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FINAL REMEDIAL INVESTIGATION REPORT PHASE 1 FOR SITE 1, SITE 3, SITE 4, SITE 5, SITE 7, SITE 8, SITE 9 AND SITE 10 NAS KEY WEST FL

5/1/1991

IT CORPORATION

0011

FINAL REPORT

REMEDIAL INVESTIGATION - PHASE I
FOR SITES 1, 3, 4, 5, 7, 8, 9, AND 10

NAVAL AIR STATION - KEY WEST
KEY WEST, FLORIDA
CONTRACT NO. N62467-88-C-0196
MAY, 1991

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The Final Report of the Remedial Investigation Phase I Report summarizes the methods used to analyze the sites, the conclusions derived from the investigation and the recommendations for further investigations at sites 1, 3, 4, 5, 7, 8, 9, and 10 of the Naval Air Station at Key West, Florida.

The information derived from the investigation provides qualitative and quantitative concentrations of contaminants in various media within and in the vicinity of the potential sources at each site. The quantitative results were compared to established Concentration Standards for Comparison (CSC). The qualitative and quantitative data were used to prepare a preliminary hazard assessment. Based on this assessment, IT Corporation presents recommendations for appropriate further action on the sites in question.

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The recommendations for further action are outlined as follows:

Site 1 - Due to elevated levels of metals confirmed at the site, further sampling to determine the extent of the migration is recommended along with a background sampling program to establish background standards.

Site 3 - Due to the presence of various pesticide compounds at the site, further investigation is necessary to determine if additional action is required based on the Feasibility Study data.

Site 4 - Elevated levels of metals were detected in the groundwater at the site. An additional monitoring well and further sampling to determine the extent of the contamination are recommended along with a background sampling program to establish background standards.

Site 5 - The site has been confirmed by IT Corporation to be impacted with respect to pesticides and certain volatile substances. Eventual remedial action will be required. Restricted access, a Baseline Risk Assessment, and Feasibility Study are recommended.

Site 7 - IT considers the groundwater to be impacted with respect to metals at this site. Additional sampling and analysis are required to determine the extent of the contamination migration along with a background sampling program which should supply information to support a No Further Action recommendation.

Site 8 - Elevated levels of metals were detected at this site. Further sampling and analysis is recommended to aid in determining the extent of the migration along with a background sampling program which should supply information to support a No Further Action recommendation.

Site 9 - Due to excessively contaminated soils present at the water table and throughout the vadose zone, IT considers the soil at this site to be impacted with respect to volatile organics. A Remedial Action Plan, including treatment of all excessively contaminated soils to the top of the water table, in addition to a groundwater sampling/treatment method to monitor and clean-up the free product plume, is recommended.

Site 10 - Elevated levels of metals and volatile organics were detected at this site. Migration of the contaminants however, was not evident. Further sampling and analysis is recommended to determine the potential for migration along with a background sampling program to establish background standards.

REMEDIAL INVESTIGATION-PHASE I REPORT
NAVAL AIR STATION
KEY WEST, FLORIDA

PREPARED FOR

SOUTHERN DIVISION

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Table of Contents

Table of Contents *(Continued)*

Page

Table of Contents *(Continued)*

Table of Contents *(Continued)*

Table of Contents *(Continued)*

List of Tables

List of Tables *(Continued)*

List of Tables *(Continued)*

List of Tables *(Continued)*

List of Tables *(Continued)*

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List of Figures

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1.0 Introduction

A Remedial Investigation-Phase I (RI-Phase I) has been performed by IT Corporation (IT) at the Naval Air Station (NAS), Key West. The introduction presents the objectives of the RI-Phase I, a brief summary of the Scope of Work, a description of the sites, and the Report Format.

The objectives of the RI-Phase I were:

- To conduct an investigation of potential contamination sources at Sites 1, 3, 4, 5, 7, 8, 9 and 10 at NAS-Key West
- To obtain quantitative data on concentrations of contaminants within and in the vicinity of the potential sources at all sites
- To confirm the presence or absence of contamination at each of the sites and, where possible, the direction of migration of contaminants based on the properties of the contaminant, the environmental setting and the hydrogeology of the site
- To assess the risk to the environment and to human health that may be caused by contaminant migration at each site
- To determine whether remedial actions (RA) are required

IT's approach was to conduct only that field work required to determine whether a site (A) can be dropped from further consideration, (B) requires further investigation, or (C) requires remedial action (RA).

This RI-Phase I report summarizes the investigations performed and conclusions made in relation to the objectives of the study.

1.1 Scope of Work

A Work Plan (WP) was developed for each of the eight sites at NAS-Key West. The methods of investigation to be implemented at each site were defined in Section 3.1 of the approved WP (dated February 1990). The specific field activities for the characterization of each site are described in Sections 3.2 through 3.9 of the WP. Site characterization involves the collection and analysis of data needed to develop a basic understanding about the waste sources and routes of contaminant migration leading to an assessment of the potential risk a site may have on the environment and human health. The development of field investigative methods was based on a review of existing reports and records from previous investigations. Through the scoping process, the RI-Phase I objectives were established to characterize the sites in order to confirm the presence or absence of contamination at each site.

The methods of investigation implemented to characterize the sites were:

- Historical Aerial Photograph Review
- Utility Survey
- Air Monitoring Survey
- Waste Characterization
- Soils Investigation
- Hydrogeologic Investigation
- Surface Water and Sediment Investigation
- Sample Collection/Analyses
- Topographic Survey

The information derived from the investigations provided qualitative and quantitative data on types and concentrations of contaminants in various media within and in the vicinity of the potential sources at each site. The quantitative data was compared to established Concentrations Standards for Comparison (CSC). The comparison confirmed the presence or absence of contamination at each of the sites.

Qualitative data describing the physical characteristics of the sites were also compiled and used in the assessment of the hydrogeologic setting. Finally, all information/data was used for the preliminary hazard assessment. A preliminary hazard assessment was performed to determine whether there exist immediate impacts to either human health or the environment. This assessment is a qualitative study.

1.2 Site Descriptions

Key West is located approximately 150 miles southwest of Miami on the last major island of the Florida Keys. Key West is connected to the mainland by the Overseas Highway (U.S. Highway No. 1). The location of NAS-Key West sites in relation to one another are shown on Figure 1-1. The site locations and descriptions are presented in the following paragraphs.

1.2.1 Site 1 - Truman Annex Refuse Disposal Area

The Truman Annex Refuse Disposal Area is located along the southern shore of Truman Annex on Key West (Figure 1-1). The site is reported to cover an area of approximately seven acres, including the antenna field and the area to the immediate north.

The subsurface at this site reportedly consists of landfill material in a shallow fill area with the landfill extending beyond the natural shoreline. Previous investigations have reported that groundwater in the area is approximately 2 to 3 feet below land surface and flow is in a southerly direction towards the Atlantic Ocean.

From 1952 until the mid-1960's, 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 of at the site. It is believed that in addition to general refuse, waste paint, thinners and solvents were also sent here for disposal.

1.2.2 Site 3 - Truman Annex DDT Mixing Area

The Truman Annex DDT Mixing Area (Figure 1-1) is located at the former site of Building 265, which has been demolished. The site covers an area of about 0.25 acre and is located about 1,100 feet inland from the coastline. The site has no surface water features present.

From the 1940's to the early 1970's, 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 transferred to trucks for dispersal.

1.2.3 Site 4 - Boca Chica Open Disposal Area

The Boca Chica Open Disposal Area is located in the southeastern part of Boca Chica Key (Figure 1-1), between the Perimeter Road and Geiger Creek. The site was operated as an open disposal and burn area from 1942, when the NAS was first established on Boca Chica, until the area was closed in the mid-1960's. The site received general refuse and waste associated with the operation and maintenance of aircraft. These wastes might have included waste oils, hydraulic fluids, paint thinners and solvents.

About 2,600 tons of waste from the NAS were reportedly disposed of and burned at this site annually. Whenever possible, this burn area was cleared of any remaining debris left over from the burning process and the debris was deposited in an area of unknown dimensions to the north of the burn area. Because the burning operation was not a controlled process, all wastes may not have been completely destroyed.

The open disposal area consists of two areas, one is the burn area and the other is a debris area. The burn area is presently clear of any debris with the exception of four abandoned above-ground tanks and a scrap iron rod pile located in the northwest portion. Around one tank, the sides, foundations, and ground are covered with an unknown black asphalt-like substance. The remaining three tanks are clustered together next to a scrap iron rod pile. Much of the southern portion of the burn area is subject to tidal inundation.

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

1.2.4 Site 5 - Boca Chica DDT Mixing Area

The Boca Chica DDT Mixing Area is located next to a man-made drainage ditch, that is connected to a large borrow pit, along the west side of Runway 13 (Figure 1-1). DDT mixing operations were conducted at this site in Building 915 (demolished in 1982) from the 1940's to the early 1970's. 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.

It has been verbally reported that pesticides were mixed with waste fuel oil. Mixing with fuel oil allowed the pesticide to remain floating on the surface of any standing water in order to destroy insect larvae.

A slight odor of pesticide was detected at the site during the on-site survey. A man-made drainage ditch is located just south of the site. Drainage from the ditch is towards a large borrow pit to the east of the site. The area near the former building is partly covered with sparse grass, while the ditch has medium sized mangroves around the banks.

1.2.5 Site 7 - Fleming Key North Landfill

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

In 1977, a building housing the U.S. Department of Agriculture Animal Import Center was constructed over a portion of the landfill. During the construction, wastes were excavated and transferred to an area immediately to the west.

Groundwater in the area is approximately 3 to 4 feet below the surface over much of the site and it is reported that saline groundwater was encountered during trenching.

1.2.6 Site 8 - Fleming Key South Landfill

The Fleming Key South Landfill covers approximately 45 acres on the southern end of Fleming Key (Figure 1-1). Reportedly, as much as 8,000 tons of unknown wastes were disposed of annually at the landfill between 1962 and 1982. Since 1966, the waste disposal activities of the City of Key West had been combined with those of the Navy at this site.

The open-trench disposal method was practiced at this site, with the trench constructed in a manner similar to those at the Fleming Key North Landfill. Reportedly, the trenches were partially filled with sea water when the wastes were deposited. Wet garbage was reportedly placed directly into the trenches and combustible wastes were taken to the western portion of the site and burned. The ashes and unburned wastes were then deposited into an area in the western portion of the site.

1.2.7 Site 9 - Trumbo Point Annex Fuel Farm and Piers

The Trumbo Point Annex Fuel Farm and Piers is located east of the piers at the Trumbo Point Annex (Figure 1-1). The Annex was constructed in 1918 using dredged materials, for use as a seaplane base. Since 1942 the Annex has been used as a fuel storage and distribution point. Fuel is received at this facility from tankers and then distributed by underground transmission lines to either Truman Annex or NAS-Boca Chica. Fuels that have been stored at the site include No. 6 fuel oil, Bunker C oil, diesel, aviation gasoline, JP-4 and JP-5.

1.2.8 Site 10 - Boca Chica Fire Fighting Training Area

The Fire Fighting Training Area is located immediately west of the southern blimp pad (Figure 1-1). This area 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 used about 5 to 10 times per year for training sessions during which flammable liquids (JP-5, waste oils, or hydraulic fluids) are poured onto mock airplanes within the pit and ignited.

1.3 Report Format

The RI-Phase I Report contains the following sections:

- 2.0 Field Investigations
- 3.0 Findings/Data Summary
- 4.0 Preliminary Hazard Assessment
- 5.0 Conclusions/Recommendations
- Appendices

Section 2.0, Field Investigations, describes the method of investigation for each site. An overview of each method is presented followed by a detailed description of the field activities performed at each site.

Section 3.0, Findings/Data Summary, presents the results of the field investigations and summarizes the analytical results for those contaminants detected above the Concentration Standards for Comparison (CSC) for each site. IT chose these ultra conservative standards against which to compare the actual sampling results for the purpose of deciding impact to the various media. The CSCs are based on Florida Administrative Codes (FAC) 17-550.310-320 Groundwater Guidance Concentrations and Corrective Action Limits (CALs) as per proposed rule for Recovery Conservation Remedial Action (RCRA) corrective action limits for solid waste management units at hazardous waste management facilities, Subpart S. The sampling results include air transect, soils, hydrogeological, and surface water and sediment data. Also included are data associated with the method blanks, surrogate spikes, and matrix spike analyses.

Section 4.0, Preliminary Hazard Assessment determines whether there are any immediate impacts to human health or the environment at each site.

Section 5.0, Conclusions/Recommendations, presents conclusions and recommendations for each site based on the findings.

The following appendices included are:

- Appendix A - Field Activity Daily Logs
- Appendix B - Tailgate Safety Meeting Logs
- Appendix C - Equipment Calibration Logs
- Appendix D - Test Pit Logs
- Appendix E - Visual Classification of Soils and Well Installation Reports
- Appendix F - Sample Collection Logs/Chain of Custody/Request for Analysis Forms
- Appendix G - Certificates of Analysis

2.0 Field Investigations

This section presents the field activities associated with site characterization. The section begins with a general description of the Methods of Investigation that IT implemented, as described in the Work Plan followed by site specific activities. For each site the method of investigation is listed and specific field investigation details are presented. Documentation of field activities performed are contained in the following appendices:

- Appendix A - Field Activity Daily Logs
- Appendix B - Tailgate Safety Meeting Logs
- Appendix C - Equipment Calibration Logs

During some field activities, conditions were encountered that altered the proposed scope of work. These variances are documented and include a description of the alternative procedures implemented.

2.1 Methods of Investigation

Field investigation methods used in this study were selected to meet the data needs and project objectives established in Section 1.0. This subsection provides an overview of the investigative methods used in obtaining data to meet the objectives. These investigative methods are:

- Historical Aerial Photograph Review
- Utility Survey
- Air Monitoring Survey
- Waste Characterization
- Soils Investigation
- Hydrogeologic Investigation
- Surface Water and Sediment Investigation
- Sample Collection/Analysis
- Topographic Survey

Each investigative procedure is addressed below.

2.1.1 Aerial Photographs Review

IT researched the NAS facility files and Key West's Public Library for historical aerial photographs of the subject sites. The review of historical aerial photographs was performed to help identify waste disposal boundaries at the disposal areas at Truman Annex and Boca Chica and the north and south landfills on Fleming Key. Due to the limited number and poor quality of historical photographs (i.e., poor resolution and poor angle of the photograph) useful information was not obtained.

2.1.2 Utility Survey

In accordance with the Work Plan, NAS-Key West personnel identified the locations of utilities at each site prior to any subsurface work (i.e., excavations or borings). Alternative work areas (boring test pit, etc.) were selected where the survey indicated the presence of utilities. IT received authorization for excavation from NAS-Key West personnel prior to commencement of excavation activities.

2.1.3 Air Monitoring Survey

In accordance with the Work Plan, an air monitoring survey was conducted at Sites 1, 4, 7, 8, and 10 prior to any other field activity. The purpose of the air monitoring survey was to identify any fugitive emissions of volatile organic compounds (VOC) released directly into the atmosphere. This information was necessary to assess the potential for atmosphere contamination, personnel protection and for the presence of volatile chemicals.

The air monitoring survey at each site consisted of one or more transects of continuous air monitoring using an organic vapor analyzer (OVA) equipped with a flame ionization detector (FID). As the operator traversed the site,the OVA was held at arms length (approximately 3-4 feet above the ground). In addition, during all drilling activities and excavation of the test pits, ambient air conditions were monitored as described in Section 6.0 of the Health and Safety Plan (HSP).

Local meteorological data were compiled, including the development of a windrose for each month from January through August 1990 through a review of existing meteorological records kept at NAS-Key West.

2.1.4 Waste Characterization

In accordance with the Work Plan, test pits were installed in specified locations at Sites 1, 7 and 8 to visually characterize the buried waste substances and materials disposed at these NAS-Key West disposal sites. An estimate of each waste type encountered and the approximate waste areal extent were compiled for the specified sites. Test pit excavation details are presented in Section 5.1 of the Field Sampling Plan (FSP).

The test pits were excavated using a back-hoe and a track-hoe. During the excavation process the waste material exposed in the pit/trench was visually examined and the contents were identified and listed. At the completion of the excavation operation, the waste material was backfilled into the excavation and leveled to the existing grade. Test pit logs are provided in Appendix D.

As described in the Work Plan, if either of the following conditions were encountered the pit was to be terminated:

- The excavation encountered the water table
- The equipment met with refusal

Samples of the waste materials were not collected as part of this study.

2.1.5 Soils Investigation

This investigation included sampling and analysis of both the surficial soil and soil underlying the waste. Soil sampling and boring techniques are described in Section 5.1 of the FSP. All surface and subsurface sampling equipment was decontaminated upon arrival at the site and between sample collection as detailed in Section 5.6 of the FSP. Activities to assess contamination in surficial soils included the collection of soil samples using a stainless steel trowel, hand auger or split spoon sampler. Surficial soil samples were obtained at Sites 3, 4, and 5. Sample collection logs are included in Appendix F.

To confirm the chemical characteristics of the soil underlying the waste units, a soil-boring program was implemented. Soil samples were collected at the waste/soil contact using a decontaminated split-spoon sampler. A lithologic log was prepared for each borehole by visually classifying split spoons (Appendix E). Selected split spoon soil samples were submitted for laboratory analyses for chemical characterization.

2.1.6 Hydrogeologic Investigation

The hydrogeologic investigation entailed three distinct phases. The first phase included determining well depths, purging/developing, and assessing the integrity of the existing wells. The decision to sample the existing wells was made in the field, based on the results of the first phase of work. The criterion for sampling the existing wells was that the wells must produce a sand free discharge and be within 0.5 foot of their reported installed depth. The exact number of existing wells that were sampled are identified in Sections 2.2 to 2.9 of this report. The second phase included the installation of temporary groundwater monitoring wells using hollow stem augers. Split-spoon samples were collected for logging purposes and, as specified by the Work Plan, laboratory analysis. The third phase consisted of groundwater sampling of all new and existing monitoring wells at each site. Groundwater samples were submitted to the laboratory for chemical analyses to assess groundwater quality impacts. Groundwater sampling techniques are described in Section 5.2 of the FSP. Sample Collection Logs are provided in Appendix F.

The monitoring wells were constructed of 2 inch diameter PVC casing and slot screen which were enveloped by a sand pack that was overlain by a bentonite seal and finished to the surface with neat cement grout. All monitoring wells have locking protective steel casings. Monitoring well construction details of the new wells installed at each site are presented in Appendix E. Groundwater levels were measured in selected monitoring wells and groundwater elevation maps were prepared for each site.

Recorder wells of 6 inch diameter were installed at Sites 1, 4, 7, 8, and 10 to assess the effects of tides on the groundwater flow system at each site. The water levels in these wells were monitored every 1/2 hour for 30 days. A recorder well which should have been installed at Site 9 was inadvertently installed at Site 10. However, existing Monitoring Well KWM-25 was used to monitor groundwater levels at Site 9 to assess tidal effects.

IT has installed protective steel posts around ten (10) wells that did not meet the 3 foot stick-up criteria and which could be possibly damaged by vehicular traffic. The steel posts are 6 feet in length, 2 inches in diameter and are set approximately 3 feet below grade in a borehole dug using a post hole digger. The borehole annulus and steel post were backfilled with Redi-mix concrete.

2.1.7 Surface Water and Sediment Investigation

As described in the Work Plan, surface water and sediment sampling was implemented at Sites 4, 5, 7, and 8. The remaining sites were not sampled due to the lack of permanent, intermittent or ephemeral streams or ponds. Surface water and sediment sampling procedures are described in Sections 5.1.2 and 5.3 of the FSP. Sample Collection Logs are included in Appendix F.

Sea water samples were not collected as part of this investigation because of the turbulent nature of the shoreline environment. Concentrations of contaminants leaching into the beach and surf zone would be quickly diluted and go undetected by chemical analysis. Contaminants are more likely to adsorb onto sediments where sites are along the shore line. Accordingly, sediments samples were collected at Sites 1, 7, and 8.

2.1.8 Sample Analysis

All samples collected for laboratory analyses were submitted to ITAS Services Analytical (ITAS) laboratory in Knoxville, Tennessee. This laboratory is approved by the Naval Energy and Environmental Support Activity (NEESA) and also has an approved Generic Quality Assurance Plan on file with the Florida Department of Environmental Regulation (FDER) for work on petroleum contaminated sites such as Site 9. All analytical methods were in conformance with applicable federal and state procedures. In addition, the laboratory has performed the analyses using United States Environmental Protection Agency (USEPA) approved methods in accordance with NEESA Level C Quality Control as specified in the Scope of Work. Certificates of Analysis are included in Appendix G.

Groundwater, soils, surface water and sediment samples (except where noted) were analyzed for the Target Compound List (TCL) and Target Analyte List (TAL) by Contract Laboratory Protocols (CLP) methods. The

TCL and TAL constituents were used as criteria to determine if a release had occurred and to assess the need for remedial action.

Soil samples collected at Sites 1, 4, 7, 8, and 9 were analyzed by Extraction Procedures (EP) Toxicity for the eight drinking water metals. This analysis identified the hazardous or non-hazardous nature of the soils underlying the waste units.

In accordance with the Work Plan, one sample per media, from Site 4, the Boca Chica Open Disposal Area, Site 10, and the Boca Chica Fire Fighting Training Area, were analyzed for the Appendix IX parameters by CLP requirements.

ITAS did encounter analytical problems with some of the samples. Specifically, the extremely high salt content of the groundwater samples was destroying graphite tubes used to analyze the samples for metals. IT requested a variance to the analysis of metals by Inductively Coupled Plasma Spectroscopy (ICAP) method rather than by the graphite furnace atomic absorption spectroscopy method. The Southern Division Naval Facilities Engineering Command (SouthDiv) granted the variance and the ICP method was used for sample analysis.

IT also reported a laboratory instrument failure used for the analysis of total organic carbon (TOC). As a result of this instrument failure, five of the eight soil samples collected for TOC analysis exceeded their holding times and were not analyzed. IT informed SouthDiv of this situation and received approval to obtain additional soil samples at shallow depths (i.e., within 3 to 5 feet of the surface) by an alternative collection method. The samples were collected and submitted for analysis.

2.1.9 Site Survey

A field survey was performed to establish the horizontal locations and elevations of existing and new monitoring wells. Horizontal locations were also obtained for test pits and soil borings, sediment sampling sites and other pertinent features at each site.

From this field survey, a base map was prepared for each site to show pertinent site features with all elevations referenced to mean sea level (MSL).

2.2 Field Activities at Sites 1, 3, 4, 5, 7, 8, 9, and 10

The following discussion describes the specific field activities performed under each investigation method for each site.

2.2.1 Site 1 - Truman Annex Refuse Disposal Area

- Air Monitoring Survey: One air quality survey was conducted along the transect shown in Figure 2-1. The operator continuously monitored the air quality along the transect using an OVA equipped with a flame ionization detector.

- Waste Characterization: Because of the uncontrolled disposal of refuse at this site, waste types and distribution patterns were investigated by the installation of seven test pits (T1 through T7). The locations of these pits are shown in Figure 2-1. A description of the materials encountered is provided in the Test Pit Logs contained in Appendix D.

  Several test pits were terminated prior to the 8 foot maximum depth due to the equipment meeting with refusal or due to contact with the water table. Test Pit T-1 was terminated at 5 feet due to refusal; Test Pits T-3, T-5, T-6, and T-7 were terminated, between 5 and 6 feet, at the water table.

- Soil Investigation: Three exploratory borings (subsequently converted into Monitoring Wells MW1-1, MW1-2 and MW1-3) were installed at the locations shown in Figure 2-1. A lithologic log was prepared for each soil boring and is included in Appendix E. Samples from each boring were continuously collected using split spoons and field screened with an OVA. The borings were terminated between 14 and 18 feet.

- Soil samples for chemical analysis were collected from each boring at the depth the on-site geologist identified as the base of the landfill. This decision was based on OVA readings of split spoons and soil texture changes between the landfill material and the underlying native material. The depth interval of each soil sample is noted on the respective log (Appendix E). Three soil samples were collected at the soil/waste interface and were analyzed for metals by EP Toxicity. One soil sample collected during the installation of MW1-2 was analyzed for the following geotechnical parameters:

  - Total Organic Carbon (TOC)
  - Grain size, Ion Exchange, pH, Density, Moisture, Permeability

- Hydrogeologic Investigation: The three exploratory soil borings were completed as temporary monitoring wells at the locations shown in Figure 2-1. The wells were screened over a 12.5 foot interval so as to intercept the water table. Well construction details and sketches are provided with the lithologic logs in Appendix E. A recorder well was also installed (Figure 2-1) to allow continuous groundwater level measurements for one month to assess the influence of the tides on the site groundwater flow system.

  Groundwater samples were collected from each of the seven on-site monitoring wells (3 new and 4 existing). These samples were analyzed for the following parameters:

  - TAL Volatile Organic Analysis (VOA)
  - TCL Semi-Volatile Organic Analysis (Semi-VOA)
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL Cyanide (CN)

  Groundwater levels were measured at each of the wells on July 17, 1990. Table 2-1 lists the measured groundwater levels and the calculated groundwater elevations at the wells.

- Surface Water and Sediment Investigation: Three sediment samples (S-1, S-2 and S-3) were collected from the rip rap along the shore line at the locations shown in Figure 2-1. These samples were analyzed for the following parameters:

  - TAL VOA
  - TCL Semi-VOA
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

2.3 Site 3 - Truman Annex DDT Mixing Area

- Air Monitoring Survey: An air monitoring survey was not conducted at this site because the nature of contamination is related to the pesticide DDT. Because the pesticide DDT is not volatile, it cannot be measured by an OVA.

- Waste Characterization: Based on available information, this site has not been used for waste disposal and has only been impacted by pesticide handling during this operation. As such, the waste characterization program at this site was conducted in accordance with the Work Plan as part of the soil and hydrogeologic investigations.

- Soil Investigation: The site was divided into six separate sections (Figure 2-2). These sections correspond to and overlap the original plots designated in the report prepared by Geraghty and Miller (March 1987); the IT plots are however, of larger areal extent. Ten surficial soil samples were collected from the upper 0.5 feet within each of these plots and composited. A total of six composite surficial soil samples (one per plot) were submitted for laboratory analysis for the following parameters:

  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

  In order to avoid volatilization through the compositing process, a discrete soil sample was collected near the center of each plot and analyzed for:

  - TAL VOA
  - TCL Semi-VOA

  One soil sample was analyzed for:

  - Total Organic Carbon
  - Grain size, Ion Exchange, pH, Density, Moisture, Permeability

  The initial sample to be analyzed for total organic carbon (TOC) was sent to the laboratory; however, because of instrument failure, the TOC sample exceeded the holding time and was not analyzed. Following approval by the SouthDiv, the sample was re-collected at Site 3 Plot No. 4 and analyzed.

  Three soil borings (subsequently converted into monitoring wells MW3-1, MW3-2, and MW3-3) were installed at the locations shown in Figure 2-2. Soil samples were continuously collected using split spoons and field screened with an OVA. The borings were terminated at an average depth of 10 feet. All boreholes were logged for lithologic purposes. Visual classifications forms for the soil borings are provided in Appendix E.

  Two of the boreholes (MW3-1 and MW3-2) were specifically installed in Plot No. 4 and Plot No. 2, respectively, in order to collect soil samples at the water table. The location of these boreholes corresponds approximately to the same locations shown in the Geraghty and Miller plots that contained elevated levels of pesticides. The two soil samples were analyzed for the following parameters:

  - TAL VOA
  - TCL Semi-VOA

- TCL Pesticides/PCBs
- TCL Metals
- TCL CN

- Hydrogeologic Investigation: The three soil borings were completed as temporary monitoring wells (MW3-1, MW3-2, and MW3-3) at the locations shown in Figure 2-2. The wells were screened over a 5 foot interval from a depth interval of 5 to 10 feet. Well construction details and sketches are provided with the lithologic logs in Appendix E.

  Groundwater samples were collected from each of the three new monitoring wells. These samples were analyzed for the following parameters:

  - TAL VOA
  - TCL SEMI-VOA
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

  Groundwater levels were measured at each of the wells on July 9, 1990. Table 2-2 provides the measured groundwater levels and the calculated groundwater elevations at the wells.

  The placement of Monitoring Well MW3-2, located within Plot No. 2 of the site grid, was not installed according to the original location marked on the site plan. A layer of concrete was found to exist approximately 1 foot below ground. The boring (monitoring well) was relocated 5 feet to the east of its original location and completed.

  The location of Monitoring Well MW3-3 was moved south approximately 5 feet due to overhead power lines above the proposed site.

- Surface Water and Sediment Investigation: No surface water features are present at the site. Accordingly, no surface water and/or sediment samples were collected.

2.4 Site 4 - Boca Chica Open Disposal Area

- Air Monitoring Survey: An air quality survey was conducted along one transect shown in Figure 2-3. The operator continuously monitored the air quality along the transect using an OVA equipped with a flame ionization detector. The operator also noted the location of any waste debris along the transect.

