  
=====

=====  
Flash Point: 101F/39C  
Flash Point Method: TCC  
Lower Explosive Limit: 0.7  
Upper Explosive Limit: 6.0  
Extinguishing Media: DRY CHEMICAL,CARBON DIOXIDE,FOAM  
Special Fire Fighting Procedures: WEAR SELF CONTAINED BREATHING APPARATUS. USE  
WATER TO COOL FIRE EXPOSED CONTAINERS. BEWARE OF SPREADING BURNING LIQUID WITH  
THE COOLING WATER.  
Unusual Fire and Explosion Hazards: NONE  
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Reactivity Data

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Stability: YES  
Conditions To Avoid (Stability): HEAT,IGNITION SOURCES  
Materials To Avoid: STRONG ACIDS,STRONG BASES,OXIDIZING AGENTS,SELECTED AMINES  
Hazardous Decomposition Products: NORMAL PRODUCTS OF COMBUSTION  
Hazardous Polymerization Occur: NO  
Conditions To Avoid (Polymerization): NONE SPECIFIED BY THE MFR.  
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Health Hazard Data

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LD50-LC50 - Mixture: N/K  
Route Of Entry - Inhalation: YES  
Route Of Entry - Skin: YES  
Route Of Entry - Ingestion: YES  
Health Hazards - Acute And Chronic: PRODUCT IS IRRITATING TO EYES AND MUCCUS  
MEMBRANES. PROLONGED-REPEATED EXPOSURE MAY LEAD TO PAINTER'S SYNDROME.  
DELIBERATELY CONCENTRATING AND INHALING THIS PRODUCT MAY BE HARMFUL OR FATAL.  
Carcinogenity - NTP: NO  
Carcinogenity - IARC: NO  
Carcinogenity - OSHA: NO  
Explanation Of Carcinogenity: N/R  
Signs and Symptoms Of Overexposure: EYE:IRRITATION,BURNING,TEARING.  
SKIN:PROLONGED EXPOSURE CAUSES DRYING,CRACKING. INHALED:RESPIRATORY IRRITATION,  
CENTRAL NERVOUS SYSTEM DEPRESSION,DROWSINESS,DIZZINESS,LOSS OF CO-ORDINATION,  
FATIGUE. INGESTED:G/I IRRITATION,CENTRAL NERVOUS SYSTEM DEPRESSION,DROWSINESS,  
DIZZINESS,ETC.  
Medical Conditions Aggrevated By Exposure: ASTHMA & SIMILAR RESPIRATORY  
DISEASES.  
Emergency And First Aid Procedures: EYE/SKIN:FLUSH WITH WATER. IF IRRITATION  
PERSISTS,CALL A PHYSICIAN. INHALED:REMOVE FROM EXPOSURE. IF BREATHING  
DIFFICULTY,GIVE OXYGEN AND GET MEDICAL ATTENTION. INGESTED:DO NOT INDUCE  
VOMITING. GET IMMEDIATE MEDICAL ATTENTION.  
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Precautions for Safe Handling and Use

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Steps if Material is Released or Spilled: ELIMINATE SOURCES OF IGNITION AND  
VENTILATE AREA. KEEP OUT OF DRAINS,SEWERS OR WATERWAYS. ABSORB ON INERT  
MATERIAL. STORE IN TIGHTLY CLOSED CONTAINERS PENDING DISPOSAL.

Neutralizing Agent: NONE  
Waste Disposal Method: DISPOSE I/A/W FEDERAL,STATE,LOCAL REGULATIONS. HMIS  
SUGGESTS INCINERATION.  
Precautions to be Taken in Handling and Storing: STORE TIGHTLY CLOSED IN A

COOL, DRY, WELL VENTILATED AREA, FREE FROM IGNITION SOURCES. DO NOT CUT, WELD, GRIND, ETC., ON CONTAINERS.

Other Precautions: EMPTY CONTAINERS MAY CONTAIN RESIDUE OR VAPORS. EXPLOSION HAZARD. TREAT WITH DUE RESPECT.

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Control Measures  
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Respiratory Protection: USE NIOSH RESPIRATOR FOR ORGANIC VAPORS OR SUPPLIED AIR RESPIRATOR IF EXPOSED OVER TLV.

Ventilation: USE LOCAL EXHAUST TO MAINTAIN EXPOSURES BELOW TLV.

Protective Gloves: IMPERMEABLE

Eye Protection: SAFETY GLASSES OR SPLASH GOGGLES

Other Protective Equipment: SAFETY SHOWER/EYE WASH. IMPERVIOUS CLOTHING IS RECOMMENDED FOR OPERATIONS WHERE SPLASHING AND CONTACT ARE ROUTINE.

Work Hygienic Practices: USE NORMAL CHEMICAL HYGIENE PRACTICE.

Supplemental Safety and Health Data: DATE OF ISSUE OF MSDS: 6/16/87; PRODUCT CODE #11005; MSDS RECEIVED; MAY 6, 1988.