- Waste Characterization: The presence of mangrove trees within the debris area prohibited the installation of trenches and test pits to uncover the type of residual wastes. Mangroves are a salt water species indicative of wetland conditions, and, therefore protected from excessive disturbance (i.e., clear cutting of trees) by the state and federal wetlands regulations. Furthermore, the character of the burn area does not suggest the presence of buried material or debris. Therefore, test pits were not installed in either area.

  The chosen method of waste characterization at this site was by visual observation of surface debris along the air monitoring transect.

- Soil Investigation: Five exploratory soil borings (subsequently converted into monitoring wells MW4-1 through MW4-5) were installed in the debris area at the locations shown in Figure 2-3. In each boring, soil samples were continuously collected using split spoons and field screened with an OVA. The borings were terminated at an average depth of 10 feet. A lithologic log was prepared for each soil boring and is included in Appendix E.

Soil samples were collected from each boring at the base of the waste material. This decision was based on OVA readings of split spoons and the transition of the material from the waste to soil. The depth interval of soil samples is noted on the log (Appendix E). The five soil samples collected from the borings were analyzed for metals by EP Toxicity. A sample from Boring B-1 was analyzed for the following parameters:

- Total Organic Carbon
- Grain Size, Ion Exchange, pH, Density, Moisture, Permeability

One split spoon from the boring converted into monitoring well MW4-5 was analyzed for the Appendix IX parameter list. Five surface soil samples were collected from the upper 0.5 feet within the burn area in order to evaluate the burn area as the source of contaminants. These locations are presented on Figure 2-3. Four of the five surface soil samples (B-1, B-2, B-3, B-4) were analyzed for the following:

- TAL VOA
- TCL Semi-VOA
- TCL Pesticides/PCBs
- TCL Metals
- TCL CN

The fifth soil sample (from Boring B-5) was analyzed for the Appendix IX parameter list.

- Hydrogeologic Investigation: The five exploratory soil borings were completed as temporary monitoring wells (MW4-1 through MW4-5) at the locations shown in Figure 2-3. The wells were screened over a 10 to 15 foot interval. Well construction details and sketches are provided with the lithologic logs in Appendix E. A recorder well was also installed (Figure 2-3) to allow continuous groundwater level measurements for one month to assess the influence of tides on the site groundwater flow system.

A groundwater sample was collected from each of the nine monitoring wells (5 new and 4 existing). Eight of the nine samples were analyzed for the following parameters:

- TAL VOA
- TCL Semi-VOA
- TCL Pesticides/PCBs
- TCL Metals
- TCL CN

One groundwater sample (Monitoring Well MW4-4) was analyzed for the Appendix IX parameter list.

Groundwater levels were measured at each of the wells. Table 2-3 lists the measured groundwater levels and the calculated groundwater elevations at the wells.

Protective steel posts were installed around Monitoring Wells MW4-1 and MW4-2. It was necessary to add a coupling with a PVC extension to reach the satisfactory height.

- Surface Water and Sediment Investigation: Two surface water and two sediment samples were collected at the locations shown in Figure 2-3. These samples were collected in an area inundated with surface water near the waste mounds located at the edge of the debris area. One sample of surface water and both samples of sediments were analyzed for the following parameters:

  - TAL VOA
  - TCL Semi-VOA
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

  One surface water sample (S-1) was analyzed for the Appendix IX parameter list.

2.5 Site 5 - Boca Chica DDT Mixing Area

- Air Monitoring Survey: Because the pesticide DDT is not volatile and cannot be measured by an OVA, an air monitoring survey was not conducted.

- Waste Characterization: Based on available information, this site has not been used for waste disposal and has been impacted only by pesticides during its operation. As such, the waste characterization program at the Boca Chica DDT Mixing Area was conducted as part of the soil and hydrogeologic investigations.

- Soil Investigation: The site was divided into six separate sections. These sections correspond to and overlap the original Geraghty and Miller plots presented in the (March 1987) report; however, the sections are of larger areal extent. Ten surficial soil samples were collected from the upper 0.5 feet in each of the sections and composited. A total of six composite surficial soil samples (one per section) were submitted for laboratory analysis for the following parameters:

  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

  In order to avoid volatilization through the composting process, a discrete soil sample was collected near the center of each plot and analyzed for:

  - TAL VOA
  - TCL Semi-VOA

  One soil sample was analyzed for:

  - Total Organic Carbon
  - Grain size, Ion Exchange, pH, Density, Moisture, Permeability

  The TOC sample was collected and submitted for analysis. As the result of an instrument failure, the TOC sample exceeded the holding time and was not analyzed. Following approval by the Navy, the sample was re-collected near MW5-2 and analyzed.

  Three soil borings (subsequently converted into Monitoring Wells MW5-1, MW5-2, and MW5-3) were installed at the locations shown in Figure 2-4. In each boring, soil samples were continuously collected using split spoons and field screened with an OVA. The borings were terminated at an average depth of 10 feet. A lithologic log of the soils was prepared for each of the three soil borings. Visual classifications forms for the soil borings are provided in Appendix E.

Two of the boreholes (MW5-2 and MW5-3) were specifically installed into Plot No. 5 and Plot No. 6 respectively in order to collect soil samples at the water table. The location of these boreholes corresponds approximately to the same Geraghty and Miller plots that contained elevated levels of pesticides. The two soil samples (MW5-2 and MW5-3) were analyzed for the following parameters:

- TAL VOA
- TCL Semi-VOA
- TCL Pesticides/PCBs
- TCL Metals
- TCL CN

• Hydrogeologic Investigation: The three soil borings were completed as temporary monitoring wells (MW5-1 through MW5-3) at the locations shown in Figure 2-4. The wells were screened over a 5 foot interval from a depth of 5 to 10 feet. Well construction details and sketches are provided with the drilling logs in Appendix E.

  Groundwater samples were collected from each of the three new monitoring wells. These samples were analyzed for the following parameters:

  - TAL VOA
  - TCL Semi-VOA
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

  Sample 05-03-GW was held past the holding time for semi-volatiles and was not analyzed. A sample was taken at a later date and analyzed for semi-volatiles.

  Groundwater levels were measured at each of the wells. Table 2-4 provides the measured groundwater levels and the calculated groundwater elevations at the wells.

• Surface Water and Sediment Investigation: Two surface water and two sediment samples were collected from the drainage ditch at the locations shown on Figure 2-4. These samples were analyzed for the following parameters:

  - TAL VOA
  - TCL Semi-VOA
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

2.6 Site 7 - Fleming Key North Landfill

• Air Monitoring Survey: Two air quality surveys were conducted along the transects shown in Figure 2-5. The operator continuously monitored the air quality along the transect using an OVA equipped with a flame ionization detector.

- Waste Characterization: Waste type and distribution patterns were investigated by the excavation of 21 test pits. These test pits were distributed throughout the site as shown in Figure 2-5. A description of the materials encountered is provided in the Test Pit Logs contained in Appendix D.

  Test Pits, T-1 through T-5, T-14, T-15, and T-20 were terminated due to the presence of the water table at a depth of 5 to 6 feet. Test Pits T-6 through T-11, T-16, T-18, T-19, and T-20 were terminated due to the presence of the water table at a depth of 3 to 4 feet.

- Soil Investigation: Five exploratory borings (subsequently converted into Monitoring Wells MW7-1 through MW7-5) were installed at the locations shown in Figure 2-5. A lithologic log was prepared for each soil boring. Soil samples from each boring were continuously collected using split spoons and field screened with an OVA. The borings were terminated between 14 and 18 feet. Visual classification forms for the soil borings are contained in Appendix E.

  A soil sample was collected at the base of the landfill from each borehole. This decision was based on OVA readings of split spoons and the texture change between the fill material in the landfill and the underlying soil material. The depth interval of each soil sample is noted on the lithologic log. These five soil samples were analyzed for the eight metals by EP Toxicity. One soil sample collected from the boring for Monitoring Well MW7-2 was analyzed for the following parameters:

  - Total Organic Carbon
  - Grain size, Ion Exchange, pH, Density, Moisture, Permeability

  Due to instrument failure in the laboratory, the total organic carbon sample was not analyzed. Upon approval by the Navy, a sample was collected at a later date and submitted for analysis.

- Hydrogeologic Investigation: The five soil borings were completed as temporary monitoring wells (MW7-1 through MW7-5) at the locations shown in Figure 2-5. A sixth monitoring well was installed between existing wells KWM-10 and KWM-11. The wells were screened over a 17 foot interval so as to intercept the water table. Well construction details and sketches are provided with the lithologic logs in Appendix E. A recorder well was installed at the site to allow continuous groundwater level measurements for one month to assess the influence of the tides on the site groundwater flow system.

  Groundwater samples were collected from each of the nine monitoring wells (6 new and 3 existing). These samples were analyzed for the following parameters:

  - TAL VOC
  - TCL Semi-VOA
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

  During the sampling of monitoring wells at Site 7, IT discovered the existing well KWM-10 was destroyed. The steel protective casing was observed to be lying on the ground and the PVC well casing was broken off at the ground surface. KWM-10 was not sampled due to its condition.

  Groundwater levels were measured at each of the wells except KWM-10 and KWM-09 on July 17, 1990. Existing Monitoring Well KWM-09 was inadvertently not measured. Table 2-5 provides the measured groundwater levels and the calculated groundwater elevations at the wells.

Protective steel posts were installed around Monitoring Wells MW7-4 and MW7-5 due to the addition of couplings. Monitoring Wells MW7-1 and MW7-2 also have protective steel posts because these areas are near roads frequently used by vehicular traffic.

- Surface Water and Sediment Investigation: Three sediment samples (S-1, S-3 and S-4) were collected from along the shore line at the locations shown in Figure 2-5. One surface water and one sediment sample (labeled S-2) were collected from the tidal creek located in the northern portion of the landfill. The sample location is depicted in Figure 2-5. All samples were analyzed for the following parameters:

  - TAL VOA
  - TCL Semi-VOA
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

2.7 Site 8 - Fleming Key South Landfill

- Air Monitoring Survey: Four air quality surveys were conducted along the transects shown on Figure 2-6. The operator continuously monitored the air quality along each transect using an OVA.

- Waste Characterization: Twenty test pits were excavated within the landfill area to characterize substances and materials disposed of at the landfill. These test pits were distributed throughout the site as shown in Figure 2-6. A description of the materials encountered is provided in the Test Pit Logs contained in Appendix D.

  The condition of Test Pits T-4 through T-6, T-8 through T-10 and T-14 allowed for deeper excavation than the 8 foot scheduled depth. This allowed a better understanding of the buried material. Test Pits T-3, T-7, T-7B, T-7C and T-13 were terminated due to the presence of the water table at a depth of 4 to 5 feet.

- Soil Investigation: A total of ten borings were drilled at this site at the locations shown on Figure 2-6. Six of the borings were subsequently converted into Monitoring Wells MW8-1 through MW8-6. At each boring, soil samples were continuously collected using split spoons and field screened with an OVA. The borings were terminated at an average depth of 10 feet. A lithologic log was prepared for each boring and visual classification forms for the borings are provided in Appendix E. The four boreholes not completed as monitoring wells were grouted in accordance with Florida Administrative Code (FAC) 17-532.500(4).

  A soil sample was collected at the base of the landfill from each borehole . This decision was based on OVA readings of split spoons and changes between the fill material of the landfill and the underlying native material. The depth interval of each soil sample is noted on the lithologic log (Appendix E). Ten collected soil samples (one per boring) were analyzed for the eight metals by EP Toxicity.

  One soil sample collected from the boring for MW8-6 was analyzed for the following parameters:

  - Total Organic Carbon
  - Grain size, Ion Exchange, pH, Density, Moisture, Permeability

The TOC sample was collected and submitted for analysis. As the result of an instrument failure, the TOC sample exceeded the holding time and was not analyzed. Following approval by the Navy, the sample was re-collected.

- Hydrogeologic Investigation: Six of the boreholes were converted into Monitoring Wells MW8-1 through MW8-6. Two of the six monitoring wells are positioned along the perimeter of the landfill (MW8-2 and MW8-3) with another two located within the interior portion of the landfill (MW8-1 and MW8-6). The remaining two monitoring wells were initially to be installed to replace Monitoring Wells KWM-13 and KWM-16, which were thought to have been destroyed. However, IT discovered Monitoring Well KWM-13 during the well installation phase of work. IT chose to replace KWM-13 with a new Monitoring Well MW8-4 at the location shown on Figure 2-6. Monitoring Well KWM-16 was replaced as KWM-16R. Finally, one additional well (Monitoring Well MW8-5) was installed between existing monitoring wells KWM-14 and KWM-15.

  The monitoring wells were screened over a 15 to 20 foot interval. Well construction details and sketches are provided with the lithologic logs in Appendix E. One recorder well (Figure 2-6) was installed at the site to allow continuous groundwater monitoring to assess the influence of the tides on the site groundwater flow system.

  Groundwater samples were collected from each of the nine monitoring wells (7 new and 2 existing). These samples were analyzed for the following parameters:

  - TAL VOA
  - TCL Semi-VOA
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

  IT learned that the discovered Monitoring Well KWM13 was installed by another contractor other than Geraghty and Miller. IT chose not to sample Monitoring Well KWM13 because of uncertainty of its integrity. Well KWM-17 on South Fleming Key was reportedly located in an area with dense vegetation on the western portion of the site. After repeated attempts by the field crew, Monitoring Well KWM-17 could not be located.

  Groundwater levels were measured at each of the wells except KWM13 and MW8-6 on July 17, 1990. Monitoring Well KWM13 was not measured because of its uncertain integrity and Monitoring Well MW8-6 was inadvertently not measured. Table 2-6 provides the measured groundwater levels and the calculated groundwater elevations at the wells.

- Surface Water and Sediment Investigation: Three sediment samples (S-1, S-2, and S-3) were collected from along the shore line at the locations shown in Figure 2-6. In addition, one surface water sample was collected from an open disposal trench that contained standing water. These samples were analyzed for the following parameters:

  - TAL VOA
  - TCL Semi-VOA
  - TCL Pesticides/PCBs
  - TCL Metals
  - TCL CN

2.8 Site 9 - Trumbo Point Annex Fuel Farm and Piers

- Air Monitoring Survey: Trumbo Point Fuel Farm and Piers did not have an air monitoring survey performed due to the operation of the Fuel Farm. Based upon the presence of hydrocarbon fuels, an OVA transect would not provide any further information regarding the impact of volatile organics on the environment. For health and safety purposes, OVA readings were monitored during all subsurface work.

- Waste Characterization: Existing data indicate that the contamination from petroleum hydrocarbons including the gasoline and kerosene groups, exists in some areas of the site. The investigation to determine the extent of excess soil contamination was conducted by the installation of soil borings guided by OVA measurements. The investigative technique followed the procedure presented in the FAC 17-70.003(3).

  The Trumbo Point Fuel Farm and Piers were not used as a landfill. Based upon the previous land use, wastes should not be present at this site. Due to this, test pits were not excavated at the site.

- Soils Investigation: IT installed 44 soil borings at the site. Four of these borings were converted into Monitoring Wells MW9-10, MW9-11 and MW9-12, and replacement well, MW-6R. Please note that Monitoring Wells MW-13 through MW-17 identified on Figure 2-7 are part of the Pilot Treatment Plant work. Boring locations are shown on Figures 2-7 and 2-8. At each boring, soil samples were continuously collected using split spoons. Of these 40 borings, 16 were installed to 4 feet, 21 were installed to 6 feet and three installed to 8 feet. A lithologic log was prepared for each boring (Appendix E). Soil borings not used for monitoring well installation were then grouted in accordance with FAC 17-532.500(4).

  A head space analysis was performed on each soil sample to determine excessive volatile soil contamination according to FAC 17-770.2.

  One of the five TOC samples discussed in Section 2.1.8 of this report was collected at soil boring B-30 and submitted to ITAS for analysis.

- Hydrogeologic Investigation: Existing monitoring wells at Site 9, (KWM-01 through KWM-10 and KWM-20 through KWM-25) were evaluated to determine the need for sampling and analysis. IT requested a variance to sampling all existing monitoring wells at Site 9 and recommended that only six existing Monitoring Wells (KWM-02, KWM-05, KWM-09, KWM-21, MW-6R, and MW-11) be sampled and analyzed. The remaining monitoring wells were believed to be constructed improperly (i.e., well screen above the base of manhole) or observed to be damaged (i.e., broken casings) thus putting into question the monitoring wells' integrity. In addition, many wells contained petroleum product that prohibited sampling.

  The Navy's reply to IT's requested variance was to not sample any monitoring well at Site 9 that was perceived to have questionable integrity. Accordingly, IT sampled and analyzed only Monitoring Wells KWM-02, KWM-05, and KWM-09, KWM-21, MW-6R, and MW9-11.

  Four boreholes as mentioned above were converted into monitoring wells. Three were new monitoring wells installed by IT, and one well was a replacement well installed for a destroyed Geraghty and Miller monitoring well. Locations of these wells are shown on Figure 2-7.

  The monitoring wells were screened over the interval of 2.5 to 10 feet below land surface. Well construction details and sketches are provided with the lithologic logs in Appendix E. A 6 inch recorder well was to be installed at Site 9, however it was inadvertently installed at Site 10. Existing Monitoring Well KWM-25 was evaluated for this purpose and was used to monitor groundwater levels to assess the effects of tides at this site.

Due to the presence of free product and the questionable integrity of some of the existing monitoring wells only six were sampled at this site. Groundwater samples were analyzed for:

- EPA Method 601 Parameters
- EPA Method 602 Parameters
- EPA Method 610 Parameters
- EPA Method 504.1 Parameters
- EPA Method 239.2, Lead

Groundwater levels were collected from the sampled monitoring wells. However, the water level measurements for three of the wells took place on different days. In order to compare water levels to determine groundwater flow direction, IT choose to map water levels collected on approximately the same day. Monitoring Wells KWM-02, KWM-05, KWM-20, were used for this purpose. The depth to water was measured on July 13 and 15, 1990. Table 2-7 lists the measured groundwater levels and the calculated groundwater elevations at the wells.

- Surface Water and Sediment Investigation: Surface water and sediment samples were not collected at this site because surface water features do not exist.

2.9 Site 10 - Boca Chica Fire Fighting Training Area

- Air Monitoring Survey: Two air quality surveys were conducted along the transects shown on Figure 2-9. These transects were conducted using an OVA equipped with a FID. The operator continuously monitored the air quality along the transect.

- Waste Characterization: Because of no known waste disposal practices, waste characterization relates only to chemicals used at the site. As such, waste type and distribution patterns were investigated as part of the soil and hydrogeological investigation.

- Soil Investigation: A total of ten soil borings were installed at Site 10. Three of these borings were subsequently converted to monitoring wells (MW10-1, MW10-2, and MW10-3). Locations of the soil borings are shown on Figure 2-9. At each boring, soil samples were continuously collected using split spoons and field screened with an OVA. The ten soil borings were terminated at approximately a depth of 10 feet. The seven borings not converted to monitoring wells were grouted in accordance with FAC 17-532.500(4).

  From each boring, one sample was collected for EP Toxicity analysis for metals. A sample was also collected from Boring B-5 for TOC analysis. Samples for grain size, pH, and ion exchange capacity were collected from Boring B-2.

  One soil sample collected from the borehole converted into Monitoring Well MW10-1, was analyzed for the Appendix IX parameter list.

- Hydrogeologic Investigation: IT installed three monitoring wells in exploratory borings as previously described. The monitoring wells were screened over the intervals 1 to 11 feet below land surface. Well construction details and sketches are provided with the drilling logs in Appendix E. Groundwater samples were collected from five (3 new and 2 existing) monitoring wells at the site. These samples were analyzed for:

- TAL VOC
- TCL Semi VOA
- TCL Pesticide/PCBs
- TCL Metals
- TCL CN

The groundwater sample from Monitoring Well MW10-1 was analyzed for Appendix IX parameters.

Groundwater levels were measured on July 17, 1990. Table 2-8 lists the measured groundwater levels and the calculated groundwater elevations at the wells.

- Surface Water and Sediment Investigation: Surface water and sediment samples were not collected at this site because surface water features do not exist.

3.0 Findings/Data Summary

The findings and data presented in this section are the result of the field/analytical program conducted for each reported site. Only the analytical results of detected parameters are identified in the associated discussions and tables. IT has chosen to report in this document, Concentration Standards for Comparison (CSCs) in lieu of the previous label of Applicable Relevant and Appropriate Requirements (ARARs). This decision to rename the comparison values is based on the objectives of the study which is to confirm the presence or absence of contamination. Hence, exceeding the CSCs confirms only the presence of contamination. Because the chosen CSC values are ultra conservative, but not site specific nor based on ecological criteria, they cannot be considered as realistic ARARs. Eventually, true ARARs will be selected for those sites that require remediation. The ARARs will be based on the classification of the waters, both surface water and groundwater, and on toxicity to organisms.

IT recognizes that soil and sediments standards are not esablished. IT chose to use RCRA defined criteria that defines "hazardous waste" as the CSC for soil/sediment media. This CSC criteria defines only impacts to soil and/or sediment.

Sampling data was compared to the CSCs to establish "site contamination." In addition, the information obtained from the drilling program, groundwater level measurements and aquifer characterization was used to describe the hydrogeologic setting. If "contamination" was identified, an assessment of the potential for migration is presented.

3.1 NAS-Key West Environmental Setting

This section summarizes the environmental setting of meteorology, geology, hydrology, and biology in Key West, Florida. Information was generated from the review of readily available data and the results of the Remedial Investigation/Phase I effort.

Location: NAS-Key West is located approximately 150 miles southwest of Miami on the last major island of the Florida Keys. It is connected to the mainland by the Overseas Highway (US Highway No. 1). Tourism is the primary industry in the Key West area with fishing being the second most important industry.

Climate: Key West has a tropical-maritime climate. The monthly average high and low temperatures for January to August 1990 are listed in Table 3-1, with averages of 84.5 and 75.5 degrees Fahrenheit, respectively. In addition, total rainfall for this time period was reported to be 36.68 inches.

A separate wind rose was constructed for the months of January through August. Each wind rose is based upon daily wind speed data and shown in Figures 3-1A through 3-1H as obtained from NAS-Key West. Based on the data, the winds in Key West between January and May 1990 were trending east-southwest averaging 18.3 knots. From June to August 1990, the winds were north-northeast averaging 15.8 knots.

Biology: The Key West Naval Complex includes areas such as Truman Annex and Trumbo Point Annex that are completely developed. Other areas such as portions of Boca Chica, Saddlebunch, and Demolition Island are mostly cleared land. Around the periphery of these islands are mangrove swamps and salt marshes in intertidal areas, grading into marine grass flats in sub-tidal areas. Areas cleared and left fallow have come back with an Australian Pine monoculture or thick cover of other early successionals.

In Florida there are 68 animal species considered endangered or threatened by either the Unites States Fish and Wildlife Service (USFWS) or the Florida Game and Freshwater Fish Commission (FGFFC). Eleven 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, Pelican, Bald Eagle, Least Tern, White-Crowned Pigeons, West Indian Manatee, and the Stock Island Tree Snail.

There are 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 USFWS.

Geologic Conditions: 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 and consists of cemented remains of ancient coral reefs, fossils, and shells. The Miami Oolite is approximately 20 feet thick at Key West and is considered to contain primary porosity. Primary porosity is porosity that developed during the final stages of sedimentation. The underlying Key Largo Limestone is 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.

Hydrologic Conditions: The shallow sedimentary materials encountered during the investigation constitute a water table aquifer. The hydraulic properties of the media (hydraulic conductivity, transmissivity, and porosity) were obtained from two Environmental Assessment Reports conducted by IT Corporation at two commercial fuel dispensing facilities located close to the NAS-Key West. These reports are on file at the IT Corporation Deerfield Beach office and the Florida Department of Environmental Regulation (FDER). Pertinent values were also obtained from an Initial Assessment Study of Naval Air Station, Key West, Florida (NEESA 13-071) prepared in 1985.

On site slug tests were performed at these fuel dispensing facilities to collect water level versus time data to calculate hydraulic conductivities. IT, using the Bouwer and Rice method of analysis, calculated average hydraulic conductivities of 72 and 1,024 gallons per day per square foot (gpd/ft^2), respectively. Transmissivity values range from approximately 72,500 gallons per day per foot (gpd/ft) to 12,400 gpd/ft. Because storativity cannot be determined from slug test data, an estimated value of storativity of an unconfined aquifer is generally considered to be equal to the total porosity. The estimated average porosity of the oolitic limestone ranges from 0.20 to 0.35, the storativity ranges from 0.10 to 0.17. The lower value is representative of silty sand, while the higher value is representative of the oolitic limestone.

Groundwater Use: Although Key West is underlain by highly transmissive limestones, most groundwater is brackish, saline or hypersaline and can not be used for potable purposes. However, a fresh water lense does exist and is located in the interior of the island, however, literature is not available on the physical aspects of this fresh water lense. The United States Geological Survey (USGS) has completed assessment work and is currently compiling a report providing detailed information. As a result, potable water is obtained by rainwater catchment or imported via pipeline by the Florida Keys Aqueduct Authority over a 150 mile pipeline from Miami.

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 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.

3.2 Site 1 - Truman Annex Refuse Disposal Area

3.2.1 Existing Data

The previous study conducted 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 below land surface (BLS).

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 to be about 2 to 3 feet BLS and ranged from about one-half 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 USEPA 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 of 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. At present this fill material remains at the site.

3.2.2 Air Monitoring Survey

Site 1 is located on the southwestern side of Key West, the windward side of the island. Table 3-2 lists the air monitoring survey performed by IT personnel at this site, which indicated no fugitive emissions of volatile organic compounds were detected.

3.2.3 Waste Characterization

The area of uncontrolled dumping at this site is estimated to be seven acres. Because of the uncontrolled disposal aspects at this site, waste types and distribution patterns were investigated by the excavation of seven test pits (T-1 through T-7). Waste encountered consisted of approximately 50 percent construction debris, 15 percent household refuge and 35 percent scrap metal. Included in the construction debris were concrete slabs, steel rebar, steel cable, bricks and piping. The household refuge consisted of glass, yard trash and small pieces of wood. The scrap metal consisted mostly of sheet metal. Table 3-3 lists the detailed description of the refuge encountered. Waste material occurs from approximately 0.5 BLS to the bottom of the pits. The pits were terminated at the water table which was encountered at approximately 8 feet BLS.

3.2.4 Soil Investigation

Only barium and lead were detected by EP Toxicity analyses of the soil samples collected from the three borings at Site 1 (Table 3-4). Barium concentrations were (below) the CSC while the soil sample from Boring MW1-3 contained a detectable lead concentration at 0.10 mg/kg which exceeds the established CSC (0.05 mg/kg) and thus can be considered hazardous.

3.2.5 Hydrogeologic Investigation

The following discussion presents the physical setting and analytical results utilized to evaluate the potential for contamination and its migration.

3.2.5.1 Geologic Conditions

Information derived from the borings was used to construct a geologic framework necessary 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 was obtained from a composite soil sample collected from ground surface to 2 feet BLS in Borehole MW1-2 (Table 3-5). This data includes 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 is expected because of the abundance of carbonate soils and rock. The ion exchange capacity is relatively high compared to values obtained at the other sites. A cation exchange value of 189.98 milliequivilents per gram (meq/g) means the ability of the media to hold adsorbed ions much more strongly, and to hold them in greater amounts than do others.

The total organic content (TOC) at 1.96 mg/kg indicates little organic matter exists. This condition reduces the media's ability to attenuate contaminates. The permeability of the soil sample is 2.49×10^{-6} centimeters per second (cm/sec) which is representative of a mixture of sand, silt, and clay.

3.2.5.2 Hydrologic Conditions

The indigenous material encountered below Site 1 consists of oolitic limestone, hence the higher hydraulic conductivity and transmissivity values discussed above are considered to be 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) with the highest levels normally 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 and tidal fluctuations, appears to have an average thickness of approximately 6 to 7 feet.

Groundwater levels collected for this site were plotted, contoured, and depicted on Figure 3-2. Based on the data a groundwater mound 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 moving inland. Groundwater at this site mainly discharges into the Atlantic Ocean. Recharge of the aquifer 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 well were continuously monitored through the month of August 1990 to accurately assess tidal influences. This information was then compared with actual sea level fluctuations during the same time period. Hydrographs depicting the water level elevations and sea level fluctuations for the month of August are presented in Figure 3-3. Clearly, the peaks and valleys on both hydrographs coincide and tidal influence is noted; however, the degree of influence of the groundwater flow is limited. Sea level fluctuations range 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.

3.2.5.3 Analytical Results

The following section presents results of groundwater laboratory analysis. Analytical results are presented in Tables 3-6 through 3-8. Only compounds that were present in concentrations greater than the detection limits are shown. Certificates of analysis for all the samples analyzed are included in Appendix G.

Inorganics: Groundwater analytical results for Site 1 indicate the detection of many of the metal compounds (Table 3-6). Groundwater obtained from Monitoring Wells KWM-01 and KWM-02 located upgradient at the outer edge of the reported landfill area contained the lowest levels of metal concentrations. Monitoring wells located downgradient along the shoreline within the landfill area encountered the highest concentrations with Monitoring Well MW1-2 having the highest metal concentrations. Several metal compounds, however, were detected in Monitoring Well MW1-1 which is relatively upgradient.

Numerous metals have been detected at concentrations above their CSC limits. However, the detected concentrations (barium, iron, and sodium) are probably more related to the soil/rock characteristics or perhaps sea water intrusion, than an indication of contamination.

The other detected metals above their CSCs (antimony, arsenic, cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc) may represent contamination because these are not typically associated with carbonates and/or sea water. Hence, these detected metal concentrations may be caused by the leaching of wastes from within the landfill.

Organics: Analytical results indicate that organic and semi-organic compounds (Table 3-7) were either not detected or the concentration are below the detection limits of the analyzing instruments. Accordingly, the areas investigated do not appear to be impacted by organic and semi-organic compounds.

Pesticides/PCBs: Groundwater from only one monitoring well, MW1-2, had any detectable concentrations of pesticides (Table 3-8). Alpha-chlordane at 0.98 part per billion (ppb) and gamma-chlordane at 1.1 ppb were the only pesticides detected.

3.2.6 Surface Water and Sediment Investigation

Surface water samples were not collected at this site. The analytical results for the sediment samples are summarized in Tables 3-9 and 3-10 which indicate the highest concentrations of the inorganics (metals) and the pesticides/PCBs were detected in the samples collected at locations S-1 and S-2.

Of the parameters analyzed for, only the inorganic (metal) compounds and the pesticides/PCBs were detected. All of the sediment samples collected from the rip rap contained detectable concentrations of metals, however, none of the concentrations exceeded the CSCs.

Several pesticides were detected in the sediment samples collected from the rip rap along the shoreline. The pesticide 4,4-DDE was detected in all three samples and 4,4-DDT was detected in two of the samples (S-1 and S-2); however, These concentrations did not exceed the established CSCs.

Aroclor-1260 was detected at a concentration (2,300 micrograms per kilogram (ug/kg)) above the established CSC (45 ug/kg) for this compound in the sediment sample collected at S-2.

Table 3-11 presents a full data summary for water levels and all detected contaminants.

3.3 Site 3 - Truman Annex DDT Mixing Area

3.3.1 Existing Data

During a previous study, 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 0-1, 1-2, and 2-3 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 sites. Information regarding the specific locations of these sampling points is not available.

3.3.2 Air Monitoring Survey

An air monitoring survey was not conducted at this site because the nature of contamination is related to the pesticide DDT. Because the pesticide DDT is not a volatile organic, it cannot be measured with an OVA. However, for health and safety purposes, ambient air was monitored with an OVA during all subsurface operations.

3.3.3 Waste Characterization

Based on available information, this site has not been used for waste disposal and has only been impacted by chemical mixing and handling of pesticides. As such, the waste characterization at this site was conducted as part of the soil and hydrogeologic investigations.

3.3.4 Soil Investigation

Certificates of Analysis for all soil samples analyzed are provided in Appendix G with Tables 3-12 through 3-14 providing a summary. Only those compounds that were present in concentrations greater than the instrument detection limits are listed in the tables.

As shown in Table 3-12 the analyses of the composite soil sample collected from each of the six plots indicate that DDT, along with the respective daughter isomers are present. The highest concentrations are found in Plots 1 and 3. As listed in the table, the reported concentrations for 4,4 DDT, 4,4 DDD and 4,4 DDE exceed their established CSCs in all the composite samples.

The results of the pesticide analyses for the discrete samples collected from Plots 2 and 4 are also shown on Table 3-12. The discrete sample collected from Plot 2 contained DDT and other pesticides and the reported concentration for 4,4-DDT (1,800 ug/kg) exceeded the established CSC for this compound. In general, however, the reported concentrations for this sample were lower than the composite sample from Plot 2. The discrete sample collected from Plot 4 correlated well with the results of the composite sample, both having concentrations for 4,4-DDT, 4,4-DDD and 4,4-DDE that exceed the established CSCs.

Tables 3-13 shows the laboratory results for the discrete volatile organic compounds (VOC) samples collected from the center of each plot and for the discrete samples collected from Borings B-1 and B-2. As listed in the table several of the volatile organic compounds were detected, however none exceeded their respective CSCs.

Table 3-14 shows the results for the Target Analyte List. The soils at this site do not appear to be impacted by any inorganic compounds.

3.3.5 Hydrogeologic Investigation

The following discussion presents the physical setting and analytical results utilized to evaluate the potential for contamination and its migration.

3.3.5.1 Geologic Conditions

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 material encountered during the installation of monitoring wells ranged 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 present at approximately 5 feet BLS where the density of the material encountered changes from very hard to soft. This soft material encountered is suspected to be part of the Miami Oolite formation.

Geotechnical data was obtained from a composite soil sample collected from ground surface to approximately 2 feet BLS, as shown in Table 3-5. Grain size analysis indicates a well graded natural material with grain sizes ranging from gravel to clay. The pH is 8.35 due to the occurrence of carbonate properties in soils/rocks in the area.

The ion exchange capacity is 89.97 meg/g for this sample, which is relatively high. This relatively high result means this media has the ability to hold ions strongly and in greater amount, thus decreasing the potential for contaminant migration.

The total organic content (TOC) is the highest reported value in comparison with the other sites. The value for TOC is reported at 8,700 parts per million (ppm) which indicates an abundance of dissolved organic material.

The permeability of the composite soil sample is reported at 6.55 x 10^{-7} cm/sec which is characteristic of very impermeable material. Resource Conservation and Recovery Act (RCRA) facilities require a permeability of 1 x 10^{-7} cm/sec for the clay liners/caps, thus the reported result for this sample is comparable to the permeability of a clay.

3.3.5.2 Hydrologic Conditions

Groundwater levels were measured in the three new monitoring wells installed at this site and groundwater contours were calculated using these wells to define the water table as shown in Figure 3-4. 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 of Site 1, where a recorder well was installed. The fluctuations would be to a smaller degree because the location of Site 3 is further inland thereby lessening the effects of the tidal influence.

3.3.5.3 Analytical

The following section presents results of the groundwater laboratory analysis. Analytical results are presented in Tables 3-14 and 3-15. Only compounds that were present in concentrations greater than the CSCs are shown. Certificates of Analysis for all the samples analyzed are included in Appendix G.

Inorganics: The laboratory results of the inorganics for groundwater samples are shown in Table 3-15. Groundwater samples obtained from all three monitoring wells contained metals. Groundwater obtained from Monitoring Well MW3-2 had the highest concentrations except for cadmium.

The concentrations of iron and sodium above their CSCs is expected because of the dissolution of carbonate rock and the intrusion of sea water at the site. Cadmium, while detected slightly above its CSC is not a high enough concentration to reflect widespread metal contamination.

Organics: Volatile organic or semi-organic compounds were not detected in any of the groundwater samples.

Pesticides/PCBs: Various pesticide compounds (Alpha-BHC, Beta-BHC, Dieldrin, 4,4 DDD, 4,4 DDT, and Heptachlor) were detected in all three monitoring wells (Table 3-16) at concentrations above their respective CSCs. This is probably due to the leaching of unintentional spillage that took place on and around the DDT mixing area, at Building 265, during its operation.

3.3.6 Surface Water and Sediment Investigation

Surface water or sediment samples were not collected because these features are not present at the site.

Table 3-17 presents a data summary table for water levels and all detected contaminants.

3.4 Site 4 - Boca Chica Open Disposal Area

3.4.1 Existing Data

Four shallow groundwater monitoring wells (KWM-05 through KWM-08) were previously 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, TDS, and USEPA priority pollutants. Generally, the analytical results listed the TDS range from 24,000 to 42,000 ppm. Acid extractables, 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 ppb. Several base neutral extractable compounds also were detected in concentrations of less than 10 ppb, except for naphthalene (34 ppb). Of the metals analyzed, concentrations of mercury (0.01 ppm), copper (0.06 ppm), and arsenic (0.065 ppm) 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.

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.

3.4.2 Air Monitoring Survey

Table 3-2 lists the air monitoring survey performed by IT personnel at this site which indicates volatile organic compound emissions were not detected at that time period.

3.4.3 Waste Characterization

The presence of the mangrove trees within the debris area prohibited the installation of trenches and test pits to determine the type of residual wastes. Mangroves are a salt water species indicative of wetland conditions, and, therefore protected from excessive disturbance (i.e., clear cutting of trees) by the State and Federal wetlands regulations. Furthermore, the character of the burn area does not suggest the presence of buried material or debris. Therefore, test pits were not installed in either area.

The waste characterization at this site was performed by visual observation of surface debris. In the debris area, no waste material were observed on the surface or in the soil borings.

The burn area was inspected for surficial debris and appeared relatively clear with the exception of four abandoned above ground tanks located in the northwest portion of the site. Around one tank, the sides, foundation and ground was covered with an unknown black asphalt-like substance. The remaining three tanks are clustered together next to a scrap iron rod pile. Along the transect on the north edge of the site, metal, and concrete debris were observed.

3.4.4 Soil Investigation

The Certificates of Analyses for all the soil samples are presented in Appendix G with a summary of the analytical results listed in Table 3-18 through 3-24. Only those compounds that were present in concentrations greater than the instrument detection limits are listed in the table.

Soil analysis at the site found only the PCB Aroclor 1260 and Heptachlor epoxide present above their established CSC. Heptachlor epoxide was detected in the Appendix IX analysis of the sample from B-5 at a concentration of 120 ug/kg as shown in Table 3-18. Aroclor 1260 was detected in B-2 at a concentration of 940 ug/kg as shown in Table 3-19. The CSCs for Aroclor 1260 and Heptachlor epoxide were established at 45 ug/kg and 38 ug/kg, respectively. Both compounds were detected above the CSC in the burn area.

In EP Toxicity analysis of the site, barium and cadmium were detected in quantifiable concentrations as shown in Table 3-20.

3.4.5 Hydrogeologic Investigation

The following discussion presents the physical setting and analytical results used to evaluate the potential for contamination and its migration.

3.4.5.1 Geologic Conditions

Information derived from the borings was used to construct a geologic framework. 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 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 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 beneath is of medium density.

Geotechnical data was obtained from a composite soil sample collected from ground surface to 2 feet BLS from the borehole for Monitoring Well MW4-1 (Table 3-5). Geotechnical data included grain size distribution, moisture content, soil pH, cation exchange capacity, and total organic carbon content and permeability. Grain size analysis indicates that the soil sample is a poorly sorted medium to coarse grained sandy gravel with a fraction of fines. The soil has a pH 7.50 and an ion exchange capacity of 35.74 meq/g. This cation exchange capacity means the media has a relatively low ability to capture and retain cations.

The TOC value at 1.04 mg/kg indicates little organic matter which indicates the media's inability to attenuate contaminants. The permeability value of the soil was determined to be 2.29 x 10^{-6} centimeters per second which is representative of a low permeability material.

3.4.5.2 Hydrologic Conditions

The indigenous material encountered below Site 4 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 as previously discussed in Section 3.1.

Groundwater elevations obtained at the site were contoured and depicted on Figure 3-5. Groundwater elevations were influenced by surface water bodies and wetlands present at the site. The groundwater mound at the north end of the site near Monitoring Well MW4-5 results from the influence of surface water present in the mangroves as shown on the site map. Groundwater at this site discharges into the mangroves and Atlantic Ocean. Recharge of the aquifer is 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. Hydrographs depicting the groundwater level fluctuations and sea level fluctuations for the month of August are presented in Figure 3-6. Clearly, the peaks and valleys on both hydrographs coincide and tidal influence is noted. The degree of influence is limited, however. Sea level fluctuations range from approximately 0.1 feet to 2.5 feet, while fluctuations in the groundwater level only ranged from approximately 0.6 to 2.0 feet.

3.4.5.3 Analytical

The following sections present the results of groundwater laboratory analyses. Certificates of Analysis for all the samples analyzed are included in Appendix G, with a summary presented on Table 3-6. Only compounds that were detected in concentrations greater than the detection limits are shown on the tables.

Inorganics: Groundwater analytical results show the presence of metals at the site (Table 3-25). As shown in Table 3-26, Appendix IX analysis of the groundwater identified copper and lead present at concentrations of 54.7 and 38.3 ug/l, respectively. The copper concentration was below the CSC of 1,000 ug/l, and the lead concentration was below the CSC established at 50 ug/l (Table 3-25).

Inorganic: Analysis at the site detected arsenic, chromium, iron, lead, and sodium above their CSCs. The sodium concentration may be related to the naturally occurring marine environment present at the site.

Organics: Analytical results (Table 3-27) indicate that organic compounds were not detected at concentrations exceeding their established CSCs.

Pesticides: Pesticides were not detected in the groundwater at Site 4.

3.4.6 Surface Water and Sediment Investigation

Laboratory analysis performed on the surface water samples (Table 3-28) indicated that sodium was present above it's CSC. This sodium concentration is typical of marine waters, and may not represent any potential contamination.

Table 3-29 shows sediment samples contained chromium at a concentration of 118 ug/L. Chromium exceeded the CSC established at 50 ug/L, however, the CSC of 50 ug/L was for hexavalent chromium. Hexavalent chromium was not analyzed for specifically, and may not have been present in the sample because it readily degrades to trivalent chromium. As shown in Table 3-30, sediment sample, S-1, contained Aldrin, and Heptachlor epoxide above the CSCs at concentrations of 84, and 71 ug/kg, respectively. Volatile and semi-volatile compounds were not detected for sediment samples S-1 and S-2 as shown in Table 3-31.

Table 3-32 is a data summary table for all water levels and all detected contaminants.

3.5 Site 5 - Boca Chica DDT Mixing Area

3.5.1 Existing Data

Eighteen composite soil samples were previously collected and analyzed at the former location of Building 915. The site was divided into six plots and three samples points were selected in each plot. Soil samples were collected at depths of 0-1, 1-2, and 2-3 feet BLS at each of the sampling points in the plot. The exact locations of the sampling points are unknown.

The laboratory analyses of these soil samples indicated the presences 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 were detected, including Alpha-BHC, Beta-BHC, Gamma-BHC and Delta-BHC.

3.5.2 Air Monitoring Survey

Because the pesticide DDT was the only concern of this site and is not volatile, monitoring by an OVA, for an air quality survey was not conducted. However, for Health and Safety reasons, an OVA was used during all subsurface work.

3.5.3 Waste Characterization

Based on available information, this site has not been used for waste disposal and has been impacted only by chemical handling during its operation. As such, the waste characterization program at the Boca Chica DDT Mixing Area was conducted as part of the soil and hydrogeologic investigations.

3.5.4 Soil Investigation

Certificates of Analysis of all samples analyzed are included in Appendix G with a summary presented in Table 3-33 through 3-35. Only those compounds detected above instrument detection limits are listed in the table.

Surface soils (Table 3-33) at the mixing area were found to contain high concentrations of the pesticides 4,4 DDT and 4,4 DDD. Based upon these concentrations, spillage of DDT along with mixed DDT and waste oil occurred.

Subsurface soils at the site were found to contain concentrations of 4,4 DDT, 4,4 DDD and 4,4 DDE and silver, as shown in Table 3-34 and Table 3-35.

3.5.5 Hydrogeologic Investigation

The following discussion presents the physical setting and analytical results utilized to evaluate the potential for contamination and its migration.

3.5.5.1 Geologic Conditions

Information derived from the borings 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 was obtained from a composite soil sample. Geotechnical data included grain size distribution, moisture content, soil pH, cation exchange capacity, and 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 found to be 6,600 mg/kg which is relatively high compared to the other site values. The permeability value is 9.05×10^{-6} centimeters per second which is representative of a sandy clay to clay.

3.5.5.2 Hydrologic Conditions

The indigenous subsurface material encountered at Site 5 consists of oolitic limestone, hence the higher hydraulic conductivity and transmissivity values discussed above are considered to be 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 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 plotted, contoured, and depicted on Figure 3-7. Groundwater flow is towards the southeast and mainly discharges into the Atlantic Ocean. Recharge of the aquifer is through direct infiltration of precipitation.

3.5.5.3 Analytical

The following section presents results of the groundwater laboratory analysis. Certificates of Analysis are included in Appendix G with a summary presented in Tables 3-36 through 3-38. Only compounds present in concentrations greater than their detection limits are listed.

Inorganics: As shown in Table 3-36, metals were detected in the groundwater at Site 5 at concentrations above the CSC. These inorganics were sodium and iron. The concentration of sodium in MW5-1, MW5-6 and MW5-3 was 1,570,000 ug/L, 1,460,000 ug/L and 1,620,000 ug/L, which exceeded the CSC of 160,000 ug/L. The concentrations of iron in MW5-1, MW5-2, and MW5-3 were 431 ug/L, 1,700 ug/L, and 524 ug/L, exceeding the CSC of 300 ug/L.

Organics: The following compounds were detected and had concentrations above the established CSC:

- Benzene was detected in MW5-1 at 90 ug/L, which exceeded the CSC of 1 ug/L.

- Chlorobenzene was detected in MW5-1 and MW5-2 at concentrations of 210 and 57 ug/L, respectively. Both wells exceeded the CSC of 10 ug/L.

- 1,2 dichloroethane was detected in monitoring well MW5-1 at concentrations of 1,500 and 1,800 ug/L in the sample and duplicate. The CSC established for this compound is 4.2 ug/L.

- Ethylbenzene was detected in MW5-1 at a concentration of 38 ug/L. This concentration exceeds the established CSC of 2 ug/L.

- 2 methylnaphthalene was detected in MW5-1 and its sample duplicate at concentrations of 54 and 52 ug/L, respectively. CSCs were not established for this component.

- Naphthalene was detected in MW5-1 and the sample duplicate for MW5-1 at concentrations of 46 and 40 ug/L, respectively. The CSC for this compound was established at 10 ug/L.

Organic compounds detected at the site were present almost exclusively in Monitoring Well MW5-1, the only exception to this was the presence of chlorobenzene in Monitoring Well MW5-2 (Table 3-37).

Pesticides: Pesticides (Alpha-BHC, Beta-BHC, Delta-BHC, 4,4 DDE, 4,4 DDT, and 4,4 DDE) were detected in all wells at the site as shown in Table 3-38.

3.5.6 Surface Water and Sediment Investigation

Surface water and sediment samples were collected at an upstream and downstream location in the drainage ditch adjacent to the site. The analytical results from these samples are listed in Tables 3-39 through 3-44. The Certificates of Analysis of all samples analyzed are included in Appendix G.

Inorganic analyses of the surface water indicates that lead and sodium were present above the CSC established for these parameters as shown in Table 3-39. Although the sodium concentration exceeds the CSC, this concentration is likely due to the saline influence on the ditch, and represents the natural conditions.

Volatile and semi-volatile compounds were not detected in the surface water at concentrations exceeding their CSCs (Table 3-40). Three pesticides (Beta-BHC, 4,4 DDD and heptachlor) were detected in the surface water exceeding their CSCs (Table 3-41).

Sediment samples collected at the site did not contain any metals, volatile, or semi-volatile organic contaminants in concentrations exceeding the CSCs. Pesticides detected at the site above the CSCs were 4,4 DDD, 4,4 DDE, and 4,4 DDT in both samples. Analytical results for these parameters are listed in Tables 3-42 through 3-44.

Table 3-45 is data summary of water levels and all detected contaminants.

3.6 Site 7 - Fleming Key North Landfill

3.6.1 Existing Data

The previous study conducted 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 and may be above the top of the screened section of the monitoring wells.

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

3.6.2 Air Monitoring Survey

An air monitoring survey was conducted with the results detailed in Table 3-2. Based on the measurements, no fugitive emissions of organic compounds were detected at the site.

3.6.3 Waste Characterization

The approximate area the landfill occupies at this site is 15.8 acres. Waste type and distribution pattern were investigated by the installation of 21 test pits. These test pits are distributed throughout the site as shown in Figure 2-5. Wastes encountered, consisted of 60 percent household debris, 30 percent construction debris, 5 percent electrical debris and 5 percent scrap metal. Construction debris included concrete slabs, steel cables and piping. Electrical debris consisted of electrical conduit, wire and low voltage batteries. Scrap metal waste included sheet metal and refrigerator parts. The majority of the waste observed was household debris, including tires, glass, plastic and basic household trash. Table 3-3 shows a detailed summary of waste encountered at this site. The water table was commonly encountered from 3 to 5 feet BLS. By the correlation of the test pit profiles with soil boring logs, the approximate depth of the waste generally ranges from 1-5 ft. BLS. No debris was present in test pits T-5, T-7, T-15, and T-21, suggesting those test pits were beyond the outer margin of the landfill.

3.6.4 Soil Investigation

The analytical results of the soil samples are summarized in Table 3-46. Only those compounds that were present in concentrations greater than the detection limits are shown.

None of the detected metals were above their CSCs.

3.6.5 Hydrogeologic Investigation

The following discussion presents the physical setting and analytical results used to evaluate the potential for contamination and migration.

3.6.5.1 Geologic Conditions

Information regarding the hydrogeologic framework at this 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 was obtained from 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 partial size (d50) of 4 millimeters. The uniformity coefficient of 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 this site.

3.6.5.2 Hydrologic Conditions

The groundwater level 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 3-8. In general groundwater flow at the site is from the center of the Key toward the eastern and western coastline according to the water level data collected. A groundwater mound 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, the water level across the site is relatively flat with very little gradient.

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 x 10^{-5} centimeters per second. This permeability is representative of a fine sand to silty sand.

3.6.5.3 Analytical

The following section presents the groundwater analysis. Analytical results are presented in Tables 3-47 through 3-52. Only compounds that were present in concentrations greater than the detection limits are shown. Complete laboratory result reports are presented in Appendix G.

<u>Inorganics</u>: Groundwater analytical results for Site 7 indicate the detection of metal compounds above their CSCs (Table 3-47). These metals are: Antimony, Cadmium, Chromium, Iron, Lead, Manganese, Mercury, Nickel, and Sodium. The sodium concentration may be reflective of natural conditions rather than contamination. Groundwater obtained from Monitoring Wells KWM-01 and KWM-02 contained the lowest levels of metal concentrations. These wells are located upgradient at the outer edge of the reported landfill area. Wells located downgradient along the shoreline within the landfill area encountered the highest concentrations.

Organics: Only groundwater obtained from Monitoring Well KWM-12 had any detectable concentrations of volatile organic compounds (Table 3-48). However all compounds were below their established CSC or the instrument quantification.

Pesticides/PCBs: No pesticides or PCBs were detected in any of the groundwater samples collected at this site.

3.6.6 Surface Water and Sediment Investigation

A surface water sample was collected from the small tidal creek located on the western side of the site. The analytical results for this sample are summarized in Table 3-49.

This table shows the analytical results for the inorganic analytes detected in this sample. Of the analytes with established CSC limits, only iron, lead and sodium were detected in concentrations above their respective limit values. Sodium is a natural occurring substance for the area.

Four sediment samples were collected at this site. One of these samples, S-2, was collected in conjunction with the surface water sample collected from the tidal creek. The remaining samples were collected from along the shoreline. The analytical results for the inorganic analyses of the sediment samples is shown in Table 3-50. CSCs for the metals that have them, were not exceeded.

No pesticides or PCBs were detected above the instrument quantitation limits in any of the sediment samples as shown in Table 3-51.

Table 3-52 shows the analytical results of the volatile and semi-volatile analyses of the sediment samples. The sample collected at S-2 showed detectable concentrations chrysene, floranthene, phenenthrene, and pyrene for which CSCs have not been established.

Table 3-53 presents a data summary of water levels and all detected contaminants.

3.7 Site 8 - Fleming Key South Landfill

3.7.1 Existing Data

Five shallow monitoring wells (KWM13 through KWM-17) were installed at this site to depths of between 12 feet and 22 feet. Groundwater levels measured 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 USEPA 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 KWM13, KWM-14, KWM-17. Arsenic, copper, and mercury were detected in all samples, the highest concentrations being 0.007, 0.300 and 0.620 ppm, respectively.

3.7.2 Air Monitoring Survey

IT personnel conducted an air monitoring survey as shown in Table 3-2.
An OVA reading of 40 ppm was detected along transect No. 1 at this site. A "tar ditch" containing asphalt was observed in the northern most woods along this transect.

3.7.3 Waste Characterization

The approximate area of the landfill at this site is 22.6 acres. Twenty test pits were excavated over the landfill area to characterize substances and materials disposed of at this site. The test pits were distributed throughout the site as shown in Figure 2-6. Wastes encountered at this site consisted of 40 percent vehicle debris, 30 percent household debris, 25 percent construction debris and 5 percent electrical debris. Vehicle debris included car/truck parts and sheet metal. Oil, gas and antifreeze were encountered at test pit TP6 emitting high organic vapors from 90-1,000 ppm at depths of 2-18 feet BLS.

Household debris consisted mainly of cafeteria trays, silverware, food containers, glass, rubber and plastics. Construction debris encountered was mainly large concrete slabs, steel cables, wood and roofing shingles. Minimal electrical debris was found, most of which was electrical conduit. All waste encountered at this site is summarized in Table 3-3. The water table was commonly encountered from 6 to 8 feet BLS. By comparison of the test pits and soil boring logs the estimated depth of waste encountered generally ranged between 1 to 10 feet BLS. No debris was present in test pits T-7, T-9, T-11, and T-12.

3.7.4 Soil Investigation

The Certificates of Analyses for all the soil samples analyzed are contained in Appendix G with a summary listed in Table 3-54. Only those compounds that were present in concentrations greater than the instrument detection limit are listed.

None of the detected metals were above their CSCs.

3.7.5 Hydrogeologic Investigation

The following discussions presents the physical setting and analytical results necessary to evaluate the potential for contamination migration.

3.7.5.1 Geologic Conditions

Information derived from monitoring well borings was used to construct a geologic framework to assess the potential for contamination migration. As shown in Appendix E, 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 a medium density. The material encountered below the water table is soft offering little penetration resistance. Native material was usually encountered below 18 and 20 feet BLS. This native material is part of the Miami Oolite Formation.

Geotechnical data was obtained from a composite sample taken from 16 to 20 feet BLS from the borehole of Monitoring Well MW8-6, as shown in Table 3-5. In comparison with other results from this area, grain size distribution indicates the soil to be 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 of 56.1 meq/g indicates this media has a moderate ability to attract and hold adsorbed ions. The total organic content, at 5,700 mg/kg is very high in comparison to some of the other sites, and in conjunction with a permeability of 1.04×10^{-5}, this media's ability to attenuate contaminates is relatively high. The pH is very basic at 8.50, however, this is to be expected due to the abundance of carbonate rocks and soils.

3.7.5.2 Hydrologic Conditions

Hydraulic conductivity, as obtained from two Environmental Assessment Reports, ranges from approximately 72 to 1,024 gpd/ft^2. 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 3-10. Clearly this area is greatly affected by tidal variations. A groundwater trough appeared to exist in the northeast portion of Site 8 is evident at the time these water level readings were collected. Accordingly, groundwater flow seems to be into this low-lying area and then trends northeast toward inner Fleming Key. Recharge of this area is by direct infiltration of precipitation.

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

Groundwater levels were continuously monitored throughout August 1990 in the recorder well at this site. Sea level data was also compiled during this time interval to assess tidal influences on groundwater levels. Hydrographs depicting the groundwater level fluctuations and sea level fluctuations for the month of August are presented in Figure 3-11. It is apparent that the correlation of the high and low water level 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.

3.7.5.3 Analytical

The following section presents results of the groundwater laboratory analysis. Certificates of Analysis for all samples analyzed are included in Appendix G with a summary presented in Tables 3-55 through 3-62. Only compounds present in concentrations greater than their detection limits are listed on the tables.

Inorganics: Groundwater samples collected from Site 8 showed detectable concentrations of metals in all the samples (Table 3-55). In comparison to the groundwater samples collected at the other sites, several analytes, calcium, magnesium, potassium, iron, and sodium were detected. These analytes are believed to be indicative of the natural groundwater system. These analytes are seen in high concentrations in the groundwater sample collected from KWM-15. This well is hydrologically upgradient of the landfill area based on the water levels collected on July 11, 1990. The remaining wells showed varying amounts of analytes commonly associated with landfill contaminates. Arsenic, chromium, lead and mercury were detected above their CSCs.

Organics: All organic compounds except chlorobenzene were detected below their CSC limits (Table 3-56). Analysis of groundwater identified chlorobenzene present at concentrations of 63 ug/l which exceeded the CSC of 10 ug/l.

Pesticides/PCBs: No pesticides or PCBs were detected above the instrument quantitation limits in any of the water samples.

3.7.6 Surface Water and Sediment Investigation

Certificates of Analysis for all samples analyzed are included in Appendix G. Only those compounds that were present in concentrations greater than the detection limits are shown in this table.

The analytical results for inorganic analyses of the sediment samples are presented in Table 3-57. As shown on this table, all of the sediment samples contained concentrations of antimony, arsenic, chromium, copper, lead, manganese, and zinc. Only antimony was detected above its CSC.

The results of the volatile organic analysis of the sediment samples, shown on Table 3-58 indicate no concentrations were above any established CSCs.

Table 3-59 shows the results of the pesticide and PCB analysis of the sediment samples. The CSC limits have not been exceeded.

The analytical results for the surface water sample is shown on Tables 3-60 through 3-63. As previously stated, this sample was collected from standing water in an unfilled portion of the landfill trench.

Table 3-60 presents the results of the inorganic analysis for the surface water sample. The sample contained concentrations of metals above their CSCs including: arsenic, cadmium, iron, lead, and manganese.

As shown on Table 3-61, only one PCB aroclor-1242, was detected above its CSC in this sample.

Table 3-62 presents the volatile organic analyses for the surface water sample. Acetone was detected at 46 ppb, however, it was also detected in the blank suggesting a laboratory source for its presence.

Table 3-63 shows a data summary for water levels and all detected contaminants.

3.8 Site 9 - Trumbo Point Annex Fuel Farm and Piers

3.8.1 Existing Data

Two previous studies conducted at the site identified three areas of known hydrocarbon (free product) contamination. These studies included the installation of 16 monitoring wells and 15 soil borings.

3.8.2 Air Monitoring Survey

The Trumbo Point Fuel Farm and Piers did not have an air monitoring survey performed due to the known presence of volatile organics as part of the operation of the fuel farm. Air quality was monitored during all subsurface operations for health and safety purposes with readings being negligible at those sites.

3.8.3 Waste Characterization

Existing data indicates that the contamination from petroleum hydrocarbons including the gasoline and kerosene groups exist in some areas of this site. The investigation to determine the extent of excess soil contamination was conducted by the installation of soil borings guided by OVA measurements and head space analysis. The investigative technique (soil and hydrogeological) follows the procedure presented in the FAC 17-770.003(3) as a means to define the extent of contamination.

3.8.4 Soil Investigation

A soil boring program was implemented at Trumbo Annex Fuel Farm and Piers to assess the extent of excessive soil contamination. Continuous split spoon samples were collected to the top of the water table, approximately 4 to 5 feet BLS. Samples collected just above the water table were screened with an OVA using the head space analysis method. Thirty borings/samples were collected and analyzed in this manner inside Trumbo Point Fuel Farm. OVA readings ranged from 0 (i.e., not detected) to approximately 5,000 ppm. Areas of excessive soil contamination based on the head space analysis results are shown in Figure 3-14.

Four additional borings/samples were collected along the underground pipelines and head space analysis readings ranging from 3 to 12 ppm. These results based on our understanding and interpretation of the regulations do not constitute excessive soil contamination.

An additional six soil borings/samples were performed on the piers (three per pier) at Trumbo Point as shown in Figure 2-8. Head space analysis was performed resulting in OVA readings ranging from 0 to 1,200 ppm. Whether these areas of excessive soil contamination are due to accidental spillage or leakage along the underground pipeline can not be determined from this study. Areas of excessive soil contamination and head space analysis results for Trumbo Road and Piers are shown in Figure 3-15.

3.8.5 Hydrogeologic Investigation

The following discussion presents the physical setting and analytical results used to evaluate the potential for contaminate migration.

3.8.5.1 Geologic Conditions

Information gathered from the four monitoring well borings and 40 soil borings was used to establish a geologic framework. Material encountered consisted of sandy limestone fill mixed with gravel and shell fragments above the water table. Material commonly encountered below the water table was silty oolitic limestone mud as shown in the lithologic logs in Appendix E. Petroleum (free product) was encountered in the borings of Monitoring Well MW9-10 and several shallow soil borings. SPT blow counts indicate the material encountered above the water table is dense and the material at and below the water table is considered soft.

Geotechnical data was obtained from a composite soil sample collected from 2 to 4 feet BLS, Boring B-30. Geotechnical data (Table 3-5) includes grain size distribution, moisture content, soil pH, cation exchange capacity, and total organic carbon content. Grain size analysis indicated that soils at the site ranged in size from cobbles to clay with an average particle size of 3.0 mm. The uniformity coefficient (1025.0) indicates this material encountered above the water table is poorly sorted compared to other values in this area. The pH of 8.35 is expected due to the natural condition of the site (carbonate soils and rocks). The cation exchange capacity is 49.22 meq/g. This result is relatively low in comparison to results of the other site and indicate a reduced ability to exchange and hold cations. The permeability is 1.80×10^{-6} which is representative of a mixture of sand, silty, and clay.

3.8.5.2 Hydrologic Conditions

Groundwater levels were collected and groundwater contour lines were derived using a three point problem. Groundwater flow is determined to be to the northeast as shown in Figure 3-12.

Groundwater fluctuations were continuously monitored through the month of August 1990 to assess tidal influence. Sea level data was also obtained during this time interval for correlation to groundwater changes. The hydrograph of sea level fluctuations and groundwater level fluctuations through the month of August are presented in Figure 3-13. The correlation between these two hydrographs are apparent. The daily peaks and valley of both hydrographs clearly coincide. An approximate two to three day lag is also observed between groundwater and sea level fluctuations throughout the month of August. Sea level fluctuations range from -0.9 to 1.4 feet MSL while groundwater elevations range from 0.4 to 3.0 feet MSL.

3.8.5.3 Analytical

Certificates of Analysis for all samples analyzed are included in Appendix G. Only compounds present in concentrations greater than their detection limits are listed on the table.

Inorganics: The inorganic analysis results indicate no compound exceeded its respective CSC (Tables 3-64 through 3-67).

Organics: High levels of volatile organics were found in monitoring wells and adjacent soils near the above ground storage Tank No. 2.

The results indicate that benzene, toluene, and ethylbenzene concentrations detected are above their respective CSC values (Table 3-64).

Table 3-68 presents a data summary for water levels and all detected contaminants.

3.8.6 Surface Water and Sediment Investigation

No surface water features were present at this site and as such surface and/or sediment samples were not collected.

3.9 Site 10 - Boca Chica Fire Fighting Training Area

3.9.1 Existing Data

Ten soil borings and two shallow monitoring wells (KWM-18 and KWM-19) were previously installed 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.

3.9.2 Air Monitoring Survey

Table 3-2 shows the air monitoring survey as performed. Minimal fugitive emissions of organic compounds were detected at this site, ranging from 1-2 ppm throughout Transects No. 1 and No. 2.

3.9.3 Waste Characterization

Because of no known waste disposal practices at this site, waste characterization will relate only to chemical use at the site. However, general site inspection revealed plane wreckage near the northern circular burnpit, burned metal frames, drums and wreckage in the burn pits and the surrounding area was charred black. Comparison of soil boring logs at this site show OVA readings from 1 ppm up to 96 ppm at depths of 1 to 10 feet BLS.

3.9.4 Soil Investigation

The analytical results of the soil samples are summarized in Tables 3-69 and 3-70. Only those compounds that were present in concentrations greater than the detection limits are shown.

3.9.5 Hydrogeologic Investigation

The following discussion presents the physical setting and analytical results used to evaluate the potential for contamination and migration.

3.9.5.1 Geologic Conditions

Information derived from the borings 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 in any of the boreholes.

Geotechnical data was obtained from 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 of 44.22 meq/g is similar to most of the other values in this area which indicates the ability of the media to hold adsorbed ions is relatively weak and results in a tendency for contaminant mitigation.

The TOC (0.73 mg/kg) is low as compared to the other values indicating little organic matter. This condition reduces the media's ability to attenuate contaminates. The permeability value is 9.55×10^{-6} centimeters per second which is representative of a fine sand.

3.9.5.2 Hydrologic Conditions

Groundwater levels collected for this site were plotted, contoured, and depicted on Figure 3-16. Elevation contours indicate that groundwater is moving from inland towards the lagoon area. Recharge of the aquifer is through direct infiltration of precipitation.

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

3.9.5.3 Analytical

The following section presents results of groundwater laboratory analysis. Only compounds that were present in concentrations greater than the detection limits are shown. Complete laboratory Certificates of Analysis are presented in Appendix G.

Inorganics: Groundwater analytical results for site 10 indicate that metal compounds have impacted this area (Tables 3-71 and 3-74). Groundwater obtained from monitoring well MW10-3 contained the highest levels of metal concentrations.

Only chromium, iron, and sodium were detected. Chromium was detected above the CSC limit of 50 ppb in groundwater obtained from monitoring wells MW10-2 and MW10-3 at 73.5 and 53 ppb, respectively. Iron was detected above the CSC limit of 300 ppb in groundwater obtained from all of the monitoring wells, except MW10-1 and ranged from 1,230 ppb in KWM-18 to 4,940 ppb in MW10-3. Sodium was detected above the CSC limit of 160,000 ppb in groundwater obtained from all of the monitoring wells which is expected due to the salinity of the groundwater.

Organics: Only groundwater obtained from monitoring wells MW10-2 and KWM-18 had any detectable concentrations of volatile organic compounds (Table 3-72). Benzene, ethylbenzene, and naphthalene, were detected in groundwater obtained from KWM-18 at 11 ug/l, 15 ug/l, and 39 ug/l, respectively. These compounds are above their respective CSC limit. The presence of these compounds are indicative of a gasoline or diesel fuel. Considering the number of fire fighting exercises that occur, the degree of contamination related to organic compounds appears relatively low.

Pesticides: All compounds were below detection limits (Table 3-73).

3.9.6 Surface Water and Sediment Investigation

No surface water or sediment samples were collected for site 10.

Table 3-75 presents a data summary table for water levels and detected contaminants.

3.10 QA Summary

Various types of quality control samples were submitted to the laboratory to assess overall accuracy and precision. Information regarding accuracy and precision is necessary to determine the confidence in the data set.

Precision and accuracy together indicate the errors associated with any given analytical procedure. Accuracy measures the systematic error of a method, as compared to a reference standard. In laboratory procedures, accuracy is determined as percent recovery of a known (spiked) sample. Because precision examines the distribution of reported values around their true value, precision can be defined as a measure of the magnitude of the error. Precision is often expressed as the Relative Percent Difference (RPD) between two measurements from identical (duplicate or spiked duplicate) samples.

The sampling effort at the NAS Key West involved the collection of QC samples in the field. The types of QC field samples collected included:

- trip blanks
- equipment rinsates
- sample duplicates

In addition to these field QA/QC samples, quality control samples were prepared and analyzed in the laboratory. These included:

- method blanks
- matrix spikes
- matrix spike duplicates
- surrogate spikes.

Each of these laboratory samples are used to assess a different aspect of quality control.

Method blanks indicate any contamination that might occur in the processing of a sample. They consist of deionized water that is prepared and analyzed as if it were a site-specific sample. Any positive results in the method blank would indicate contamination in the reagents, containers, or possibly equipment used to process the samples.

Trip blanks are samples that originate from analyte-free water taken from the laboratory to the sampling site and returned to the laboratory with the volatile organic samples. Trip blanks are only analyzed for VOA's and any contamination in the trip blank would indicate that volatile organic compounds may have contaminated the field sample during transport.

Equipment rinsate samples are samples collected using the water that has been rinsed over cleaned sampling equipment. The rinsates are analyzed for the same parameters as the related samples. Any positive results in the equipment rinsate may indicate the possibility of cross-contamination between sampling points.

When the results of trip blanks, equipment rinsates, and method blanks are all negative, it is reasonable to conclude that the levels of that particular compound tested for, when found in a site-specific sample, do in fact originate from the site.

Unlike method blanks, surrogate and matrix spikes are used to determine accuracy and precision. Surrogates are compounds that are added to every sample (blank, site, matrix spike, etc.) that are used to evaluate analytical efficiency by measuring recovery. Surrogates are typically brominated, fluorinated, or isotopically labelled compounds that are not expected to be encountered in environmental media. For example, in the volatile organic analysis for the Target Compound List under CLP protocol, the surrogates used to evaluate recovery are toluene, bromofluorobenzene, and 1,2-dichloroethane-d4. For the semi-volatile analysis, the surrogates used are nitrobenzene-d5, 2-fluorobiphenyl, terphenyl, phenol-d5, 2-fluorophenol, and 2,4,5-tribromophenol, and for pesticide analyses, the surrogate is dibutylchlorendate.

Matrix spikes are aliquots of the sample (either water or soil) that are "spiked" with a known quantity of the analyte(s). The spiked sample is subjected to the entire analytical process in order to indicate the appropriateness of the method for the matrix by measuring recovery of the matrix spike compounds. A matrix spike duplicate is a replicate matrix spike which is used to calculate relative percent difference (RPD) in recovery, which determines the precision of the method. Matrix spikes aid in determining how well a method works on a particular matrix.

The following sections give an overview of the quality of data associated with each type of analysis. Quality control information will be summarized and analyzed by analysis so that the overall quality of the data can be assessed.

3.10.1 Volatile Organic Analyses

Method Blanks: Method blanks for all volatile organic analyses performed are given in Tables 3-76 through 3-80. Volatile organic analyses performed were for Target Compound List parameters, Appendix IX parameters, and EPA 601/602 parameters. Method blanks are prepared for these parameters for both soil and water samples.

The method blanks for Target Compound List parameters for soil and water samples contained some detections of methylene chloride, acetone, 2-hexanone, carbon disulfide, chloroform, and 2-butanone (Tables 3-76, 3-77). However, these detections are all noted as "BDL," meaning that although the compound was detected, the concentration is an estimated value because it is below the quantification limit of the instrument. Thus, the overall quality of the data is not affected. Tables 3-78 and 3-79 show the method blanks for Appendix IX parameters for water and soil samples, respectively. These method blanks did not show any detections at the detection limits for each compound, indicating that there was no laboratory contamination during sample processing. Method blanks for volatile organics under EPA 601/602 are given in Table 3-80. Only water samples were submitted for the 601/602 analysis. Again, there were no detections of compounds either at or below the detection limits. As indicated by the method blanks, the laboratory quality for volatile organic analyses meets more than acceptable standards.

Surrogate Recoveries: Percent surrogate recoveries for volatile organic analyses for Target Compound List parameters, Appendix IX parameters, and EPA 601/602 parameters for water and soil samples are given in Tables 3-81 through 3-85. Tables 3-81 and 3-82 show the surrogate recoveries for water and soil samples for the Target Compound List. Only 4 samples had percent recoveries that were outside of contract required quality control (QC) limits for one or more surrogates. Tables 3-83 and 3-84 show the percent surrogate recoveries for Appendix IX parameters for soil and water samples. All recoveries for these surrogates are within contract required QC limits. Table 3-85 shows the percent surrogate recovery for the EPA 601/602 parameters. Although no QC limits have been established for recovery of these surrogates (bromochloromethane, ortho-chlorofluorobenzene, and fluorobenzene), the recoveries noted here approximate recoveries noted for the other analyses. Overall, the percent surrogate recoveries meet a more than acceptable level of quality, showing a high degree of analytical efficiency for the volatile organic analyses.

Matrix Spikes: Tables 3-86 and 3-87 present the matrix spikes (MS) and matrix spike duplicates (MSD) for volatile organic analysis as well as the semi-volatile organic and pesticide analysis for the Target Compound List for soil and water samples. For soil samples (Table 3-86), all matrix spike and matrix spike duplicates were within QC limits, indicating that the analytical method is appropriate for this water matrix. Relative percent differences (RPD) between the spikes and duplicates were also very small, showing a high degree of precision for this method. For water samples (Table 3-87), only two samples, 04-08-GM-GW and 01-03-GM-GW, had one to two matrix spikes that were out of advisory QC limits. As seen previously, relative percent differences were small, and the overall quality of the data meets more than acceptable standards. Tables 3-88 and 3-89 present the matrix spikes for the Appendix IX and EPA 601/602 parameters. With the exception of only one matrix spike duplicate, all recoveries were within advisory limits. Overall, the volatile organic analytical procedures have been shown to be both appropriate and precise for each matrix.

Trip Blanks: Tables 3-90 and 3-91 show trip blanks for volatile organic analyses for Target Compound List and EPA 601/602, respectively. Every trip blank showed levels of the common laboratory contaminant, methylene chloride, present in the blank (Table 3-90). However, in 5 out of 7 of these, methylene chloride was found in the method blank as well, indicating that the presence of this compound in the field blank is due to laboratory contamination. Acetone and carbon disulfide were also detected in some of these blanks, and like acetone, these were all detected at concentrations below the detection limit. One field blank, which was collected from a water tap, contained concentrations of chloroform, bromodichloromethane, dibromochloromethane, and bromoform that were both above the detection limit and not detected in the method blank.

3.10.2 Semi-volatile Organic Analysis

Method Blanks: Tables 3-92 through 3-95 show the method blanks for the semi-volatile organic analysis for soil and water samples for the Target Analyte List and Appendix IX parameters. Two of the method blanks for water samples (Table 3-93) contained a single detection above the detection limit for chrysene and bis(2-ethylhexyl)phthalate. For soil samples (Table 3-93), only two method blanks had a detection of bis(2-ethylhexyl)phthalate slightly above the detection limit. All method blanks for the Appendix IX parameters in both soil and water samples were below detectable limits. The quality of the method blank analysis more than meets acceptable standards.

Surrogate Recoveries: Tables 3-96 through 3-99 present the percent surrogate recoveries for water and soil samples for both Target Compound List (TCL) and Appendix IX analyses. Among all soil/sediment samples submitted for TCL analysis (Table 3-97), only 4 had surrogate recoveries that were outside of QC limits. Only 5 of the ground and surface water samples submitted for TCL semi-volatile analysis had surrogate recoveries that were outside of QC limits (Table 3-96). All samples submitted for Appendix IX analysis had percent surrogate recoveries that were within QC limits (Tables 3-98 and 3-99). Thus, the semi-volatile analysis, like the volatile analysis, demonstrates a high degree of analytical efficiency.

Matrix Spikes: Tables 3-86, 3-87, and 3-88 include matrix spike and matrix spike duplicate analysis for semi-volatile organic analysis. For soil samples (Table 3-86), the sample Site 5, Plot 1 had several matrix spike compounds that were outside of QC limits. However, the majority of the remaining soil and water samples (Table 3-87) had matrix spikes and RPDs that were all within QC limits. For Appendix IX samples (Table 3-88), only one sample, 04-01-SED, had an RPD that was outside of QC limits. Overall, the data meets acceptable standards for accuracy and precision.

3.10.3 Pesticide/PCB Analysis

Method Blanks: Samples were analyzed for pesticides and PCB's according to TCL and Appendix IX protocol. The method blanks for these analyses are presented in Tables 3-100 through 3-103. Pesticides were not detected in any method blanks, indicating that there was no laboratory contamination during the pesticide analyses.

Surrogate Recoveries: Percent surrogate recoveries for all samples analyzed for pesticides are shown in Tables 3-104 through 3-107. All samples analyzed for pesticides according to Appendix IX parameters had recoveries for the surrogate dibutylchlorendate that fell within advisory QC limits (Tables 3-106 and 3-107). All water samples analyzed according to TCL methods for pesticides had surrogate recoveries within advisory limits (Table 3-105). Table 3-104 presents percent surrogate recovery for pesticides in soil samples analyzed by TCL. Because of the high levels of DDD, DDE, and DDT present in the samples, dilutions were necessary. While dilutions result in elevated detection limits, they also prevent the quantitation of surrogate recoveries because the surrogates are essentially diluted out. Thus, most of the samples from Site 3 and Site 5, where heavy pesticide contamination was noted, have surrogate recoveries that were impossible to calculated due to dilution.

Matrix Spike: Tables 3-86, 3-87, and 3-88 include the matrix spikes for all pesticide analyses, both TCL and Appendix IX. Water samples for pesticide matrix spikes had percent recoveries that fell within acceptable limits fairly consistently (Tables 3-87 and 3-88). However, three of the four soil samples had MS and MSD recoveries that were consistently outside of QC limits (Tables 3-86 and 3-88). Four soil samples analyzed for TCL (Table 3-86), recoveries were impossible due to the amount of pesticides already present in the samples. Further dilutions would have resulted in a complete dilution of the spike. Four samples analyzed under Appendix IX for pesticides (Table 3-88), matrix interferences were encountered. This prevented the determination of spike recoveries in the MS and MSD analysis.

3.10.4 Inorganic (Metals) Analysis

Method Blanks: Samples were analyzed for metals according to Target Analyte List and Appendix IX. Method blanks for these analyses are presented in Tables 3-108 through 3-111. While the method blanks for Appendix IX Analysis for soil samples did not have any detections above the detection limits (Table 3-111), the remaining method blanks did contain some random detections of aluminum, iron, magnesium, potassium, thallium and zinc. These random detections, however, are not of great enough frequency to affect the overall quality of the data.

Spike and Post Digestion Recovery: Unlike organic analyses, inorganic (metal) analyses do not have percent surrogate recoveries performed. Spike and post digestion recoveries are calculated for inorganic analysis, and the results are shown in Tables 3-112, 3-113, and 3-114.

Table 3-112 presents the inorganic spikes for water samples under TAL analysis. Spike recoveries, which measure accuracy, were outside of acceptable control for many elements. The elevated levels of mineral elements such as sodium, calcium, and magnesium, caused matrix interferences. These matrix interferences resulted in elevated detection limits that were higher than the detection limits specified by the Contract Laboratory Program (CLP) as the spiking level. These same problems were seen in the water samples for Appendix IX (Table 3-114) and in the soil samples for the TAL (Table 3-113). While many of the recoveries for these samples are outside of acceptable limits, it should be noted that the matrix interferences are a result of the minerals naturally present in samples taken from a saline environment.

3.10.5 EP Toxicity Analysis

Tables 3-115 and 3-116 present the method blanks and matrix spike analysis for the EP Toxicity analysis, respectively. The method blanks did not show any detections of metals, indicating that there was not any laboratory contamination during sample processing. The matrix spike and matrix spike duplicate analysis showed a high level of accuracy and precision for this analytical procedure with only one element, silver, having recovery limits outside of advisory limits (Table 3-116).

3.10.6 EPA Method 8280 - Dioxin/Furan Analysis

Tables 3-117 and 3-118 present the method blanks for dioxin and furan analysis for water and soil samples, respectively. All method blanks were without detected dizziness or furans, indicating that no laboratory contamination occurred in the processing of the samples. Matrix spikes and matrix spike duplicates for this analysis are presented in Table 3-119. All recoveries and relative percent differences (RPD) for the compounds were within QC limits, indicating a high degree of accuracy and precision for this analysis.

3.10.7 Polynuclear Aromatic Hydrocarbon Analysis

Table 3-120 presents the method blank for the polynuclear aromatic hydrocarbon analysis performed. This analysis was free from any laboratory contamination because the method blank did not show any detections.

3.10.8 Total Organic Carbon Analysis

A single method blank was analyzed as a part of the TOC analysis (Table 3-121). This method blank did not show any detections at the detection limit of 1 mg/kg, indicating that no laboratory contamination occurred during sample processing.

3.10.9 Lead Analysis

Table 3-122 presents the method blank for lead analysis, showing that there were no detections in the method blank. A duplicate lead analysis was also performed for purposes of quality control (Table 3-123). The duplicate analysis and RPD were all within acceptable levels, indicating a more than acceptable quality of data.

3.10.10 EPA Method 504

A matrix spike and matrix spike duplicate were analyzed to determine the accuracy and precision of the Method 504 analysis (Table 3-124). All results and RPD values indicate a more than acceptable quality of data.

3.10.11 EPA 614/8140

One water and one soil sample were each analyzed for a matrix spike and matrix spike duplicate for the EPA 614/8140 analysis (Table 3-125). All recoveries and RPD values were within an acceptable range, indicating a high degree of accuracy and precision for this analysis.

4.0 Preliminary Hazard Assessment

The purpose of the Preliminary Hazard Assessment is to determine whether there are any immediate impacts to either human health or the environment from chemicals present at NAS Key West. With the exception of Site 3, for which a baseline risk assessment has already been performed, this hazard assessment will be qualitative in nature.

For each site, the potential chemicals of concern will be identified from field investigations. However, not all metals will be qualitatively evaluated. Metals such as calcium, iron, magnesium, potassium, and sodium are not evaluated in hazard assessments because of their natural occurrence and necessity to humans as a nutrient (iron) or as electrolytes (potassium, sodium, calcium, magnesium). A brief exposure assessment, (as applicable), will be provided for each site. The exposure assessment will include site-specific pathways that are related to chemical transport through media such as air, soil, or groundwater. Primary exposure routes, such as ingestion, dermal contact, and inhalation, describe mechanisms through which human receptors come in contact with contaminants. The exposure assessment will also qualitatively evaluate any potential impacts on environmental receptors, such as animals. Additionally, where applicable, a conceptual model of the site will be provided delineating the release sources, release mechanisms, transport pathways, exposure routes, and potential receptors.

Because a baseline risk assessment has already been performed for Site 3, data collected from recent field activities will be evaluated within the framework previously developed in this preliminary hazard assessment. This data will be used to determine whether the conclusions and recommendations from the initial risk assessment require revisions. The following is the preliminary Hazard Assessment for each of the eight sites at NAS-Key West.

4.1 Site 1 - Truman Annex Refuse Disposal Area

Site 1, is located on the southern shore of Truman Annex along the Atlantic Ocean, and was used as an open burn and disposal area. Currently, the site is no longer used as a landfill and has been enclosed by a fence.

4.1.1 Potential Chemicals of Concern

The potential chemicals of concern at Site 1 are metals, particularly antimony, cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc that were detected in groundwater (Table 3-7). These metals were detected in many wells at levels above their CSC. However, soil samples did not show any elevated concentrations of metals when analyzed by EP Toxicity. There were also only two detections of pesticides and PCBs above the established CSCs in sediment and groundwater samples (Tables 3-8 and 3-10). Thus, because of the limited detections of pesticides/PCB compounds, they are not considered potential chemicals of concern.

4.1.2 Potential Transport Pathways

Potential transport pathways include movement of chemicals, following release, through media such as water, soil and air. At Site 1, the potential transport pathway for metals is through the groundwater. Based on the results of the EP Toxicity analysis, the soil does not appear to contain elevated levels of metals. Neither would chemicals at this site be predicted to be transported through ambient air because metals do not undergo volatilization and the site has a vegetative cover to control fugitive dust.

4.1.3 Potential Exposure Routes

Because groundwater is the medium containing the potential chemicals of concern, possible exposure routes to humans include ingestion and dermal contact with groundwater. Inhalation exposure to metals from groundwater would not be expected to occur because metals do not undergo volatilization. Also, a human receptor would not be expected to encounter groundwater at Site 1 because groundwater at Key West is not used for potable water. All water used at Key West is supplied via a pipeline from Miami. However, the site's proximity to the sea allows that these chemicals (metals) may potentially be entering the ocean, as groundwater flow at the site has been shown to be toward the ocean.

4.1.4 Potential Receptors

Humans are not expected to be the primary receptors for chemicals (metals) present in the groundwater. However, environmental receptors, such as shellfish and other aquatic animals, may potentially be impacted by metals in the groundwater from Site 1. Humans may then potentially be exposed to these metals should they ingest any fish or shellfish that have bioaccumulated these metals. A conceptual model of the site, delineating potential receptors, is given in Figure 4-1.

4.1.6 Conclusion

Because groundwater at the site is not used for water supply systems, humans would not be expected to directly contact any chemicals present in the groundwater. However, metals present in the groundwater may impact environmental receptors such as shellfish that live along the coastline. The extent to which this may or may not occur is not known, due to the fact that the groundwater will become significantly diluted by sea water. Should bioaccumulation of metals in shellfish occur, and humans ingest some of these shellfish, there is the potential for humans to become indirectly exposed to metal contaminants. Further investigation is needed to determine the concentrations of metals actually reaching the ocean.

4.2 Site 3 - Truman Annex DDT Mixing Area

A baseline risk assessment was previously performed for Site 3. Because the site's usage has remained essentially unchanged, data from recent field investigations will be evaluated based on the assumptions and models developed in the initial baseline risk assessment. For brevity please refer to the Baseline Risk Assessment Report- Site 3 (February 1990) for a full outline of potential transport pathways and exposure routes.

4.2.1 Potential Chemicals of Concern

Confirming previous findings, the chlorinated hydrocarbon pesticides of the DDT family and dieldrin appear to be the potential chemicals of concern. These pesticides were detected primarily in soil (Table 3-12) and also to some degree in groundwater (Table 3-15). No other class of chemicals were detected on a consistent basis in the soil and water media. Volatile organic compounds from the TCL analysis were not detected in groundwater, and the volatile organic compounds that were detected in soil were all below established CSCs (Table 3-13). Likewise, metals in soil and groundwater were not detected at levels above the established CSC (Tables 3-14 and 3-15).

Acceptable concentrations of DDT and its daughter products DDD and DDE in soil for various exposure periods were determined in the baseline risk assessment as follows:

- 340 mg/kg DDT in soil for 1 hour daily exposure for 3 years
- 100 mg/kg DDT in soil for 1 hour daily exposure for 10 years
- 20 mg/kg DDT in soil for 1 hour daily exposure for 70 years.

Current field data shows that pesticides detected in the soils ranged in concentration from 89 ug/kg to 220,000 ug/kg (0.089 mg/kg to 220 mg/kg) (Table 3-12). While the pesticides encountered at Site 3 in the recent field investigation are the same as those encountered earlier, the concentrations are higher. Previous investigations showed DDT concentrations no higher than 54.2 mg/kg. Although 220 mg/kg is significantly higher than the previous findings, it is still within the acceptable ranges shown above, but is closer to the range for the shortest exposure time of three years.

4.2.2 Potential Transport Pathways

Potential transport pathways at this site involve the migration of DDT (and its daughter products) from the soil. This includes leaching into the groundwater, surface water run-off, and potential volatilization into the ambient air. As determined earlier, DDT is not very volatile and thus not expected to undergo volatilization. Sediments samples have also been found to contain DDD, DDE, and DDT at levels slightly exceeding the established CSCs. The presence of these pesticides in the sediment samples may be indicative of the fact that soil erosion is occurring. DDT is somewhat stable within the soil matrix, and does not undergo large-scale leaching from soil into groundwater.

4.2.3 Potential Exposure Routes

Because water used in Key West is supplied via a pipeline from Miami, the groundwater present at the site is not expected to be used by any human populations. Thus, human receptors would not be expected to come in contact with this groundwater through ingestion or dermal exposure. However, DDT is present in the soils at elevated concentrations and this does present the potential although very slight for dermal exposure and human ingestion of these soils.

4.2.4 Potential Receptors

The DDT and related chlorinated hydrocarbon pesticides in the soil may be a potential source for the pesticides present in the groundwater. A groundwater analysis was not conducted as a part of the previous investigation, so no comparisons can be made. Because the groundwater is not utilized by any human populations, humans will not be exposed to the pesticides present in the water through ingestion, dermal absorption, or inhalation. Site 3 is also distant enough from the ocean that no conclusions can be drawn regarding concentrations of pesticides that might reach the ocean.

While DDT does degrade in soil into DDD and DDE, these three compounds remain fairly stable in the soil matrix. The site does not appear to be a feeding ground for any animal populations, as such animals would not be expected to encounter DDT contaminated soils. A conceptual model of Site 3 is provided in Figure 4-2.

4.2.5 Conclusion

In conclusion, the DDT present at Site 3 does not present any immediate impacts to human health or the environment. While DDT is present in the soils at Site 3, and the concentration of DDT in the groundwater may be related to the DDT in the soil, the soil concentrations of DDT fall within acceptable ranges calculated in the earlier baseline risk assessment. Thus, the conclusions and recommendations provided in the baseline risk assessment are still applicable.

4.3 Site 4 - Boca Chica Open Disposal Area

This site was used as an open disposal and burning area until the mid-1960's.

4.3.1 Potential Chemicals of Concern

Media sampled at Site 4 were groundwater, soil, surface water, and sediment. Based on current analytical data, there does not appear to be any potential chemicals of concern. Analysis for volatile organic compounds in the selected media was conducted under both Appendix IX and Target Compound List Analysis (Tables 3-27, 3-21, 3-31, 3-23). Volatile organic compounds in soil and sediment samples were not found above any established CSCs. Anthracene and anthracene-related compounds were found in one sediment sample, but these compounds do not have an established CSC (Table 3-31). Additionally, volatile organics were not detected in any surface water samples, but 1,2-dichloroethene was detected in one groundwater sample slightly above the CSC (Table 3-27). Metals were detected in some surface and groundwater samples, but only a few of these detections were above the CSC (Table 3-25, 3-28). Pesticides were not detected in any surface or groundwater samples. The pesticides DDD, DDT, and DDE and heptachlor epoxide were detected in soil samples, but only concentrations of heptachlor epoxide and the PCB Aroclor 1260 were actually above the CSCs in two samples (Table 3-19, 3-18). Sediment samples were found to contain levels of aldrin and heptachlor over the CSC values, but it is important to note that this pesticide/PCB analysis had elevated detection limits. Additionally, the other sediment sample did not have detectable levels of these pesticides (Table 3-30).

4.3.2 Potential Transport Pathways

Potential transport pathways include movement of chemicals, following release through media such as water, soil, and air. At Site 4, based on the above information this site is not deemed likely to cause releases in these media.

4.3.3 Potential Exposure Routes

Based on the preceding information, potential exposure routes are of mineral concern at this site.

4.3.4 Potential Receptors

Based on the preceding information, the possible potential receptor is not a concern at this site. The site is not subjected to general pedestrian traffic, and only authorized personnel are at the site. Thus, although possible, it is not probable for humans to be in contact with any contaminated soils, sediment, groundwater, or surface water.

4.3.5 Conclusions

Because no particular group of compounds was detected in great enough frequency or concentration to be considered potential chemicals of concern, chemicals present at this site are not likely to cause any immediate impacts to human health or the environment. Thus, a full exposure assessment, outlining potential receptors, was not developed.

4.4 Site 5 - Boca Chica DDT Mixing Area

This site was used for DDT and related pesticide mixing operations for approximately 30 years. Reportedly, some spillage of pesticides occurred on the property as a part of these operations. The site also contains a man-made drainage ditch that supports a fish population.

4.4.1 Potential Chemicals of Concern

The potential chemicals of concern at this site are the pesticides DDD, DDE, DDT, and the related chlorinated hydrocarbon pesticide heptachlor. These pesticides were detected in sediment and soil samples at concentrations that were above the established CSCs (Tables 3-33 and 3-42). DDE, DDT, heptachlor, alpha-BHC, and beta-

BHC were also detected in ground and surface water samples (Tables 3-38, 3-41). Volatile organic compounds were not detected above the established CSCs in the surface water or sediment (Tables 3-40, 3-43), but a few compounds were detected in groundwater. While benzene and chlorobenzene were detected in one monitoring well, this monitoring well was sampled twice, and the duplicate analysis resulted in a non-detect (ND). Because of this, these detections of benzene, chlorobenzene, and additionally, 1,2-dichloroethene are considered anomalies. Metal detections in the various media were below established CSCs with the exception of two detections. (Tables 4-1, 3-36, 3-44, 3-35, 3-39).

4.4.2 Potential Transport Pathways

Potential transport pathways at this site involve the migration of DDT (and its daughter products) from the soil. This includes leaching into the groundwater, surface water run-off, and potential volatilization into the ambient air. As determined earlier, DDT is not very volatile and thus not expected to undergo volatilization. These pesticides have been detected in the groundwater and surface water at the site. Sediment samples have also been found to contain DDD, DDE, and DDT at levels exceeding the established CSC. The presence of these pesticides in the sediment samples, and to a lesser degree, in the surface water samples, may be indicative of the fact that soil erosion and surface water runoff are occurring. Although DDT is somewhat stable within the soil matrix, and does not undergo large-scale leaching from soil into groundwater, levels of DDT found in the groundwater at the site may indicate that this process may be occurring to some extent.

4.4.3 Potential Exposure Routes

Because water used in Key West is supplied via a pipeline from Miami, the groundwater present at the site is not expected to be used by any human populations. Thus, human receptors would not be expected to come in contact with this groundwater through ingestion or dermal exposure. However, DDT is present in the soils at elevated concentrations and this does present the limited potential for dermal exposure and human ingestion of these soils. DDT and heptachlor have also been found in the two surface water samples taken from the on-site ditch (Table 3-38). This ditch reportedly supports a fish population. Because of DDT's property of concentrating within the fatty tissues of organisms, the fish may contain DDT within their tissues. Should any humans ingest these fish, the potential exists for a secondary exposure to DDT.

4.4.4 Potential Receptors

Humans are potential secondary receptors for DDT should they consume fish caught in the on-site ditch or come in direct contact with any of the contaminated soil on site. Fish are the primary environmental receptors for DDT found to be present in the ditch sediment and surface water.

The site is in a restricted access area, along Runway 13. As such, the site is not subjected to general pedestrian traffic, and only classified personnel are on the site at set specified times. Thus, although possible, it is not probable for humans to be in contact with contaminated soils, sediment, or surface water, or to engage in fishing activities. A conceptual model of the site is shown in Figure 4-3.

4.4.5 Conclusions

Site 5 does contain elevated levels of DDT and related compounds in the soil. Potential receptors include both human and aquatic species, although humans are not likely to encounter the chemicals by virtue of the restrictions placed on access to the site. However, while chemicals present at the site probably do not pose any immediate impact to human health, there is a potential for impacts to the environment. This is particularly true because DDT is known for its accumulation within the tissues of organisms and eventual bioaccumulation within the higher trophic levels in the food chain. Because a fish population has been shown to exist in DDT contaminated waters, there is a potential for DDT to become concentrated in their tissues.

4.5 Site 7 - Fleming Key North Landfill

The site was once used as a waste disposal/burial area, although much of the waste has reportedly been removed.

4.5.1 Potential Chemicals of Concern

Based on analytical data collected in the field investigations, the metals of lead and manganese are the potential chemicals of concern at Site 7. Pesticides were not detected in surface or groundwater samples. Only beta-BHC was detected at or near the detection limit in one sediment sample, but there is no established CSC for this compound in soil (Table 3-51). Volatiles were not detected in surface water, and were only randomly detected below detection limits in groundwater (Table 3-48). Some sediment samples had various compounds of phenanthrene detected, but these concentrations were not above the established CSC (Table 3-52). EP Toxicity analysis on soil samples did not show any concentrations above the established CSCs. Concentrations of some metals in the groundwater, such as antimony, cadmium, and lead were elevated above their CSCs (Table 3-47). Concentrations of manganese were also elevated above the CSC in 8 of the 9 wells, and levels of mercury were elevated above the CSC in 3 out of the 9 wells. Elevated levels of metals were not found in sediments, soils, or surface water (Tables 3-50, 3-46, 3-49).

4.5.2 Potential Transport Pathways

Elevated levels of metals have been shown to exist only in the groundwater. Thus, the only medium through which the metals may be transported is through the groundwater.

4.5.3 Potential Exposure Routes

Humans normally would only be exposed to metals in the groundwater via ingestion or dermal exposure. However, because all water used in Key West is supplied from Miami, humans are not expected to come into contact with this groundwater. Thus, these exposure routes are not expected to occur.

4.5.4 Potential Receptors

Humans are not considered potential receptors because of the fact that groundwater is not used in Key West. Additionally, there are also no known animal populations using this groundwater.

4.5.5 Conclusions

This site does not present any immediate impacts to the environment or human health. Groundwater is the only medium that contains the chemicals of potential concern, and it is not anticipated that humans would contact this groundwater. Likewise, there are no potential environmental receptors.

4.6 Site 8 - Fleming Key South Landfill

The site was used as a trench and fill landfill operation. Wastes from both the NAS operations and City of Key West were disposed of at this site.

4.6.1 Potential Chemicals of Concern

The potential chemicals of concern at this site appear to be metals, particularly antimony, lead, manganese, cadmium, arsenic, and chromium. Elevated concentrations of antimony were found in two out of three sediment samples (Table 3-57). One surface water sample was analyzed for metals, and it was found to contain elevated levels of arsenic, cadmium, lead and manganese (Table 3-60). EP Toxicity analysis (Table 3-54) did not show any metal contamination in the soils, however. Volatile organic compounds were not found to any extent in any of the media analyzed. Chlorobenzene was the only volatile that was detected in ground or surface water above the established CSC, and this was only in one groundwater well (Table 3-56). Pesticide analysis of surface water samples showed one detection of the PCB Aroclor 1242 above the established CSC (Table 3-61). The pesticides DDE and DDT were detected in the sediment samples, but at levels below the CSC. (Table 3-59)

4.6.2 Potential Transport Routes

The potential chemicals of concern, metals, are limited to the groundwater. While metals are present in the surface water, only one sample was analyzed, thus limiting the conclusions that can be drawn based on a single sampling point. Thus, the transport pathway for chemicals at this site appears to be through the groundwater.

4.6.3 Potential Exposure Pathways

Humans would only be expected to come into contact with these metals through ingestion of the groundwater. However, since the groundwater at Key West is supplied from Miami, ingestion does not represent an exposure pathway.

4.6.4 Potential Receptors

Humans are not receptors for the potential chemicals of concern (metals) at this site. Additionally, because no animal populations are known to use this groundwater, there are no potential environmental receptors that might come into contact with these elevated levels of metals.

4.6.5 Conclusions

This site does not present any immediate impacts to the environment or human health.

4.7 Site 9 - Trumbo Point Annex Fuel Farm and Piers

Site 9 is currently used as a fuel storage location and transmission point. Because of its usage for fuel storage, there is a potential for fuel contamination at the site.

4.7.1 Potential Chemicals of Concern

Groundwater from the site was analyzed for polyaromatic hydrocarbons (PAHs). PAH's were detected in some monitoring wells, but all concentrations were below established CSCs (Table 3-65). Lead and xylene were also found in two of the monitoring wells, but again at levels below the established CSC. Volatile organic analysis was performed according to EPA Method 601/602 in the groundwater samples (Table 3-64). Benzene was found in two of the six monitoring wells, with one monitoring well showing particularly high levels. Toluene and ethylbenzene were found in one of the four wells. Dibromochloropropane was also detected at a level above its established CSC in one out of the six sampled wells (Tables 3-67 and 3-64).

No definitive group of potential chemicals of concern appears to exist. While it is recognized that benzene and toluene were detected at levels above their established CSCs, these detections appear to be isolated to one or two monitoring wells, while the remaining monitoring wells register no detections above the detection limit. Thus, these chemicals are not considered potential chemicals of concern.

4.7.2 Potential Transport Pathway

Potential transport pathways include movement of chemicals, following release through media such as water, soil, and air. At Site 9, the potential transport pathways are not deemed to be of concern at this time.

4.7.3 Potential Exposure Routes

Based on the preceding information, potential exposure routes are not of concern at this time.

4.7.4 Potential Receptors

Based on the preceding information, the possibility of potential receptors is not a concern at this site.

4.7.5 Conclusions

Site 9 does not appear to cause any immediate impact to human health or the environment, because no potential chemicals of concern appear to exist at Site 9. Some wells at Site 9 are known, however, to contain free product, but these are currently undergoing remedial treatment.

4.8 Site 10 - Boca Chica Fire Fighting Training Area

The site has been used as a fire fighting training area, and the potential for fuel contamination at the site exists.

4.8.1 Potential Chemicals of Concern

There does not appear to be any potential chemicals of concern at this site. Appendix IX analysis of metals in the groundwater and soil did not show any detections above established CSCs (Tables 3-74 and 3-70). Likewise, EP Toxicity analysis of soil boring samples did not reveal any detections above established CSCs (Table 3-69). While some metals, such as cadmium, chromium, and manganese, were detected in the groundwater (Table 3-71), these can not be considered potential chemicals of concern. Cadmium was only detected in one groundwater sample at concentrations slightly above the established CSC, and chromium was only detected in 2 out of 4 wells at concentrations slightly above the established CSC. Additionally, manganese was detected in only one water sample, and at a level only slightly above the established CSC. Some volatile organic compounds were detected in groundwater samples, but these detections of benzene, ethylbenzene, and naphthalene were in only one monitoring well (Table 3-72). The remaining three monitoring wells showed non-detectable levels of these compounds. Pesticides under the TAL analysis were not detected in groundwater samples at this site. One groundwater sample was also analyzed for pesticides under Appendix IX analysis (Table 3-73). Matrix interferences produced an elevated quantification limit for analysis. Because of this elevated detection limit, concentrations of pesticides can not be accurately quantified. Additionally, Appendix IX pesticide analysis of soil samples did not produce any detections. Thus, pesticides are not considered potential chemicals of concern.

4.8.2 Potential Transport Pathways

Potential transport pathways include movement of chemicals, following release through media such as water, soil, and air. At Site 10, based on the above information, this site is not deemed likely to cause releases in these media.

4.8.3 Potential Exposure Routes

Based on the preceding information, potential exposure routes are of minimal concern.

4.8.4 Potential Receptors

Based on the preceding information, the possible potential receptor is not a concern at this site. The site is a restricted access area. The site is not subject to general pedestrian traffic, and only authorized personnel are allowed at the site. Thus, although possible, it is not probable for humans to be in contact with affected soils or groundwater.

4.8.5 Conclusions

This site does not appear to result in any immediate impact to human health or the environment, because there are no potential chemicals of concern at this site.

5.0 Conclusions/Recommendations

The analytical data and field investigation data have been combined, allowing IT to present the following conclusions and recommendations relative to the confirmation of the presence or absence of contamination at each site. The gathered information has been used to determine if the site is hazardous to human health or the environment.

The recommendations presented herein are based on the assumption that the future use of each site will remain the same as the present use.

5.1 Site 1 - Truman Annex Refuse Disposal Area

5.1.1 Conclusions

A total of 11 metal concentrations exceeding the CSCs have been detected in the groundwater samples taken at Site 1. These metals fractions include antimony, arsenic, barium, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, and zinc (Table 5-1). 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 at Site 1. IT considers the groundwater to have be impacted with respect to metals at this site.

One sediment sample and one groundwater sample were found to have both pesticide and PCB concentrations above their CSCs. However, since these detections were isolated to one well at the site, this contamination is not believed to be a widespread problem.

During low tidal cycles, the groundwater at this site discharges into the Atlantic Ocean. Tidal influence has been observed to affect groundwater flow as far as 125 feet inland. 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. Note, this distribution of metal concentrations indicates 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, humans could be indirectly affected by this contamination if the groundwater is seeping into the ocean in significant amounts, allowing for bioaccumulation in the tissues in receptor organisms.

5.1.2 Recommendations

Based upon the data gathered to date, elevated levels of metals, particularly antimony, cadmium, chromium, copper, lead, manganese, mercury, nickel, and zinc have been confirmed 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 at Site 1.

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 the extent of contaminate migration laterally and vertically into the ocean. 2) Analysis of soil samples for Toxic Characteristic Leaching Procedure (TCLP) parameters. 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.

Sampling of Groundwater, Sediment and Surface Water

Groundwater, sediment and ocean water sampling locations are shown on Figure 5-1. IT proposes to install six sand points at the locations identified on Figure 5-1. The sand points will be installed to collect groundwater samples at these base of the site, along the shoreline. If metals are migrating towards the ocean, analysis of groundwater samples at the proposed six locations should detect these metals as they migrate to the Atlantic.

At each sand point sediment and ocean water samples will be collected. These samples will be collected, at the shoreline (Figure 5-1).

Sediment samples will be collected from the upper 0.5 feet at each sample location utilizing a pettet sonar dredge. These samples will be analyzed for the TCL metals. A total of 6 sediment samples will be collected.

Ocean samples will be collected from as close as possible to the surface water/sediment interface utilizing a discrete sampling depth sampler. These samples will be analyzed for the TCL metals. A total of 6 ocean water samples will be collected.

Collection of Soil Sample for TCLP

One composite soil sample will be collected for analysis for Toxic Characteristic Leaching Procedure parameters. The sample will be collected from a location near one of the previously installed soil boring locations. The sample will be collected by split spoon techniques and will consist of a composite of the materials encountered from land surface to the base of the landfill at 18 feet BLS.

Background Sampling

A background sampling program is recommended by IT to obtain analytical data for groundwater, surface water, ocean water, soil, surficial soil, and sediment to establish background levels for this site. The analytical information collected from background sampling in conjunction with other standards (i.e., surface water/groundwater classifications) that are established to protect human health and the environment will be used to formulate pragmatic, site specific Applicable Relevant and Appropriate Requirements (ARARs). The ARARs will then be used to assess the need for remediation.

5.2 Site 3 - Truman Annex DDT Mixing Area

5.2.1 Conclusions

A groundwater study of Site 3 indicates that three inorganic materials are present in concentrations above their CSC levels (Table 5-2). These materials include cadmium, iron, and sodium. Iron and sodium are considered to occur naturally at this site, but cadmium is more indicative of groundwater contamination.

Seven different pesticide compounds have also been detected in the groundwater above their CSCs at Site 3. These compounds include alpha-BHC, beta-BHC, dieldrin, 4,4-DDD, 4,4-DDE, 4,4-DDT, and heptachlor epoxide. The pesticides 4,4-DDT, 4,4-DDD, and 4,4-DDE were found to be present in significant amounts in the soil samples taken at this site. Pesticide concentrations in the groundwater indicate leaching is occurring in this area. IT considers this site to be impacted with respect to pesticides.

Groundwater at this site flows to the south-southeast toward the Atlantic Ocean. Although analytical data on groundwater flow does indicate pesticide migration to be occurring in a southeasterly direction at this site, it can not be determined if the pesticide concentrations are contaminating the Atlantic Ocean. If the pesticide are flowing into the waters of the ocean, humans may ingest these materials indirectly through the consumption of seafood.

5.2.2 Recommendations

Based upon the data presented to date, the presence of seven pesticide compounds has been confirmed at this site. Since the pesticide contamination levels fall within acceptable ranges as calculated in the earlier baseline risk assessment, immediate remedial action is not necessary. However, due to the bioaccumulating nature of these compounds and the frequent exposure of children playing in this area, IT does recommend the following: 1) restrict all access to the site (i.e., fencing), 2) Develop and screen remedial action alternatives as part of a Feasibility Study.

Perform Feasibility Study

The recommended remedial alternative development and screening procedures of a Feasibility Study consist of six broad categories grouped into three main areas of investigation. IT, as a part of a Feasibility Study, would perform the following work elements:

Identify General Response Actions

1. Identify site problems and pathways of contaminant migration.

2. Identify general response actions that will address the site problems and meet cleanup goals and objectives.

Identify and Screen Technologies and Develop Remedial Alternatives

3. Identify possible technologies in each general response action and then screen the technologies to eliminate inapplicable and/or infeasible technologies, based upon the site conditions; and

4. Assemble technologies into operable units, based on the remaining feasible technologies. Operable units are defined as a group of several unit operations and processes combined together to provide a remedial alternative.

Screen Public Health, Environmental and Cost Factors

5. Screen the alternative operable units, eliminating those that have significant adverse environmental impacts or that obviously do not protect the environment, public health and public welfare.

6. Screen the alternatives, eliminating those that are an order of magnitude higher in cost than other alternatives, but do not provide significantly greater environmental or public health benefits with technical reliability.

Based upon all the site information gathered from the site characterization, general response actions and/or classes of response will be identified without identifying specific technologies. General response actions to be considered will include the "no action" alternative as a baseline against which other alternatives can be measured. Examples of general response actions include the following:

- No action;
- Containment;
- Complete removal of the source area;
- Partial removal of the source area;
- On site treatment.

5.3 Site 4 - Boca Chica Open Disposal Area

5.3.1 Conclusions

A total of seven metal concentrations exceeding their CSCs have been detected in the groundwater at Site 4 (Table 5-3). Of these seven metals, lead and iron are the most dominant. Volatile organics were detected in only one groundwater sample and the reported concentrations were only slightly above their respective CSCs. Because of the 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 contaminates appear to be isolated, IT considers the locations where these compounds were detected above their CSCs to have been impacted.

Pesticide compounds were also detected above CSC levels in the sediment, soil, and groundwater samples at this site. The data does however indicate this may be a local contamination only. Due to the isolated nature of this pesticide contamination, it is not likely to cause immediate impacts on human health or the environment. However, this site is not to be dropped from further consideration for remedial action. As the soil and metal groundwater contamination should be remediated.

Groundwater flow at this site is to the south and to the east, discharging into the Atlantic Ocean. Comparison of the analytical data with groundwater flow does not indicate contaminate migration in downgradient wells at this site. As a result, discharge of contaminates into the Atlantic Ocean is not expected to occur. The groundwater at this site is not part of a public/domestic water supply system, therefore, human exposure to the contaminated water is not expected to occur.

5.3.2 Recommendations

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

1. A background sampling program is recommended by IT to obtain analytical data for groundwater, surface water, ocean water, soil, surficial soil, and sediment to establish background levels for this site. The analytical information collected from background sampling in conjunction with other standards (i.e. surface water/groundwater classifications) that are established to protect human health and the environment will be used to formulate pragmatic, site specific Applicable Relevant and Appropriate Requirements (ARARs). The ARARs will then be used to assess the need for remediation.

2. Installation and sampling of one additional monitoring well in the Burn Area. This will be performed to determine if high lead concentration seen in the sediment sample is leaching into the groundwater system.

3. Analysis of five soil samples for Toxic Characteristic Leaching Procedure (TCLP) parameters. This will aid in determining the potential for migration of contaminants that may be leaching from the soils in the Burn Area and the Refuse Disposal Area.

4. Perform a Quantitative Risk Assessment

<u>Install Monitoring Well</u>

The one additional monitoring well is proposed to be installed into the middle of the former Burn Area. The well will be constructed in a similar manner as the existing IT wells. The well will be equipped with 15 feet of screened interval from 5 to 20 feet BLS. A groundwater sample will then be collected from the monitoring well for laboratory analysis. This analysis will include the TCL metals analysis.

Collection of Soil Samples for TCLP

In addition, five composite soil samples will be collected for analysis for Toxic Characteristic Leaching Procedure parameters. Three samples will be collected near former borings that were installed in the Burn Area. The remaining two samples will be collected from a location within the debris area near other former soil boring locations. These samples will be collected by split spoon techniques and they will consist of a composite of the materials encountered from land surface to the end of the borings (20 feet BLS).

Perform Risk Assessment

IT recommends the performance of a quantitative risk assessment. The specific tasks of the quantitative baseline risk assessment, designed to evaluate the potential impacts of current site conditions on public health and the environment are:

- Exposure assessment;
- Toxicity assessment;
- Risk characterization.

The objectives of the exposure assessment is to identify the potential for exposure of human receptors to site related chemicals and estimate the levels of potential exposures. The toxicity assessment will examine evidence for individual contaminants to cause adverse effects in exposed populations.

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

5.4 Site 5 - Boca Chica DDT Mixing Area

5.4.1 Conclusions

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 CSCs (Table 5-4). 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 lessor degree in the sediment and groundwater at this site. Most likely, the pesticide contamination is spread by water erosion, soil erosion, and groundwater migration. Certain volatile substances such as 1,2-dichloroethene, chlorobenzene, and naphthalene were also present in levels above their CSCs thus further supporting the information that this site is contaminated. IT considers this site to have been impacted with respect to pesticides.

The downgradient monitoring wells at this site exhibit higher levels of pesticide/PCB concentrations than the wells located upgradient, thus supporting the pesticide migration theory. Groundwater flow (and pesticide migration) is in a southeasterly direction into a borrow pit. Although the groundwater at this site is unused by humans, the aquatic life in the surface water around this site may already be contaminated with the pesticide compounds. Those organisms higher in the food chain, such as the human race, may ultimately become contaminated if ingestion of the lower organisms occurs. Currently, access to this site is restricted, so public exposure to pesticides and related compounds should not be likely now or in the future.

5.4.2 Recommendations

It should be noted that due to the frequency and concentrations of pesticides and related compounds detected at this site, eventual remedial action is required. The limited accessibility of the public to the site indicates that an immediate RA plan is not necessary, however, IT does recommend the following actions be taken: 1) Continued restriction of civilian and military personnel to the site. 2) Prepare a Quantitative Risk Assessment at this site. 3) Perform a Feasibility Study.

Perform Risk Assessment

IT recommends the performance of a quantitative risk assessment. The specific tasks of the quantitative baseline risk assessment, designed to evaluate the potential impacts of current site conditions on public health and the environment are:

- Exposure assessment;
- Toxicity assessment;
- Risk characterization.

The objectives of the exposure assessment is to identify the potential for exposure of human receptors to site related chemicals and estimate levels of potential exposures. The toxicity assessment will examine evidence of individual contaminants to cause adverse effects in exposed populations.

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

Perform Feasibility Study

Based on site information from the site characterization, remedial action alternatives for the general response actions of a feasibility study will be identified without identifying specific technologies. General response actions to be considered will include the "no action" alternative as a baseline against which other alternatives can be measured. Examples of general response actions include the following:

- No action;
- Containment;
- Complete removal of the source area;
- Partial removal of the source area;
- On site treatment.

5.5 Site 7 - Fleming Key North Landfill

5.5.1 Conclusions

Elevated concentrations of lead, manganese, antimony, cadmium, chromium, iron, and mercury were detected above their CSCs in groundwater samples. Lead and iron were also detected above the established CSCs in the only surface water sample collected at this site (Table 5-5). Significant metal concentrations were not detected in any of the sediment samples. IT considers only the groundwater to have been impacted with respect to metals at this site.

Groundwater flow at this site is to the eastern and western coastline of the Key. Tidal influence has 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 toward the shoreline but within the landfill area had the highest metal concentrations. Hence, evidence for the migration of metals in groundwater is apparent and the contamination may be seeping into the ocean at this time. However since all potable water supplied to the Key West area is from Miami, humans would not be directly exposed to the metals present in the groundwater at this site.

5.5.2 Recommendations

A No Further Action (NFA) recommendation may be issued depending on the results of the following additional background and field sampling. 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 contaminate migration laterally and vertically to the ocean. 2) Analysis of soil samples for Toxic Characteristic Leaching Procedure parameters. This will aid in determining the potential for migration of contaminates that may be leaching from the landfill. 3) Background sampling of all media.

Sampling of Groundwater, Sediment, and Surface Water

Groundwater, sediment and surface water sampling locations are shown on Figure 5-2. IT proposes to install ten sand points at the locations identified on Figure 5-2. The sand 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.

At each sand point sediment and ocean water samples will be collected at the shoreline (Figure 5-2).

Sediment samples will be collected from the upper 0.5 feet at each sample location utilizing a pettet sonar dredge. These samples will be analyzed for the TCL metals. 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. These samples will be analyzed for the TCL metals. A total of 10 ocean samples will be collected.

Collection of Soil Samples

Three composite soil samples will also be collected for analysis for Toxic Characteristic Leaching Procedure parameters. The samples will be collected from locations near existing soil boring locations. The samples will be collected by split spoon techniques and will consist of a composite of the materials encountered from land surface to the base of the landfill subject to that sampling location.

Background Sampling

A background sampling program is also recommended by IT to obtain analytical data for groundwater, surface water, ocean water, soil, surficial soil, and sediments to establish background levels for this site. The analytical information collected from background sampling in conjunction wiht other standards (i.e., surface water/groundwater classifications) that are established to protect human health and the environment will be used to formulate pragmatic, site specific ARARs. The ARARs will then be used to asses the need for remediation.

5.6 Site 8 - Fleming Key South Landfill

5.6.1 Conclusions

The seven metals detected in the groundwater above their CSCs at Site 8 include antimony, cadmium, chromium, copper, lead, manganese, and mercury (Table 5-6). The volatile organic, chlorobenzene was also detected above its CSC at this site. Several metals were also detected in a surface water sample, but this is due to the fact that the surface water feature was merely a surface expression of the groundwater table. The metals present in this surface water represent actual groundwater conditions. A pesticide contamination aspect was only detected in one of the groundwater sample. IT therefore only considers this site to have been impacted with respect to metals in the groundwater.

Groundwater flow at this site trends to the northeast further inland and is greatly influenced by tidal variation. Higher metal concentrations were detected in the downgradient wells further inland, thereby showing evidence of the migration of metals in the 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 metals 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.

5.6.2 Recommendations

A No Further Action (NFA) recommendation may be issued depending on the result of the following additional sampling. Groundwater at the site is the only medium to contain potential chemicals of 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 this site. This will aid in determining the extent of contaminate migration both laterally and vertically into the ocean. 2) Analysis of soil samples for Toxic Characteristic Leaching Procedure (TCLP) parameters. This will aid in determining the potential for migration of contaminates that may be leaching from the landfill itself. 3) Background sampling of all media.

Sampling of Groundwater, Sediment, and Surface Water

Groundwater, sediment and surface water sampling locations are shown on Figure 5-3. IT proposes to install ten sand points at the locations identified on Figure 5-3. The sand 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.

At each sand point sediment and ocean water samples will be collected. These samples will be collected at the shoreline (Figure 5-3).

Sediment samples will be collected from the upper 0.5 feet at each sample location utilizing a pettet sonar dredge. These samples will be analyzed for the TCL metals. In addition, four sediment samples will be collected at the locations identified on Figure 5-3 along the shoreline. These samples will be collected at the locations specified due to a suspicion that some contaminants may have been deposited there during the dewatering operation of the sewage treatment plant construction. A total of 14 sediments 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. These samples will be analyzed for the TCL metals. A total of 10 ocean water samples will be collected.

Collection of Soil Samples for TCLP

Three composite soil samples will also be collected for analysis for Toxic Characteristic Leaching Procedure parameters. The samples will be collected from locations near three of the existing soil boring locations. The samples will be collected by split spoon techniques and will consist of a composite of the materials encountered from land surface to the base of the landfill, (18 feet BLS).

Background Sampling

A background sampling program is recommended by IT to obtain analytical data for groundwater, surface water, ocean water, soil, surficial soil, and sediment to establish background levels for this site. The analytical information collected from background sampling in conjunction with other standards (i.e., surface water/groundwater classifications) that are established to protect human health and the environment will be used to formulate pragmatic, site specific ARARs. The ARARs will then be used to assess the need for remediation.

5.7 Site 9 - Trumbo Point Annex Fuel Farm and Piers

5.7.1 Conclusions

Three volatile organics including benzene, toluene, and ethylbenzene were detected in concentrations above their established CSCs (Table 5-7). It is important to note, that IT only sampled those wells that were absent of free product. During the field investigation, free product was frequently encountered in many of the monitoring wells at this site.

Head space analysis of soil samples collected at this site registered some high levels of organic vapors in excess of 50 ppm. Due to the excessively contaminated soils present at the water table and throughout the vadose zone, IT considers the soil at this site to have been impacted with respect to volatile organics.

Groundwater flow at this site is to the northwest and the outline of excessively contaminated soils also trends in the same direction. Groundwater at this site is not used as a public/domestic water supply system. As a result, direct exposure of humans to volatile organics present in the groundwater would not be expected to occur now, or in the future.

5.7.2 Recommendations

Based upon the data gathered to date, remedial action is warranted at Site 9. A Remedial Action Plan should include the following: 1) treatment of all excessively contaminated soils to the top of the water table, 2) continued groundwater sampling of pre-existing monitoring wells to monitor the free product plume, 3) treatment of contaminated groundwater and capture of the free product plume.

5.8 Site 10 - Boca Chica Fire Fighting Training Area

5.8.1 Conclusions

The metals cadmium, chromium, manganese were detected above their established CSCs in groundwater samples taken at this site (Table 5-7). However, due to the random occurrence of these metals, contaminant migration does not appear to be occurring.

In addition some volatile organic compounds were detected above their CSCs in groundwater samples at this site. These compounds include benzene, ethylbenzene, and naphthalene. Concentrations of these volatile organics again appeared isolated in nature and were reported only slightly above the established CSCs. Widespread impact of volatile organics is not likely, based on a current understanding of the site.

Groundwater flow at this site is to the southwest. No elevated levels of dissolved metals or volatile organics were present in downgradient wells, therefore, migration of these contaminates does not appear to be occurring. The groundwater at this site is not used as a public/domestic water supply system, therefore, exposure of humans to these contaminants at this site would not be expected to occur. There is no immediate impact on human health or the environment due to these contaminates.

5.8.2 Recommendations

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. This will aid in determining the potential for migration of contaminates. 2) Background sampling of all media.

Collection of Sediment Samples

Four sediment samples will be collected from the nearby shore area and lagoon using a pettet sonar dredge, the sample locations will be based on field judgement. These samples will be analyzed for the Appendix IX parameters.

Background Sampling

A background sampling program is recommended by IT to obtain analytical data for groundwater, surface water, ocean water, soil, surficial soil, and sediment to establish background levels for this site. The analytical information collected from background sampling in conjunction with other standards (i.e., surface water/groundwater classifications) that are established to protect human health and the environment will be used to formulate pragmatic, site specific ARARs. The ARARs will then be used to assess the need for remediation.

TABLE 2-1

GROUNDWATER ELEVATIONS
Truman Annex, Refuse Disposal Area
Site 1
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL
MW 1-1	11.57	11.61	-0.04
MW 1-2	9.31	9.22	0.09
MW 1-3	10.61	10.78	-0.17
KWM-01	8.01	8.12	-0.11
KWM-02	7.52	7.7	-0.18
KWM-03	7.56	7.81	-0.25
KWM-04	8.82	8.84	-0.02

NOTE:

1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 2-2

GROUNDWATER ELEVATIONS
Truman Annex, DDT Mixing Area
Site 3
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH OF WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[1]
MW 3-1	8.49	7.42	1.07
MW 3-2	8.23	8.21	0.02
MW 3-3	9.08	7.78	1.30

NOTE:

1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 2-3

GROUNDWATER ELEVATIONS
Boca Chica, Open Disposal Area
Site 4
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATION (ft) MSL[1]
MW 4-1	4.79	4.09	0.70
MW 4-2	5.08	4.28	0.80
MW 4-3	4.91	4.31	0.60
MW 4-4	4.91	3.94	0.97
MW 4-5	5.35	4.56	0.79
KWM-05	4.03	3.22	0.81
KWM-06	4.26	3.54	0.72
KWM-07	4.09	3.49	0.60
KWM-08	4.40	3.83	0.57

NOTE:

1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 2-4

GROUNDWATER ELEVATIONS
Boca Chica, DDT Mixing Area
Site 5
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[2]
MW 5-1	7.70	4.40	3.30
MW 5-2	7.50	4.20	3.30
MW 5-3	7.47	4.00	3.47

NOTE:

1 MSL = Mean Sea Level
2 *Depth to water levels are the average of three depth measurements*

TABLE 2-5

GROUNDWATER ELEVATIONS
Fleming Key, North Landfill
Site 7
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH OF WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[1]
MW 7-1	7.03	6.37	0.66
MW 7-2	8.06	7.56	0.50
MW 7-3	4.31	3.40	0.91
MW 7-4	10.05	9.40	0.65
MW 7-5	9.12	9.07	0.05
MW 7-6	7.15	6.59	0.56
KWM-09	5.58	NM	NM
KWM-10	NM	NM	NM
KWM-11	6.27	5.80	0.47
KWM-12	3.69	3.51	0.18

NOTE:

NM Not Measured
1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 2-6

GROUNDWATER ELEVATIONS
Fleming Key, South Landfill
Site 8
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[1]
MW 8-1	13.56	13.10	0.46
MW 8-2	5.64	5.06	0.58
MW 8-3	10.72	10.24	0.48
MW 8-4	12.50	12.14	0.36
MW 8-5	9.05	8.59	0.46
MW 8-6	9.36	NM	NM
KWM-13	6.88	NM	NM
KWM-14	7.07	6.79	0.28
KWM-15	8.09	7.60	0.49
KWM-16R	8.09	7.66	0.43

NOTE:

NM Not Measured
1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 2-7

GROUNDWATER ELEVATIONS
Trumbo Point Annex, Fuel Farm and Piers
Site 9
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATION (ft) MSL[1]
MW 9-10	9.75	NM	NM
MW 9-11	10.45	NM	NM
MW 9-12	9.56	NM	NM
KWM-01	5.80	NM	NM
KWM-02	6.11	5.00	1.11
KWM-03	8.29	NM	NM
KWM-05	6.75	5.00	1.75
MW-6R	9.75	NM	NM
KWM-07	7.33	NM	NM
KWM-08	7.05	NM	NM
KWM-09	6.99	NM	NM
MW-13	6.64	NM	NM
MW-14	6.13	NM	NM
MW-15	5.91	NM	NM
MW-16	5.74	NM	NM
MW-17	5.88	NM	NM
KWM-20	6.99	6.00	0.99
KWM-21	7.64	NM	NM
KWM-22	7.72	NM	NM
KWM-23	6.85	NM	NM
KWM-24	6.63	NM	NM
KWM-25	6.94	NM	NM

NOTE:

NM Not Measured
1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 2-8

GROUNDWATER ELEVATIONS
Boca Chica, Fire Fighting Training Area
Site 10
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[1]
MW 10-1	3.56	3.00	0.56
MW 10-2	3.36	2.60	0.76
MW 10-3	3.63	3.00	0.63
KWM-18	2.82	2.60	0.22
KWM-19	3.02	2.60	0.42

NOTE:

1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 3-1

MONTHLY METEOROLOGICAL DATA
NAS-Key West
Key West, Florida
IT Project No. 595392

MONTH/YEAR	AVERAGE MONTHLY MAXIMUM TEMPERATURE (degrees F)	AVERAGE MONTHLY MINIMUM TEMPERATURE (degrees F)	TOTAL MONTHLY PRECIPITATION (in)
Jan/90	83	76	0.04
Feb/90	80.5	71.1	1.99
Mar/90	80.4	70.6	1.88
Apr/90	82.3	72.2	1.26
May/90	85.6	76.4	8.48
Jun/90	89	79	1.59
Jul/90	89	79	8.38
Aug/90	83	80	13.06

TABLE 3-2

AIR QUALITY SURVEY SUMMARY
NAS-Key West
Key West, Florida
IT Project No. 595392

SITE	TRANSECT	MINIMUM OVA READING (ppm)	MAXIMUM OVA READING (ppm)	COMMENTS
Site 1 - Truman Annex Refuse Disposal Area	1	0	0	East/west transect. Began on east fence near T.P. 3 to chain link fence on west side.
Site 4 - Boca Chica Open Disposal Area	1	0	0	East/west transect. Started near Building 1005, clearing between MW4-5 and MW4-4. Contained metal, concrete and char. End near MW4-3.
	2	0	0	NE/SW transect. Started on road, cross burn area, throiugh mangroves. End near MW4-2.
	3	0	0	NE/SW transect. Started on road, cross burn area. End near location of Soil Sample 4 (B-4).
	4	0	0	NE/SW transect. Started on road, cross margin of burn area along mangroves. End near KWM-06.
Site 7 - Fleming Key North Landfill	1	0	0	North/south transect. From chain link fence near T.P. 6 to woodline near MW7-6.
	2	0	0	North/south transect. From chain link fence near T.P. 16 to woodline near T.P. 19.
Site 8 - Fleming Key South Landfill	1	0	approx. 40	North/south transect. Tar ditch with asphalt in northern most woods.
	2	0	1-2	North/south transect. Started at chain link fence near MW8-6. Ended near T.P. 11.
	3	0	0	North/south transect. Started near MW8-2. Ended MW8-3.
	4	0	0	North/south transect. Started near Sediment Sample 1 location. Ended near T.P. 19.
Site 10 - Boca Chica Fire Fighting Training Area	1	0	1	NW/SE transect. From MW10-1, along margin of blimp pad to location of Soil Boring 2 (B-2).
	2	0	1-2	NW/SE transect. Started near Soil Boring 6 (B-6) location. Cross burn area and end near Soil Boring 2 (B-2) location.

TABLE 3-3

WASTE CHARACTERIZATION SUMMARY
Sites 1, 7, and 8
NAS-Key West
Key West, Florida
IT Project No. 595392

SITES/TEST PIT #	OVA READINGS (ppm)	SITE STRATIGRAPHY	TEST PIT DESCRIPTION	WASTE MATERIALS ENCOUNTERED
T-9	0	0 - 2 feet BLS 2 - 4 feet BLS 4 feet BLS	Crushed limestone Waste material Water table	Glass, lumber, wire
T-10	0	0 - 2 feet BLS 2 - 3 feet BLS 3 feet BLS	Crushed limestone Waste material Water table	Steel cable, household refuse, glass
T-11	0	0 - 3 feet BLS 3 - 5 feet BLS 3 feet BLS	Crushed limestone Waste material Water table	Glass, scrap metals
T-12	0	0 - 1 feet BLS 1 - 8 feet BLS	Crushed limestone Waste material	GLass, concrete, household refuse, lumber
T-13	0	0 - 1 feet BLS 1 - 8 feet BLS	Crushed limestone Waste material	Glass, tires, wire, electrical conduit, steel cable, concrete, lumber
T-14	0	0 - 2 feet BLS 2 - 3 feet BLS 3 - 6 feet BLS 6 feet BLS	Crushed limestone Waste material Native material Water table	Scrap metals
T-15	0	0 - 6 feet BLS 5.5 feet BLS	Crushed limestone Water table	No debris present
T-16	0	0 - 1 feet BLS 1 - 2 feet BLS 2 - 3 feet BLS 3 feet BLS	Crushed limestone Waste material Crushed limestone Water table	Steel cable
T-17	0	0 - 1 feet BLS 1 - 7 feet BLS 7 feet BLS	Crushed limestone Waste material Water table	Glass, paper, lumber, electrical conduit, cloth sheets
T-18	0	0 - 3 feet BLS 3 feet BLS 3 feet BLS	Crushed limestone Waste material Water table	Lumber

TABLE 3-3

WASTE CHARACTERIZATION SUMMARY
Sites 1, 7, and 8
NAS-Key West
Key West, Florida
IT Project No. 595392

SITES/TEST PIT #	OVA READINGS (ppm)	SITE STRATIGRAPHY	TEST PIT DESCRIPTION	WASTE MATERIALS ENCOUNTERED
T-19	0	0 - 1.5 feet BLS 1.5 - 2 feet BLS 2 - 3 feet BLS 3 feet BLS	Crushed limestone Waste material Crushed limestone Water table	Glass, scrap wood
T-20	0	0 - 1 feet BLS 1 - 5 feet BLS 2 feet BLS	Crushed limestone Waste material Water table	Steel cable, electrical conduit, glass, low voltage batteries, wood
T-21	10	0 - 2 feet BLS 1.5 feet BLS	Crushed limestone Water table	No debris present
Site 8 South Fleming Key T-1	5	0 - 6 feet BLS 6 - 8 feet BLS 8 feet BLS	Crushed limestone Waste material Water table	Glass, plastics, household refuse
T-2	5 2	0 - 4 feet BLS 4 - 8 feet BLS 8 - 8.5 feet BLS 8.5 feet BLS	Crushed limestone Waste material Native material Water table	Glass, wood, scrap metals, plastics
T-3	1	0 - 2 feet BLS 2 - 5 feet BLS 4 feet BLS	Crushed limestone Waste material Water table	Scrap metals, steel cable, glass

NOTE:

BLS = Below Land Surface
All test pits were filled and leveled at test pit completion

TABLE 3-4

EP TOXICITY DETECTIONS FOR SOIL SAMPLES
TAKEN FROM MONITORING WELL BORINGS
Site 1 - Truman Annex Refuse Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg - ppm

LABORATORY SAMPLE IDENTIFICATION:		MW-1, Site 1	MW-2, Site 1	MW-3, Site 1
FIELD SAMPLE LOCATION:		MW 1-1	MW 1-2	MW 1-3
SAMPLE DEPTH (ft):		18	8	8
ASSOCIATED METHOD BLANKS:		32	32	32
COMPOUNDS	CSC			
Barium	1.00	0.06	0.19	0.20
Lead	5.0	ND	ND	0.10

NOTE:

ND = Not detected at the instrument detection limit
NW = Monitoring well

TABLE 3-5

SOIL pH, PERCENT MOISTURE, DENSITY, PERMEABILITY, TOTAL ORGANIC CARBON, CATION EXCHANGE, CAPACITY AND GRAIN SIZE
NAS-Key West
Key West, Florida
IT Project No. 595392

SOIL SAMPLE LOCATIONS	DEPTH OF SAMPLE (ft) BLS	pH	PERCENT MOISTURE	DENSITY (g/cm^3)	TOTAL ORGANIC CARBON (mg/kg)	PERMEABILITY (cm/s)	CATION EXCHANGE CAPACITY (meq/g)	GRAIN SIZE DISTRIBUTION			UNIFORMITY COEFFICIENT (d60/d10)
								d10 (mm)	d60 (mm)	d50 (mm)	
Site 1, MW 1-2	0-2	8.15	25.8	2.00	1.96	2.46E-06	186.98	0.030	6.90	3.70	230.00
Site 3, Plot 4	0-2	8.35	17.4	2.12	8700	6.55E-07	89.97	0.001	2.50	1.40	2500.00
Site 4, Boring 1	16-20	7.50	29.7	2.07	1.04	2.29E-06	35.74	0.004	1.50	1.10	405.41
Site 5, Well MW5-2	0-4	8.35	21.2	2.02	6600	9.05E-06	39.37	0.010	4.10	2.70	410.00
Site 7, Well MW7-2	0-16	7.85	19.6	1.76	6800	1.11E-05	40.35	0.012	6.50	4.00	541.67
Site 8, Well MW8-6	16-20	8.50	37.3	1.91	5700	1.04E-05	56.1	0.003	3.80	1.80	1266.67
Site 9, Boring 30	0-4	8.35	39.2	1.94	4900	1.80E-06	49.22	0.004	4.10	3.00	1025.00
Site 10, Boring 2	2-8	8.65	21.1	1.79	0.73	9.55E-06	44.22	0.005	2.30	0.95	442.31

TABLE 3-6

ANALYTICAL DETECTION FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES
Site 1, Truman Annex Refuse Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392

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	01-04-EB
FIELD SAMPLE LOCATION:		MW 1-1	MW 1-2	MW 1-3	KWM-01	KWM-02	KWM-03	KWM-04	KWM-04 duplicalte	equipment rinsate
ASSOCIATED METHOD BLANKS:		38	38	38	65	65	65	65	65	65
COMPOUNDS	CSC									
Aluminum	NE	5,870	34,900	46,500	BDL	12,800	2,120	1,520	6,210	ND
Antimony	14	ND	557	313	ND	427	95.2	ND	ND	ND
Arsenic	50	ND	62.2	46.6	ND	ND	ND	ND	ND	ND
Barium	1,000	227 E	1,380 E	1,310 E	NDL	ND	BDL	BDL	BDL	ND
Cadmium	10	ND	54.5	33.2	ND	22.2	ND	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	ND
Chromium	50	92.2	351	657	ND	142	33.2	61.2	61.1	ND
Cobalt	NE	ND	BDL	BDL	ND	ND	ND	ND	ND	ND
Copper	1,000	64.5	9,520	10,200	48.8	3,360	136	BDL	85.6	ND
Iron	300	5,100 E	155,000 E	81,000 E	258 E	89,500 E	3,790 E	793 E	3,040 E	BDL
Lead	50	57.1	5,700	4,360	47.2	4,140	219	ND	86.1	ND

TABLE 3-6

ANALYTICAL DETECTION FOR TARGET ANALYTE LIST (INORGANICS)
IN GROUNDWATER SAMPLES
Site 1, Truman Annex Refuse Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392

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	01-04-EB
FIELD SAMPLE LOCATION:		MW 1-1	MW 1-2	MW 1-3	KWM-01	KWM-02	KWM-03	KWM-04	KWM-04 duplicalte	equipment rinsate
ASSOCIATED METHOD BLANKS:		38	38	38	65	65	65	65	65	65
Magnesium	NE	128,000	922,000	964,000	718,000	811,000	693,000	157,000	159,000	ND
Manganese	50	134	2,940	921	BDL	1,360	41.7	40.6	65.6	ND
Mercury	2	ND	16.2	11.1	ND	2.4	0.95	ND	ND	ND
Nickel	70	ND	303	277	ND	88.2	BDL	ND	ND	ND
Potassium	NE	47,000	287,000	281,000	208,000	244,000	201,000	55,200	56,200	ND
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	ND
Vanadium	NE	55.4	116	114	ND	96.8	63.3	BDL	BDL	ND
Zinc	5,000	171	15,200	10,400	26.9	7,320	432	64.2	209	45

NOTE:

BDL = Below Detection Limit
NE = Not Established
ND = Not detected at instrument quantitation limit
E = Compound exceeded calibration range of instrument

TABLE 3-7

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILES AND SEMI-VOLATILES)IN GROUNDWATER SAMPLES
Site 1 - Truman Annex Refuse Disposal Areas
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	01-04-GWD	01-02-GW	01-03-GM-GW	01-04-GWO	01-04-EB
FIELD SAMPLE LOCATION:		MW 1-1	MW 1-2	MW 1-3	KWM-01	KWM-01 duplicate	KWM-02	KWM-03	KWM-04	equipment rinsate
ASSOCIATED METHOD BLANKS:		33,35	33,35	33,35	55,59	55,59	55,59	56,59	55,59	57,61
COMPOUNDS	CSC									
Acetone	700	ND	BDL	BDL	ND	ND	BDL	ND	ND	24
Methylene chloride	3,800	BDL*	BDL*	BDL*	BDL*	BDL*	BDL*	ND	BDL*	ND
Toluene	24	ND	BDL	ND	ND	ND	BDL	ND	BDL	ND
Carbon disulfide	3,500	ND	ND	BDL	ND	ND	ND	ND	ND	ND
Trichloroethene	NE	ND	ND	ND	ND	BDL	ND	ND	ND	ND

NOTE:

NE = Not established
* = Analyte was detected in both the blank and the sample
ND = Not detected at instrument detection limit
BDL = Detected, but below the instrument quantification limit
KWM = Monitoring well
MW = Monitoring well

TABLE 3-8

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS FOR GROUNWATER SAMPLES
Site 1 - 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-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:		37	37	37	62	62	62	62	62
COMPOUNDS	CSC								
Alpha-chlordane	0.03	ND	0.98*	ND	ND	ND	ND	ND	ND
gamma-chlordane	0.03	ND	1.10*	ND	ND	ND	ND	ND	ND

NOTE:

* = Compound analyzed at secondary dilution factor according to the following:

01-02-GW - Dilution factor of 5. Values for alpha chlordane and gamma chordane are estimated concentrations below the detection limit at this concentration

ND = Not detected at instrument detection limit

TABLE 3-9

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN SEDIMENT SAMPLES
Site 1 - Truman Annex Refuse Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

LABORATORY SAMPLE IDENTIFICATION:		01-01-SED	01-02-SED	01-03-SED
FIELD SAMPLE LOCATION:		S-1	S-2	S-3
ASSOCIATED METHOD BLANKS:		42	42	42
COMPOUND	CSC			
Aluminum	NE	546	6,170	1,960
Arsenic	NE	4.0	3.9	ND
Barium	850	BDL	40.5	BDL
Beryllium	85	ND	BDL	ND
Cadmium	NE	1.1	ND	ND
Calcium	NE	301,000	156,000	206,000
Chromium	85	8.0	6.1	9.0
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
Nickel	340	ND	4.7	ND
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:

BDL = Detected but below the instrument quantitation limit
NE = Not established
ND = Not detected at instrument quantitation limit
S = Sediment/Surface water location

TABLE 3-10

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS FOR SEDIMENT SAMPLES
Site 1 - Truman Annex Refuse Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

LABORATORY SAMPLE IDENTIFICATION:		01-01-SED	01-02-SED	01-03-SED
FIELD SAMPLE LOCATION:		S-1	S-2	S-3
ASSOCIATED METHOD BLANKS:		41	41	41
COMPOUND	CSC			
Aroclor-1260	450	BDL	2,300	ND
Aroclor-1254	450	210	BDL	ND
a-BHC	NE	BDL	20[Z]	ND
4,4-DDE	1,000	44*	37*	32
4,4-DDT	1,000	41	39	BDL

NOTE:

* = *Designates samples analyzed at a dilution factor according to the following:*

01-01-SED: Dilution factor of 2. Value for DDE represents a concentration below the detection limit at that dilution

01-02-SED: Dilution factor of 10. Values for DDE represent estimated values below the detection limit at that dilution

NE = Not established
BDL = Detected but below the instrument quantitation limit
S = Sediment/Surface water location
ND = Not detected
Z = Elevated quantitation limit due to matrix interferences obscuring compound of interest

TABLE 3-11

DATA SUMMARY - SITE 1
Truman Annex, Refuse Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATION (ft) MSL[1]
MW 1-1	11.57	11.61	-0.04
MW 1-2	9.31	9.22	0.09
MW 1-3	10.61	10.78	-0.17
KWM-01	8.01	8.12	-0.11
KWM-02	7.52	7.70	-0.18
KWM-03	7.56	7.81	-0.25
KWM-04	8.82	8.84	-0.02

NOTE:

1 MSL = Mean Sea Level
2 Depth to Water Levels are the average of three depth measurements

TABLE 3-11

DATA SUMMARY - SITE 1
Truman Annex, Refuse Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganics	Antimony	14	95.2	557
		Arsenic	50	---	62.2
		Barium	1,000	1,318	1,380
		Cadmium	10	22.2	54.5
		Chromium	50	61.1	657
		Copper	1,000	3,360	10,200
		Iron	300	793	155,000
		Lead	50	57.1	5,700
		Manganese	50	65.6	2,940
		Mercury	2	2.4	16.2
		Nickel	70	88.2	303
		Sodium	160,000	800,000	7,840,000
		Zinc	5,000	7,320	15,200
	Pesticides/PCB	Alpha-chlordane	.027	---	.98
		Gamma-chlordane	.027	---	1.1
Sediment Sample	Pesticides/PCB	Aroclor-1260	45	---	2,300
		Aroclor-1254	45	---	210

NOTE:

* = Minimum values represent the smallest concentration level above CSC
--- = Present when only one value above CSC exists
CSC = Concentrated standards for comparison

TABLE 3-12

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS FOR SOIL SAMPLES
Site 3 - Truman Annex DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		20	20	20	20	20	20	30	30
COMPOUND	CSC								
4,4-DDT	1,000	220,000*	86,000	100,000	79,000	17,000	9,100*	1,800	6,000
4,4-DDD	1,500	34,000*	6,700	80,000	68,000	2,000	1,200	BDL	83,000
4,4-DDE	1,000	30,000*	20,000*	33,000*	26,000*	9,100*	8,700*	560*	8,600*
Beta-BHC	NE	BDL	BDL	2,900	4,700	800	BDL	89	2,300
Dieldrin	NE	28,000	ND	6,800*	4,400	BDL	ND	BDL	BDL
Alpha-chlordane	270	BDL	ND	ND	ND	ND	ND	BDL	ND
Gamma-chlordane	270	BDL	BDL	ND	ND	BDL	ND	BDL	ND
Aldrin	21	BDL	ND	ND	ND	ND	ND	ND	ND

TABLE 3-12

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS FOR SOIL SAMPLES
Site 3 - Truman Annex DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:	20	20	20	20	20	20	30	30

NOTE:

BDL = Below detection limit
ND = Not detected
NE = Not established
MW = Monitoring well

* = Designates samples analyzed at a dilution factor according to the following:

NAS Site 3, Plot 2: Dilution factor of 50. Value for 4,4-DDE represents an estimated value less than the detection limit at this dilution
NAS Site 3, Plot 4: Dilution factor of 2,000. Value for 4,4-DDE represents an estimated value less than the detection limit at this dilution
Site 3, Plot 2: Dilution factor of 2,000. Value of 4,4-DDE repersents an estimated value less than the detection limit at this dilution
Site 3, Plot 1: Dilution factor of 5,000. Values for dieldrin, 4,4-DDE and 4,4-DDD are estimated values less than the detection limit at this dilution
Site 3, Plot 3: Dilution factor of 2,000. Values for dieldrin, 4,4-DDD are estimated values below the detection limit at this dilution
Site 3, Plot 4: Dilution factor of 2,000. Value for 4,4-DDE represents an estimated value less than the detection limit at this dilution
Site 3, Plot 5: Dilution factor of 500. Values for 4,4-DDE and 4,4-DDT are estimated values below the detection limit at this dilution
Site 3, Plot 6: Dilution factor of 400.

TABLE 3-13

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILES AND SEMI-VOLATILES) IN SOIL
Site 3 - Truman Annex DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	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:		18, 19	18, 19	18, 19	18, 19	18, 19	18, 19	27, 29	28, 29
COMPOUND	CSC								
1,2,4-trichlorobenzene	340,000	ND	ND	ND	ND	ND	ND	ND	ND
Naphthalene	NE	ND	ND	ND	ND	ND	ND	ND	ND
Diethylphthalate	14,000,000	ND	BDL	BDL	BDL	BDL	ND	420	ND
Methylene chloride	47,000	BDL	BDL	BDL	BDL	10	BDL	ND	BDL
Acetone	1,700,000	BDL	880+	78+	BDL+	ND	ND	ND	BDL
Chrysene	NE	BDL	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthlate	340,000	BDL	BDL	BDL	ND	ND	ND	460+	BDL
Benzo(a)pyrene	NE	BDL	ND	ND	ND	ND	ND	ND	ND
Benzo(g,h,i)perylene	NE	BDL	ND	ND	ND	ND	ND	ND	ND
Toluene	5,100,000	ND	ND	ND	ND	ND	BDL	ND	ND

TABLE 3-13

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILES AND SEMI-VOLATILES) IN SOIL
Site 3 - Truman Annex DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	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:		18, 19	18, 19	18, 19	18, 19	18, 19	18, 19	27, 29	28, 29
COMPOUND	CSC								
Chlorobenzene	510,000	ND	ND	ND	ND	ND	1,600	ND	ND
Ethylbenzene	1,700,000	ND	ND	ND	ND	ND	1,500	ND	ND
Total xylene	34,000,000	ND	ND	ND	ND	ND	8,200	ND	ND

NOTE:

MW = Monitoring well
NE = Not established
ND = Not detected at the instrument detection limit
BDL = Detected but below instrument quantitation limit
+ = Values were off scale due to a matrix interference

TABLE 3-14

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)
IN SURFACE/SUBSURFACE SOIL SAMPLES
Site 3 - 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
Barium	850	BDL	BDL	BDL	28.5	BDL	BDL	BDL	BDL
Beryllium	85	ND	ND	ND	ND	ND	BDL	ND	ND
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
Nickel	340	ND	ND	ND	ND	ND	BDL	ND	ND

TABLE 3-14

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)
IN SURFACE/SUBSURFACE SOIL SAMPLES
Site 3 - 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
Silver	51	ND	ND	ND	ND	ND	ND	ND	ND
Sodium	NE	BDL	BDL	1,310	1,140	BDL	1,030	919	1,060
Vanadium	NE	BDL	BDL	BDL	BDL	BDL	BDL	ND	BDL
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
ND = Not detected at instrument detection limit
BDL = Detected, but below instrument quantitation limit
NE = Not established
MW = Monitoring well

TABLE 3-15

ANALYTICAL DETECTION FOR TARGET ANALYTE LIST (INORGANICS) FOR GROUNDWATER SAMPLES
Site 3 - 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	03-ER
FIELD SAMPLE LOCATION:		MW 3-1	MW 3-2	MW 3-3	equipment rinsate
ASSOCIATED METHOD BLANKS:		7	7	7	8
COMPOUND	CSC				
Aluminum	NE	711	BDL	981	ND
Arsenic	50	ND	20.4	18.1	ND
Barium	1,000	BDL	BDL	BDL	ND
Cadmium	10	11.4	ND	13.6	13.9
Calcium	NE	1,670,000	455,000	1,150,000	ND
Copper	1,000	25.4	ND	BDL	ND
[illegible]	300	425	895	540	BDL
Lead	50	8.4	5.6	15.8	8.6
Magnesium	NE	74,200	143,000	63,600	ND
Manganese	50	BDL	BDL	BDL	ND
Mercury	2	ND	ND	0.2 (.22)	0.2 (.22)
Potassium	NE	21,900	49,700	22,700	ND
Silver	50	ND	ND	ND	ND
Sodium	160,000	534,000	1,140,000	567,000	ND
Zinc	5,000	336	46.1	357	400

NOTE:

NE = Not established
ND = Not detected at the instrument detection limit
BDL = Detected but below instrument quantitation limit
MW = Monitoring well

TABLE 3-16

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS
FOR GROUNDWATER SAMPLES
Site 3 - Turman 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	03-ER
FIELD SAMPLE LOCATION:		MW 3-1	MW 3-2	MW 3-3	equipment rinsate
ASSOCIATED METHOD BLANKS:		5	5	5	6
COMPOUND	CSC				
Alpha-BHC	0.05	ND	ND	0.11	ND
Beta-BHC	0.05	1.0*	7.0*	0.91*	ND
.mma-GHC	4	ND	ND	1.4*	ND
Dieldrin	0.05	0.47	BDL	1.8*	ND
4,4-DDD	0.15	2.1*	0.77	BDL	ND
4,4-DDE	0.1	ND	ND	0.19	ND
4,4-DDT	0.1	ND	ND	0.21	ND
Heptachlor epoxide	0.0039	ND	0.14	ND	ND

NOTE:

* = Compound analyzed at a secondary dilution factor
ND = Not detected at instrument detection limit
BDL = Detected, but below instrument quantitation limit
MW = Monitoring well

TABLE 3-17

DATA SUMMARY - SITE 3
Truman Annex, DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH OF WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[1]
MW 3-1	8.49	7.42	1.07
MW 3-2	8.23	8.21	0.02
MW 3-3	9.08	7.78	1.30

NOTE:

1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 3-17

DATA SUMMARY - SITE 3
Truman Annex, DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATON
Groundwater	Inorganics	Cadmium	10	11.4	13.9
		Iron	300	425	895
		Sodium	160,000	534,000	1,140,000
	Pesticides/PCB	Alpha-BHC	.05	---	.11
		Beta	.05	.91	7.00
		Dieldrin	.05	.47	1.80
		4,4-DDD	.15	.77	2.10
		4,4-DDE	.10	---	.19
		4,4-DDT	.10	---	.21
		Heptachlor epoxide	.0039	---	.14
Soil Sample	Pesticides/PCB	4,4-DDT	1,000	1,800	220,000
		4,4-DDD	1,500	2,000	83,000
		4,4-DDE	1,000	8,600	33,000

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standards for comparison

TABLE 3-18

ANALYTICAL DETECTIONS FOR APPENDIX IX PESTICIDE/PCB ANALYSIS PARAMETERS IN SURFACE/SUBSURFACE SOIL SAMPLES
Site 4 - Boca Chica Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		82	89
COMPOUND	CSC		
Heptachlor	78	ND	BDL+
Aldrin	21	ND	BDL+
Heptachlor epoxide	38	ND	120
Endosulfan I	850**	ND	BDL+
Dieldrin	NE	ND	BDL+
DDE	1,000	ND	BDL*
4,4-DDD	1,500	ND	BLD*
4,4-DDT	1,000	ND	BLD*
Aroclor 1254	NE	ND	BDL+
Aroclor 1260	NE	ND	BDL+
Isodrin	NE	ND	BDL+
Chlorobenzilate	NE	ND	BDL*
Gamma-BHC	NE	ND	BDL
Gamma chlordane	NE	ND	BDL

NOTE:

+ = Values were off scale due to a matrix interference at a dilution factor of 5
* = Values were off scale at a dilution factor of 5. Values were ND at a dilution factor of 50
** = CSC is for Endosulfan
ND = Not detected at instrument detection limit
NE = Not established
B = Boring location
BDL = Detected, but below instrument quantitation limit
MW = Monitoring well

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TABLE 3-19

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS FOR SOIL SAMPLES
Site 4 - Boca Chica Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		41	41	41	41
COMPOUND	CSC				
4,4-DDD	1,500	29	310*	46	ND
DDE	1,000	18	840*	110*	ND
4,4-DDT	1,000	30	BDL	32	ND
Arochlor 1260	45	ND	940	ND	ND

NOTE:

* = Designates samples analyzed at a dilution factor according to the following:

04-05-SED: Dilution factor of 5. Value for DDE represents an estimated value below the detection limit at this dilution.

ND = Not detected at instrument detection limit
BDL = Detected, but below the instrument detection limit
B = Boring location
Note: Boring B-5 sample collected for Appendix IX analysis

TABLE 3-20

EP TOXICITY DETECTIONS FOR SOIL BORING SAMPLES
Site 4 - Boc Chica Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/L (ppm)

LABORATORY SAMPLE IDENTIFICATION:		Site 4-1	Site 4-2	MW 3-D, Site 4	MW 4-D, Site 4	MW 5-D, Site 4
FIELD SAMPLE LOCATION:		MW 4-1	MW 4-2	MW 4-3	MW 4-4	MW 4-5
SAMPLE DEPTH (ft):		16-20	16-20	18-20	18-20	18-20
ASSOCIATED METHOD BLANKS:		13	13	32	32	32
COMPOUND	CSC					
Barium	100.000	0.031	0.043	0.023	0.025	0.044
Lead	5.000	BDL	BDL	BDL	BDL	BDL
Cadmium	1.000	BDL	BDL	BDL	0.012	BDL

NOTE:

MW = Monitoring well
BDL = Detected, but below the instrument quantitation limit

TABLE 3-21

ANALYTICAL DETECTIONS FOR VOLATILE ORGANICS (VOLATILES AND SEMI-VOLATILES) IN SOIL SAMPLES
Site 4 - Boca Chica Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		39,40	39,40	39,40	39,40
COMPOUND	CSC				
Acetone	1,700,000	17	BDL	BDL	ND
Bis(2-ethylhexyl)phthalate	340,000	BDL	BDL	BDL	BDL
Methylene chloride	47,000	10	9	BDL	8
Diethylphthlate	14,000,000	ND	ND	ND	ND
1,1 dichloroethene	NE	BDL	ND	ND	ND
2-butanone	NE	BDL	ND	ND	ND
Toluene	5,100,000	ND	BDL	BDL	ND
Acenaphthylene	NE	BDL	ND	ND	ND
Anthracene	NE	BDL	ND	ND	ND
Fluoranthene	NE	BDL	BDL	BDL	ND
Pyrene	NE	BDL	BDL	BDL	ND
Benzo(a)anthracene	NE	BDL	ND	BDL	ND
Benzo(b)fluoranthene	NE	BDL	BDL	BDL	ND
Benzo(k)fluoranthene	NE	BDL	BDL	BDL	ND
Benzo(a)pyrene	NE	BDL	ND	BDL	ND
Indeno(1,2,3-cd)pyrene	NE	BDL	ND	ND	ND
Benzo(g,h,i)perylene	NE	BDL	BDL	ND	ND
Chrysene	NE	ND	BDL	BDL	ND

NOTE:

NE = Not established
ND = Not detected to the instrument detection limit
BDL = Detected, but below instrument quantitation limit
B = Boring location
Note: Boring B-5 sample collected for Appendix IX analysis

TABLE 3-22

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) ANALYSIS FOR SOIL SAMPLES
Site 4 - Boca Chica Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

? all excavated

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
Barium	850	BDL	BDL	27.9	BDL
Calcium	NE	91,600	313,000	331,000	298,000
Chromium	85**	12.2	10	10.5	6.9
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
Nickel	340	11.1	4.9	BDL	ND
Potassium	NE	1,720	667	806	BDL
Silver	51	ND	ND	3.3	ND
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 is for Chromium VI (Soil)
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 3-23

ANALYTICAL DETECTIONS FOR APPENDIX IX PARAMETERS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILE AND SEMI-VOLATILE) IN SURFACE/SUBSURFACE SOIL SAMPLES
Site 4 - Boca Chica Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		80, 81	85, 87
COMPOUND	CSC		
Methylene chloride	47,000	10	ND
Acenaphthylene	NE	ND	2,500
Fluoranthene	NE	ND	3,600
Pyrene	NE	ND	8,500
Benzo(a)anthracene	NE	ND	2,900
ysene	NE	ND	5,900
Benzo(b)fluoranthene	NE	ND	3,800
Benzo(k)fluoranthene	NE	ND	3,800
Benzo(a)pryene	NE	ND	3,500
Indeno(1,2,3-cd)pyrene	NE	ND	3,000
Benzo(g,h,i)perylene	NE	ND	3,900
Bis(2-ethylhexyl)phthlate	340	BDL	BDL
Fluorene	NE	ND	BDL
Phenanthrene	NE	ND	BDL
Anthracene	NE	ND	BDL
Dibenzo(a,h)anthracene	NE	ND	BDL

NOTE:

BDL = Detected, but below instrument quantitation limit
ND = Not detected at the instrument detection limit
NE = Not established
MW = Monitoring well
B = Boring location

TABLE 3-24

ANALYTICAL DETECTIONS FOR APPENDIX IX INORGANIC (METALS) ANALYSIS IN SURFACE/SUBSURFACE SOIL SAMPLES
Site 4 - 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		
Antimony	6.8	ND	BDL
Arsenic	NE	6.4	11.4
Barium	850	BDL	141
Beryllium	85	ND	BDL
Cadmium	NE	ND	10.6
Chromium	85*	9.7	47.3
Cobalt	NE	ND	7.3
Copper	NE	26.8	594.0
Lead	NE	27.1	1,140
Mercury	NE	0.15	5.5
Nickel	340	BDL	42.4
Silver	51	ND	2.5
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:

ND = Not detected at the instrument detection limit
BDL = Detected, but below the instrument quantitation limit
NE = Not established
* = CSC is for Chromium VI (Soil)
MW = Monitoring well
B = Boring location

TABLE 3-25

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANCS) FOR GROUNDWATER SAMPLES
Site 4 - 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
Anitmony	14	BDL	ND	ND	ND	BDL	ND	ND
Arsenic	50	ND	ND	59	ND	ND	ND	ND
Barium	1,000	BDL	BDL	BDL	BDL	BDL	BLD	BDL
Cadmium	10	ND	ND	ND	9.7	ND	5.6	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	35.6	ND	25.9	12.9	18.2
Copper	1,000	67.2	ND	BDL	51	30	72.8	BDL
Iron	300	14,300 E	282 E	2,790 E	3,850	7,340 E	5,890	1,110
Lead	50	48	36.3	ND	65.4	54.8	74.4	36.1
Magnesium	NE	1,330,000	673,000	695,000	693,000	948,000	1,290,000	897,000
Manganese	50	53.6	ND	44.4	28.3	29.3	33.7	ND
Mercury	2	0.37	ND	ND	ND	0.39	ND	ND
Nickel	70	BDL	ND	ND	ND	ND	ND	ND

TABLE 3-25

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANCS) FOR GROUNDWATER SAMPLES
Site 4 - 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							
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
Zinc	5,000	70.7	BDL	21.7	59.3	142	83.4	BDL

NOTE:

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

TABLE 3-26

ANALYTICAL DETECTIONS FOR APPENDIX IX INORGANIC (METALS)
ANALYSIS IN GROUND/SURFACE WATER SAMPLES
Site 4 - Boca Chica Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		04-04-GW	04-01-SW
FIELD SAMPLE LOCATION:		MW 4-4	S-1
ASSOCIATED METHOD BLANKS:		79	90
COMPOUNDS	CSC		
Barium	1,000	BDL	BDL
Copper	1,000	54.7	272
Lead	50	38.3	377
Mercury	2	ND	8.4
Zinc	5,000	BDL	731

NOTE:

BDL = Detected, but below instrument quantitation limit
ND = Not detected at instrument detection limit
MW = Monitoring well

TABLE 3-27

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILES AND SEMI-VOLATILES)
IN GROUNDWATER SAMPLES
Site 4 - 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 BLANK:		34, 35	33,35	33,35	49, 52	55, 59	49, 52	50, 42
COMPOUND	CSC							
Carbon disulfide	3,500	5	5+	BDL+	BDL	BDL	ND	ND
1,2 dichloroethene (total)	4.2	ND	ND	ND	BDL	BDL	6	ND
Total xylenes	50	ND	ND	ND	BDL	ND	ND	ND
Methylene chloride	4.7	BDL+	BDL+	BDL+	ND	ND	ND	BDL+
Acenaphthylene	10	ND	ND	ND	BDL	ND	ND	ND
Fluoranthene	42	ND	ND	ND	BDL	ND	ND	ND
Pyrene	10	ND	ND	ND	BDL	ND	ND	ND
Bis(2-ethylhexyl)phthlate	700	ND	ND	ND	BDL+	ND	BDL+	ND
Vinyl chloride	1	ND	ND	ND	ND	BDL	ND	ND
Acetone	700	ND	BDL	BDL	ND	ND	ND	ND

TABLE 3-27

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILES AND SEMI-VOLATILES) IN GROUNDWATER SAMPLES
Site 4 - 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 BLANK:		34, 35	33,35	33,35	49, 52	55, 59	49, 52	50, 42
COMPOUND	CSC							
2-butanone	170	ND	BDL	BDL	ND	ND	ND	ND
4-chloraoniline	NE	BDL	ND	ND	ND	ND	ND	ND

NOTE:

NE = Not established
BDL = Detected, but below the instrument quantitation limit
ND = Not detected to the instrument detection limit
+ = Analyte detected in blank as well as in the sample
KWM/MW = Monitoring well
Note: Monitoring well (MW 4-4) sample collected for Appendix IX analysis

TABLE 3-28

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) ANALYSIS FOR SURFACE WATER SAMPLE
Site 4 - 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
Barium	1,000	BDL
Cadmium	10	13.7
Calcium	NE	546,000
Copper	1,000	BDL
Iron	300	BDL
Lead	50	BDL
Magnesium	NE	1,600,000
Mercury	2	BDL
Potassium	NE	454,000
Sodium	160,000	13,100,000

NOTE:

NE = Not established
BDL = Detected, but below instrument quantitation limit
S = Sediment/Surface Water Location

TABLE 3-29

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN SEDIMENT SAMPLE
Site 4 - Boca Chica Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

LABORATORY SAMPLE IDENTIFICATION:		04-07-SED	04-02-SED
FIELD SAMPLE LOCATION:		S-1	S-2
ASSOCIATED METHOD BLANK:		42	71
COMPOUND	CSC		
Aluminum	NE	12,700	1,990
Antimony	68	9.4	ND
Arsenic	NE	18.2	ND
Barium	850	384	BDL
Cadmium	NE	10.6	ND
Calcium	NE	183,000	45,100
Chromium	85*	118	15
Cobalt	NE	17.3	ND
Copper	NE	589	211
on	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
Nickel	340	89.3	ND
Potassium	NE	1,090	BDL
Silver	51	3.9	ND
Sodium	NE	25,300	75,700
Thallium	NE	74.3	ND
Vanadium	NE	11.5	BDL
Zinc	NE	2,610	119

NOTE:

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

TABLE 3-30

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS FOR SEDIMENT SAMPLES
Site 4 - Boca Chica Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are ug/kg (ppb)

LABORATORY SAMPLE IDENTIFICATION:		04-07-SED	04-02-SED
FIELD SAMPLE LOCATION:		S-1	S-2
ASSOCIATED METHOD BLANKS:		41	70
COMPOUND	CSC		
Aldrin	21	84+	ND
Delta-BHC	NE	69+	ND
,4-DDD	1,500	920*	ND
4,4-DDE	1,000	450*	ND
4,4-DDT	1,000	780*	ND
Heptachlor epoxide	38	71+	ND

? excavated, RCD

NOTE:

S = Sediment/Surface Water location
+ = Indicates elevated detection limits at dilution factor of 5 due to matrix interferences
ND = Not detected at instrument detection limit
NE = Not established
* - Designates samples analyzed at a dilution factor according to the following:

04-07-SED: Dilution factor of 50. Values for DDE, DDD, and DDT represent concentrations below the detection limit at that dilution

TABLE 3-31

VOLATILE ORGANIC ANALYSIS (VOLATILES AND SEMI-VOLATILES)
FOR SEDIMENT SAMPLES
Site 4 - Boca Chica Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

LABORTORY SAMPLE IDENTIFICATION:		04-07-SED	04-02-SED
FIELD SAMPLE LOCATION:		S-1	S-2
ASSOCIATED METHOD BLANKS:		39, 40	67, 69
COMPOUND	CSC		
Acenaphthylene	NE	13,000	ND
Anthracene	NE	6,300	ND
Benzo(a)anthracene	NE	7,500	ND
Benzo(b)fluoranthene	NE	7,600	ND
Benzo(k)fluoranthene	NE	10,000	ND
Benzo(a)pyrene	NE	8,300	ND
Benzo(g,h,i)perylene	NE	8,600	ND
Chrysene	NE	16,000	ND
'uoranthene	NE	8,300	ND
Indeno(1,2,3-cd)pyrene	NE	7,000	ND
Methylene chloride	47,000	8	BDL
Pyrene	NE	18,000	ND
Acetone	1,700,000	BDL	BDL
Toluene	5,100,000	BDL	ND
Total xylenes	34,000,000	BDL	ND
Dibenzofuran	NE	BDL	ND
Fluorene	NE	BDL	ND
Hexachlorobenzene	NE	BDL	ND
Phenanthrene	NE	BDL	ND
Bis(2-ethylhexyl)phthlate	340,000	BDL	BDL
Dibenzo(a,h)anthracene	NE	BDL	ND

NOTE:

NE = Note established
ND = Not detected at instrument detection limit
BDL = Detected, but below instrument quantitation limit
S = Sediment/Surface Water location

TABLE 3-32

DATA SUMMARY - SITE 4
Boca Chica, Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATION (ft) MSL[1]
MW 4-1	4.79	4.09	0.70
MW 4-2	5.08	4.28	0.80
MW 4-3	4.91	4.31	0.60
MW 4-4	4.91	3.94	0.97
MW 4-5	5.35	4.56	0.79
KWM-05	4.03	3.22	0.81
KWM-06	4.26	3.54	0.72
KWM-07	4.09	3.49	0.60
KWM-08	4.40	3.83	0.57

NOTE:

1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 3-32

DATA SUMMARY - SITE 4
Boca Chica, Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganics	Arsenic	50	---	59
		Chromium	50	---	106
		Iron	300	1,110	14,300
		Lead	50	54.8	377
		Manganese	50	---	53.6
		Sodium	160,000	5,530,000	11,000,000
		Mercury	2	---	8.4
	Pesticides/PCB	Heptachlor epoxide	38	---	120
	Volatiles	1,2-dichloroethene	4.2	---	6
Soil Samples	Pesticides/PCB	Heptachlor epoxide	38	---	120
		Aroclor-1260	45	---	940
Surface Water	Inorganics	Cadmium	10	---	13.7
		Sodium	160,000	---	13,100,000
Sediment Sample	Inorganics	Chromium	85	---	118
	Pesticides/PCB	Aldrin	21	---	84
		Heptachlor epoxide	38	---	71

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standards for comparison

TABLE 3-33

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS FOR SURFACE/SUBSURFACE SOIL SAMPLES

Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

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 LOCAITON:		Plot 1	Plot 2	Plot 3	Plot 4	Plot 5	Plot 6	MW 5-2	MW 5-3
ASSOCIATED METHOD BLANKS:		16	30	30	30	30	30	25	25
COMPOUND	CSC								
4,4-DDT	1,000	2,800,000*	42,000	160,000	210,000*	470,000*	25,000*	8,100*	1,000*
4,4-DDD	1,500	1,800,000*	620,000*	840,000*	49,000*	580,000*	23,000*	37,000*	BDL
4,4-DDE	1,000	BDL	BDL	BDL	BDL	BDL	BDL	8,400*	100*
Beta-BHC	NE	ND	BDL	ND	ND	BDL	1,100	ND	ND
Alpha-BHC	NE	BDL	BDL	BDL	ND	ND	BDL	ND	ND
Delta-BHC	NE	BDL	ND	ND	ND	ND	BDL	ND	ND

NOTE:

MW = Monitoring well
BDL = Detected, but below instrument quantitation limit
ND = Not detected at the instrument quantitation limit
NE = Not established

* = Designates samples analyzed at a dilution factor according to the following:

Site 5, Plot 1: Dilution factor of 50,000. Results of this sample agree well with results from sample diluted at a factor of 5,000
Site 5, Plot 2: Dilution factor of 20,000.
Site 5, Plot 3: Dilution factor of 20,000.
Site 5, Plot 4: Dilution factor of 5,000. Value for 4,4-DDD represents an estimated value less than the detection limit at this dilution
Site 5, Plot 5: Dilution factor of 20,000.
Site 5, Plot 6: Dilution factor of 1,000.
Site 5, MW-2: Dilution factor of 1,000. Values for DDE & DDT represent an estimated value less than detection limit at this dilution
Site 5, MW-3: Dilution factor of 1,000. Values for DDE & DDT represent an estimated values less than detection limit at this dilution

TABLE 3-34

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILES AND SEMI-VOLATILES)
IN SURFACE/SUBSURFACE SOIL SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	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:		14, 15	27, 29	28, 29	28, 29	28, 29	28, 29	23, 24	23, 24
COMPOUND	CSC								
Chloroform	57,000	11	ND	ND	ND	BDL	ND	ND	ND
Chlorobenzene	510,000	ND	1,600	ND	ND	ND	ND	ND	ND
Ethylbenzene	1,700,000	ND	1,500	ND	ND	ND	ND	ND	ND
Total xylenes	34,000,000	BDL	8,200	7	ND	ND	ND	ND	ND
Methylene chloride	47,000	17*	BDL	BDL	BDL	7	ND	BDL*	46*
1,2,4-trichlorobenzene	340,000	3,500	ND	ND	ND	ND	ND	ND	ND
Naphthalene	NE	6,000	ND	ND	ND	ND	ND	ND	ND
2-methylnaphthalene	NE	25,000	12,000	16,000	ND	ND	ND	ND	ND
Phenanthrene	NE	2,600	ND	ND	ND	ND	ND	ND	ND
Bis(2-ethylhexyl)phthalate	340,000	2,100	ND	ND	1,100*	BDL	1,800*	BDL	BDL
Acetone	1,700,000	BDL	ND	BDL	ND	BDL	BDL	BDL*	BDL*
Bromodichloromethane	340,000	BDL	ND	ND	ND	ND	ND	ND	ND
1,3-dichlorobenzene	NE	BDL	ND	ND	ND	ND	ND	ND	ND
1,4-dichlorobenzene	NE	BDL	ND	ND	ND	ND	ND	ND	ND

TABLE 3-34

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILES AND SEMI-VOLATILES)
IN SURFACE/SUBSURFACE SOIL SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		Discrete	Discrete	Discrete	Discrete	Discrete	Discrete	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:		14, 15	27, 29	28, 29	28, 29	28, 29	28, 29	23, 24	23, 24
COMPOUND	CSC								
Anthracene	NE	BDL	ND	ND	ND	ND	ND	ND	ND
Toluene	5,100,000	ND	BDL	14	BDL	15	BDL	ND	ND
1,2-dichloroethane	3,800	ND	ND	BDL	ND	ND	ND	ND	ND
Diethylphthlate	14,000,000	ND	ND	ND	BDL	ND	BDL	ND	ND
Di-n-butylphthlate	NE	ND	ND	ND	BDL	ND	BDL	ND	ND
Carbon disolfide	1,700,000	ND	ND	ND	ND	ND	ND	BDL	ND
2-hexanone	NE	ND	ND	ND	ND	ND	ND	BDL*	ND

NOTE:

* = Analyte was detected in the blank as well as the sample
ND = Not detected at the instrument detection limit
BDL = Detected, but below the instrument quantitation limit
NE = Not established

TABLE 3-35

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN SURFACE/SUBSURFACE SOIL SAMPLES
Site 5 - 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
Barium	850	53.3 E	BDL	BDL	BDL	BDL	BDL	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	9.8	ND	ND	ND	ND	ND	386
Sodium	NE	735	909	1,050	1,600	1,770	1,130	1,660	1,230

TABLE 3-35

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN SURFACE/SUBSURFACE SOIL SAMPLES
Site 5 - 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:

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

TABLE 3-36

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)
FOR GROUNDWATER SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		05-01-GWD	05-01-GWO	05-02-GW	05-03-GW
FIELD SAMPLE LOCATION:		MW 5-1 duplicate	MW 5-1	MW 5-2	MW 5-3
ASSOCIATED METHOD BLANKS:		47	47	54	54
COMPOUND	CSC				
Aluminum	NE	682	717	3,000	1,010
Barium	1,000	BDL	BDL	BDL	BDL
Calcium	NE	94,000	1,210,000	1,460,000	1,410,000
Chromium	50	ND	ND	33.7	ND
pper	1,000	BDL	ND	ND	ND
Iron	300	465	497	1,700	524
Lead	50	ND	ND	ND	ND
Magnesium	NE	163,000	163,000	159,000	190,000
Manganese	50	BDL	BDL	18.8	BDL
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
Zinc	5,000	27.9	26.8	49	ND

NOTE:

ND = Not detected at instrument detection limit
NE = Not established
BDL = Detected, but below instrument quantitation limit
MW = Monitoring well

TABLE 3-37

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC ANALYSIS (VOLATILES AND SEMI-VOLATILES)
FOR GROUNDWATER SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		05-01-GWO	05-01-GWD	05-02-GW	05-03-GW	Boca Chica DDT
FIELD SAMPLE LOCATION:		MW 5-1	MW 5-1 duplicate	MW 5-2	MW 5-3	MW 5-3
ASSOCIATED METHOD BLANKS:		43, 45	43, 45	49	49	95
COMPOUND	CSC					
Acetone	700	BDL	16	ND	BDL	NA
Benzene	1	ND	90	ND	BDL	NA
Carbon disulfide	3,500	BDL+	10+	BDL	BDL	NA
Chlorobenzene	10	ND	210	57	BDL	NA
1,2-dichloroethene (total)	4.2	1,500	1,800	ND	BDL	NA
Ethylbenzene	2	ND	38	ND	BDL	NA
2-methylnaphthalene	NE	54	52	ND	NA	ND
Naphthalene	10	46	40	ND	NA	ND
Toluene	24	ND	16	ND	BDL	NA
1,2,4-trichlorobenzene	700	15	16	ND	NA	ND
Xylenes (total)	50	BDL	76	BDL	BDL	NA
1,1-dichloroethene	NE	ND	BDL	ND	ND	NA
Methylene chloride	4.7	BDL+	BDL+	BDL	ND	NA
Trichloroethene	3	ND	BDL	ND	ND	NA
1,3-dichlorobenzene	10	BDL	BDL	BDL	ND	NA

TABLE 3-37

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC ANALYSIS (VOLATILES AND SEMI-VOLATILES)
FOR GROUNDWATER SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		05-01-GWO	05-01-GWD	05-02-GW	05-03-GW	Boca Chica DDT
FIELD SAMPLE LOCATION:		MW 5-1	MW 5-1 duplicate	MW 5-2	MW 5-3	MW 5-3
ASSOCIATED METHOD BLANKS:		43, 45	43, 45	49	49	95
COMPOUND	CSC					
1,4-dichlorobenzene	75	BDL	BDL	ND	ND	NA
1,2-dichlorobenzene	10	BDL	BDL	ND	ND	NA
Benzoic acid	NE	BDL	BDL	ND	NA	ND
Bis(2-ethylhexyl)phthlate	700	ND	BDL	ND	NA	ND
4-methylphenol	NE	ND	ND	BDL	NA	ND

NOTE:

+ = Analyte was found in blank as well as sample
NA = Not analyzed
ND = Not detected at instrument detection limit
BDL = Detected, but below instrument quantitation limit
NE = Not established
MW = Montioring well

TABLE 3-38

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS
FOR GROUNDWATER SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		05-01-GWD	05-01-GWO	05-02-GW	05-03-GW
FIELD SAMPLE LOCATION:		MW 5-1 duplicate	MW 5-1	MW 5-2	MW 5-3
ASSOCIATED METHOD BLANKS:		46	46	53	53
COMPOUND	CSC				
Alpha-BHC	0.05	16*	14*	BDL	BDL
Beta-BHC	0.05	6.1	5.0	2.4*	0.05
Delta-BHC	0.05	15*	13*	0.10	BDL
nma-BHC (lindane)	4.0	1.1	BDL	BDL	BDL
4,4-DDE	0.01	2.6	22	1.5*	0.16
4,4-DDT	0.01	34*	30*	0.72	0.16
Heptachlor epoxide	0.0039	BDL	BDL	BDL	BDL
4,4-DDD	0.15	BDL	BDL	BDL	0.76

NOTE:

* - Compound analyzed at a secondary dilution factor according to the followign:

05-01-GWD: Dilution factor of 200
05-01-GWO: Dilution factor of 200
05-02-GW: Diltution factor of 20. Value for DDE represents an estimated concentration below the detection limit at this dilution

BDL = Detected, but below instrument quantitation limit
MW = Monitoring well

TABLE 3-39

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (METALS)
FOR SURFACE WATER SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		05-SW-D	05-SW-U
FIELD SAMPLE LOCATION:		S-1	S-2
ASSOCIATED METHOD BLANKS:		65	65
COMPOUND	CSC		
Aluminum	NE	BDL	1,510
Barium	1,000	BDL	BDL
lcium	NE	246,000	242,000
on	300	112*	236*
Lead	50	53.6	ND
Magnesium	NE	819,000	792,000
Potassium	NE	232,000	220,000
Silver	50	BDL	BDL
Sodium	160,000	6,590,000	6,410,000
Zinc	5,000	22.4	36.6

NOTE:

NE = Not established
* = Reported value estimated due to the presence of an interference
BDL = Detected, but below the instrument quantitation limit
ND = Not detected to the instrument detection limit
S = Sediment/Surface Water location

TABLE 3-40

VOLATILE ORGANIC ANALYSIS (VOLATILES AND SEMI-VOLATILES) FOR SURFACE WATER SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		05-SW-D	05-SW-U
FIELD SAMPLE LOCATION:		S-1	S-2
ASSOCIATED METHOD BLANKS:		55, 59	57, 59
COMPOUND	CSC		
Acetone	700	ND	13
Methylene chloride	4.7	BDL	BDL
Benzyl alcohol	NE	ND	BDL

NOTE:

ND = Not detected at instrument detection limit
BDL = Dectected, but below instrument quantitation limit
NE = Not established
S = Sediment/Surface Water sample

TABLE 3-41

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS
IN SURFACE WATER SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		05-SW-D	05-SW-U
FIELD SAMPLE LOCATION:		S-1	S-2
ASSOCIATED METHOD BLANKS:		62	62
COMPOUND	CSC		
Aldrin	0.0021	ND*	ND
Beta-BHC	0.05	0.07	ND
4,4-DDD	0.15	ND	0.24
Heptachlor	0.0078	0.0620	ND

NOTE:

* = Elevated detection limit due to interference
ND = Not detected below instrument detection limit
S = Sediment/Surface Water location

TABLE 3-42

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS IN SEDIMENT SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

LABORATORY SAMPLE IDENTIFICATION:		05-SED-U	05-SED-D
FIELD SAMPLE LOCATION:		S-2	S-1
ASSOCIATED METHOD BLANKS:		64	64
COMPOUND	CSC		
4,4-DDD	1,500	13,000*	6,000*
ƆDE	1,000	1,800	2,800*
4,4-DDT	1,000	2,500	1,900*
Dieldrin	NE	BDL	<3,100*

NOTE:

* = Designates samples analyzed at a dilution factor according to the following:

05-SED-U: Dilution factor of 200. Value for DDD represents a concentration below the detection limit at this dilution
05-SEd-D: Dilution factor of 100. Values for DDE and DDT represent concentrations below the detection limit at this dilution. Value for dieldrin is below the detection limit at this dilution.

NE = Not established
BDL = Detected, but below instrument quantitation limit
S = Sediment/Surface Water location

TABLE 3-43

VOLATILE ORGANIC ANALYSIS (VOLATILES AND SEMI-VOLATILES) FOR SEDIMENT SAMPLES
Site 5 - Boca Chica DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

LABORATORY SAMPLE IDENTIFICATION:		05-SED-U	05-SED-D
FIELD SAMPLE LOCATION:		S-2	S-1
ASSOCIATED METHOD BLANKS:		58, 61	58, 61
COMPOUND	CSC		
hylene chloride	47,000	53	10
Acetone	1,700,000	BDL	ND
Butylbenzylphthlate	NE	BDL	BDL
Di-n-butylphthlate	NE	BDL	BDL
Bis(2-ethylhexyl)phthlate	14,000,000	BDL	BDL

NOTE:

ND = Not detected to the instrument detection limit
BDL = Detected, but below instrument quantitation limit
NE = Not established
S = Sediment/Surface Water Location

TABLE 3-44

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS)
FOR SEDIMENT SAMPLES
Site 5 - 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
Barium	850	BDL	BDL
Cadmium	NE	1.8	1.9
Calcium	NE	317,000	325,000
Chromium	85*	5.6	5.3
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
Vanadium	NE	BDL	BDL
Zinc	NE	46.5 E	58.6

NOTE:

NE = Not established
BDL = Detected, but below instrument quantitation limit
E = The reported value is estimated due to an interference
* = CSC is for Chromium VI
S = Sediment/Surface Water location

TABLE 3-45

DATA SUMMARY - SITE 5
Boca Chica, DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[2]
MW 5-1	7.70	4.40	3.30
MW 5-2	7.50	4.20	3.30
MW 5-3	7.47	4.00	3.47

NOTE:

1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 3-45

DATA SUMMARY - SITE 5
Boca Chica, DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Soil Samples	Pesticides/PCB	4,4-DDT	1,000	1,000	2,800,000
		4,4-DDT	1,500	23,000	1,800,000
		4,4-DDE	1,000	---	8,400
	Inorganics	Silver	51	---	386
Groundwater	Inorganics	Iron	300	465	1,700
		Sodium	160,000	1,460,000	1,620,000
	Volatiles	Chlorobenzene	10	57	210
		1,2-dichloroethene	4.2	1,500	1,800
		Ethylbenzene	2	---	38
		Naphthalene	10	40	46
		Xylenes	50	---	76
	Pesticides/PCB	Alpha-BHC	.05	14	16
		Beta-BHC	.05	0.54	6.1
		Delta-BHC	.05	0.10	15
		4,4-DDE	.01	.16	22
		4,4-DDT	.01	.16	34
		4,4-DDD	.15	---	.76
Surface Water	Inorganics	Lead	50	---	53.6
		Sodium	160,000	6,410,000	6,590,000
	Pesticides/PCB	Beta-BHC	.05	---	.066
		4,4-DDD	.15	---	.24

TABLE 3-45

DATA SUMMARY - SITE 5
Boca Chica, DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Sediment Samples	Pesticides/PCB	4,4-DDD	1,500	6,000	13,000
		4,4-DDE	1,000	1,800	2,800
		4,4-DDT	1,000	1,900	2,500

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
SC Concentration standards for comparison

TABLE 3-46

EP TOXICITY DETECTIONS FOR SOIL SAMPLES TAKEN FROM MONITORING WELL BORINGS
Site 7 - Fleming Key North Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/L (ppm)

LABORATORY SAMPLE IDENTIFICATION:		Site 7, MW-1	Site 7, MW-2	Site 7, MW-3	Site 7, MW-4	Site 7, MW-5	Site 7, MW-6
FIELD SAMPLE LOCATION:		MW 7-1	MW 7-2	MW 7-3	MW 7-4	MW 7-5	MW 7-6
SAMPLE DEPTH (ft):		17	20	20	20	20	17
ASSOCIATED METHOD BLANKS:		22	22	22	22	22	22
COMPOUND	CSC						
Barium	100	0.03	0.24	0.05	0.04	0.03	0.04
Chromium	5	ND	ND	ND	ND	ND	0.01
Silver	5	ND	ND	ND	ND	ND	0.01

NOTE:

MW = Monitoring well
ND = Not detected at the instrument detection limit

TABLE 3-47

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES
Site 7 - 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
Arsenic	50	25.4	BDL	ND	25.6	27.3	19.4	ND	ND	ND	ND	ND
Barium	1,000	531	BDL	BDL	BDL	234	BDL	BDL	BDL	BDL	247	ND
Beryllium	170	BDL	ND	ND	BDL	ND	ND	ND	ND	ND	ND	ND
Cadmium	10	21.7	14.3	10.4	12	14.9	10.3	9.2	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	17.9	ND	23.8	115	ND	ND	22.9	ND	28.8	ND
Cobalt	NE	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Copper	1,000	956	66.4	43	55.3	680	BDL	ND	315	154	215	ND

TABLE 3-47

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES
Site 7 - 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											
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	21.6	ND	42.1	746	10.6	29.4	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	1.1	0.63	0.48	13.6	0.44	0.37	73	BDL	1.3	ND
Nickel	70	91.2	ND	ND	ND	51.2	ND	ND	ND	34.9	BDL	ND
Potassium	NE	255,000	336,000	330,000	335,000	221,000	409,000	259,000	292,000	379,000	356,000	ND
Silver	50	ND	11	12.6	ND	ND	BDL	BDL	ND	ND	ND	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

TABLE 3-47

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES
Site 7 - 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											
Zinc	5,000	2,880	498	368	388	1,630	290	267	380	344	3,950	53

NOTE:

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

TABLE 3-48

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILES AND SEMI-VOLATILES) IN GROUNDWATER SAMPES
Site 7 - 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	07-11-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	equipment rinsate
ASSOCIATED METHOD BLANKS:		1, 3	1, 3	1, 3	1, 3	1, 3	1, 3	1, 3	50	57, 59	57, 59	57, 60	44
COMPOUND	CSC												
Acetone	700	BDL	ND	ND	ND	ND	BDL	ND	ND	BDL	15	BDL	ND
Methylene chloride	NE	BDL*	BDL*	ND	BDL*	BDL*	BDL*	BDL*	BDL*	ND	ND	BDL	BDL*
Carbon dislfide	NE	ND	ND	ND	ND	ND	ND	BDL	BDL	ND	BDL	BDL	BDL*

NOTE:

* = Compound detected in the blank as well as in the sample
ND = Not detected at instrument detection limit
BDL = Detected, but below instrument quantitation limit
NE = Not established
KWM/MW = Monitoring well

TABLE 3-49

ANALYTICAL DETECTIONS FOR TARGET ANALYTE (INORGANIC) ANALYSIS FOR SURFACE WATER
Site 7 - Fleming Key North Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		07-02-SW
FIELD SAMPLE LOCATION:		S-2 (Tidal Creek)
ASSOCIATED METHOD BLANK:		54
COMPOUND	CSC	
Aluminum	NE	447
Barium	1,000	BDL
[illegible]ium	NE	420,000
Copper	1,000	42.5
Iron	300	556
Lead	50	72.2
Magnesium	NE	1,370,000
Mercury	2	0.63
Potassium	NE	454,000
Sodium	160,000	11,400,000
Vanadium	NE	BDL

NOTE:

NE = Not established
BDL = *Detected, but below instrument quantitation limit*

TABLE 3-50

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANCS) IN SEDIMENT SAMPLES
Site 7 - 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
Barium	850	BDL	BDL	BDL	BDL
Cadmium	NE	ND	1.1	ND	ND
Calcium	NE	301,000	247,000	380,000	241,000
Chromium	85*	3.3	3.6	4.5	4.1
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
Potassium	NE	ND	BDL	ND	BDL
Silver	51	7.0	6.1	BDL	ND
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 is for Chromium VI
NE = Not established
BDL = Detected, but below instrument quantitation limit
ND = Not detected at instrument detection limit
S = Sediment/Surface Water location

TABLE 3-51

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS FOR SEDIMENT SAMPLES
Site 7 - 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-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:		70	70	70	70
COMPOUND	CSC				
Beta-BHC	NE	ND	BDL*	ND	ND

NOTE:

S = Sediment/Surface Water location
NE = Not established
* = Elevated detection limit due to matrix interference
ND = Not detected at instrument detection limit
BDL = Detected, but below instrument quantitation limit

TABLE 3-52

VOLATILE ORGANIC ANALYSIS (VOLATILES AND SEMI-VOLATILES) FOR SEDIMENT SAMPLES
Site 7 - Fleming Key North Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

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:		67, 69	67, 69	68, 69	68, 69
COMPOUND	CSC				
Chrysene	NE	ND	950	ND	ND
Fluoranthene	NE	ND	1,900	ND	ND
Phenanthrene	NE	ND	2,100	ND	ND
Pyrene	NE	ND	1,700	ND	ND
Methylene chloride	47,000	BDL	BDL	BDL	BDL
Bis(2-ethylhexyl)phthlate	340,000	BDL	BDL	BDL	BDL
[illegible]nthalene	NE	ND	BDL	ND	ND
Acenaphthlene	NE	ND	BDL	ND	ND
Dibenzofuran	NE	ND	BDL	ND	ND
Fluorene	NE	ND	BDL	ND	ND
Benzo(a)anthracene	NE	ND	BDL	ND	ND
Benzo(b)fluoranthene	NE	ND	BDL	ND	ND
Benzo(k)fluoranthene	NE	ND	BDL	ND	ND
Benzo(a)pyrene	NE	ND	BDL	ND	ND
Indeno(1,2,3-cd)pyrene	NE	ND	BDL	ND	ND
Dibenzo(a,h)anthracene	NE	ND	BDL	ND	ND
Benzo(g,h,i)perylene	NE	ND	BDL	ND	ND

NOTE:

BDL = Detected, but below instrument quantitation limit
NE = Not established
ND = Not detected at the instrument detection limit
S = Sediment/Surface Water location

TABLE 3-53

DATA SUMMARY - SITE 7
Fleming Key, North Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH OF WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[1]
MW 7-1	7.03	6.37	0.66
MW 7-2	8.06	7.56	0.50
MW 7-3	4.31	3.40	0.91
MW 7-4	10.05	9.40	0.65
MW 7-5	9.12	9.07	0.05
MW 7-6	7.15	6.59	0.56
KWM-09	5.58	NM	NM
KWM-10	NM	NM	NM
KWM-11	6.27	5.80	0.47
KWM-12	3.69	3.51	0.18

NOTE:

NM Not Measured
[1] MSL = Mean Sea Level
[2] Depth to water levels are the average of three depth measurements

TABLE 3-53

DATA SUMMARY - SITE 7
Fleming Key, North Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganics	Antimony	29	90.4	141
		Cadmium	10	10.3	21.7
		Chromium	50	115	384
		Iron	300	549	121,000
		Lead	50	125	1,430
		Manganese	50	56.9	656
		Mercury	2	12.4	73
		Nickel	70	---	91.2
		Sodium	160,000	6,190,000	14,300,000
Surface Water	Inorganic	Iron	300	---	556
		Lead	50	---	72.2
		Sodium	160,000	---	11,400,000

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standards for comparison

TABLE 3-54

EP TOXICITY DETECTIONS FOR SOIL BORING SAMPLES
Site 8 - Fleming Key South Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/L (ppm)

LABORATORY SAMPLE IDENTIFICATION:		MWSF-1	MWSF-2	MWSF-3	MWSF-4	MWSF-5	MWSF-6	BSF-1	BSF-2	BSF-3	BSF-4
FIELD SAMPLE LOCATION:		MW 8-1	MW 8-2	MW 8-3	MW 8-4	MW 8-5	MW 8-6	B-1	B-2	B-3	B-4
ASSOCIATED METHOD BLANK:		22	22	22	22	22	22	22	22	22	22
COMPOUND	CSC										
Barium	100	0.059	0.046	0.048	0.029	0.039	0.049	0.044	0.026	0.029	0.045
Chromium	5	ND	ND	ND	ND	ND	ND	ND	0.01	0.01	0.02
Silver	5	ND	ND	ND	ND	ND	ND	0.01	ND	ND	ND

NOTE:

B = Soil boring
MW = Monitoring well
ND = Not detected at the instrument detection limit

TABLE 3-55

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES
Site 8 - 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-ER	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	equipment rinsate	KWM-14	KWM-15
ASSOCIATED METHOD BLANK:		7	38	7	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	BDL	2,530	BDL
Antimony	14	ND	BDL	95.4	BDL	ND	BDL	BDL	ND	ND	ND
Arsenic	50	20.8	50.5	24.5	14.7	ND	109	53.3	12.4	ND	ND
Barium	1,000	204	333 E	295	BDL	BDL	364	264	ND	BDL	BDL
Beryllium	170	BDL	ND	ND	ND	ND	ND	ND	ND	ND	ND
Cadmium	10	13	ND	11.4	12	15.60	31	21.8	71.8	24	ND
Calcium	NE	4,100,000	2,440,000	3,090,000	810,000	3,180,000	7,220,000	4,570,000	BDL	369,000	353,000
Chromium	50	42.7	49.2	55.9	ND	14.80	115	77	ND	ND	ND
Copper	1,000	156	163	345	BDL	62.50	466	274	ND	1,780	ND
Iron	300	14,600 E	30,400 E	23,400	5,920	3,500	70,600	43,800	218	3,340 E	167
Lead	50	90.9	497	1,870	22.3	59.00	598	395	7.8	ND	37.8
Magnesium	NE	852,000	1,090,000	1,270,000	1,210,000	869,000	1,030,000	932,000	ND	999,000	933,000
Manganese	50	167	195	161	96 E	35.90 E	508 E	337 E	BDL	85	ND
Mercury	2	1.50	1.10	11.50	0.44	0.22	5.00	2.20	ND	0.53	ND

TABLE 3-55

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) IN GROUNDWATER SAMPLES
Site 8 - 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-ER	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	equipment rinsate	KWM-14	KWM-15
ASSOCIATED METHOD BLANK:		7	38	7	7	7	7	7	7	65	65
COMPOUND	CSC										
Nickel	70	BDL	BDL	ND	BDL	ND	BDL	ND	ND	ND	ND
Potassium	NE	274,000	315,000	361,000	360,000	265,000	366,000	359,000	ND	281,000	260,000
Silver	50	ND	ND	ND	BDL	ND	ND	ND	ND	21	BDL
Sodium	160,000	7,430,000	9,110,000	10,400,000	10,100,000	7,090,000	8,520,000	7,940,000	BDL	7,850,000	7,410,000
Vanadium	NE	BDL	BDL	BDL	BDL	BDL	54.5	BDL	ND	ND	ND
Zinc	5,000	585	664	1,990	323	464	3,210	2,050	1,690	840	ND

NOTE:

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

TABLE 3-56

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILE AND SEMI-VOLATILE) IN GROUNDWATER SAMPLES

Site 8 - Fleming Key Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		08-14-GW	08-15-GW	08-01-GW	08-03-GW	08-04-GW	08-05-GW	08-06-GW	08-06 GWD	08-ER	08-02-GW
FIELD SAMPLE LOCATION:		KWM-14	KWM-15	MW 8-1	MW 8-3	MW 8-4	MW 8-5	MW 8-6	MW 8-6 duplicate	equipment rinsate	MW 8-2
ASSOCIATED METHOD BLANK:		57, 59	57, 60	1, 3	2, 4	2, 4	2, 4	2, 4	2, 4	2, 4	33, 36
COMPOUND	CSC										
Bis(2-ethylhexyl)phthalate	700	ND	BDL	ND	BDL	BDL	BDL	ND	26	BDL	ND
Carbon disulfide	3,500	ND	ND	ND	ND	7	BDL	ND	5	BDL	BDL+
Chlorobenzene	10	ND	ND	ND	ND	ND	ND	63	63	ND	ND
1,4-dichlorobenzene	75	ND	ND	BDL	ND	ND	ND	36	36	ND	ND
Methylene chloride	3,800	ND	ND	ND	ND	BDL+	BDL+	BDL+	BDL+	BDL+	BDL+
1,1-dichloroethene	7	ND	ND	ND	ND	BDL	ND	ND	ND	ND	ND
Acetone	700	ND	ND	ND	ND	BDL	BDL	ND	ND	ND	ND

NOTE:

+ = Compound was detected in the blank as well as in the sample
BDL = Detected, but below the instrument quantitation limit
ND = Not detected to the instrument detection limit

TABLE 3-57

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) FOR SEDIMENT SAMPLES

Site 8 - 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			
Aluminum	NE	1,840	17,400	3,850
Antimony	6.8	ND	20.3	20.7
Arsenic	NE	6.7	43.5	15.8
Barium	850	38.8	105	304
Cadmium	NE	1.0	11.4	3.3
Calcium	NE	247,000	180,00	251,000
Chromium	85*	12	71	28
Cobalt	NE	ND	10.1	BDL
per	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
Nickel	340	17	65.4	18.6
Potassium	NE	716	609	BDL
Silver	51	ND	2.4	17.7
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:

NE = Not established
* = This CSC has been established for Chromium VI
BDL = Detected, but below instrument quantitation limit
ND = Not detected to the instrument detection limit
: Sediment/Surface Water location

TABLE 3-58

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC ANALYSIS (VOLATILES AND SEMI-VOLATILES) FOR SEDIMENT SAMPLES
Site 8, Fleming Key South Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

LABORATORY SAMPLE IDENTIFICATION:		08-01-SED	08-02-SED	08-03-SED
FIELD SAMPLE LOCATION:		S-1	S-2	S-3
ASSOCIATED METHOD BLANK:		68, 69	68, 69	68, 69
COMPOUND	CSC			
2-ethylhexyl)phthalate	340,000	1,100	BDL	BDL
Methylene chloride	47,000	10	7	7
Acetone	1,700,000	BDL	ND	ND
Toluene	5,100,000	BDL	ND	ND
Benzo(g,h,i)perylene	NE	ND	ND	BDL

NOTE:

ND = Not detected at the instrument detection limit
BDL = Detected, but below instrument quantitation limit
NE = Not established
S = Sediment/Surface Water location

/595392\P3SDOR-8.SB8

TABLE 3-59

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS FOR SEDIMENT SAMPLES
Site 8 - Fleming Key South Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

LABORATORY SAMPLE IDENTIFICATION:		08-01-SED	08-02-SED	08-03-SED
FIELD SAMPLE LOCATION:		S-1	S-2	S-3
ASSOCIATED METHOD BLANK:		70	70	0
COMPOUND	CSC			
4,4-DDE	1,000	ND	180*	BDL
4,4-DDT	1,000	ND	46*	27

NOTE:

ND = Not detected at the instrument detection limit
BDL = Detected, but below instrument quantitation limit
S = Sediment/Surface Water location

* = Designates samples analyzed at a dilution factor according to the following:

08-02-SED: Dilution factor of 10. Value for DDT represents an estimated concentration below the detection limit at this dilution

TABLE 3-60

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST
(INORGANIC) ANALYSIS FOR SURFACE WATER SAMPLE
Site 8 - Fleming Key South Landfill
NAS-Key West
Key West, Florida
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		08-01-SW
FIELD SAMPLE LOCATION:		SW-1
ASSOCIATED METHOD BLANK:		54
COMPOUND	CSC	
Aluminum	NE	2,030
Arsenic	50	57.3
Barium	1,000	BDL
Cadmium	10	19.8
Calcium	NE	331,000
Chromium	50	37.2
per	1,000	172
Iron	300	305,000
Lead	50	155
Magnesium	NE	1,100,000
Manganese	50	294
Mercury	2	0.43
Potassium	NE	325,000
Silver	50	10.2
Sodium	160,000	9,390,000
Vanadium	NE	BDL
Zinc	5,000	62.3

NOTE:

NE = Not established
BDL = Detected, but below instrument quantitation limit
SW = Surface water location

TABLE 3-61

ANALYTICAL DETECTIONS FOR PESTICIDE/PCB ANALYSIS
FOR SURFACE WATER SAMPLES
Site 8 - 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-SW
D SMAPLE LOCATION:		SW-1
SSOCIATED METHOD BLANK:		53
COMPOUND	CSC	
Aroclor-1242	0.0046	1.1000

NOTE:

SW = Surface water location

TABLE 3-62

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC ANALYSIS (VOLATILES AND SEMI-VOLATILES) FOR SURFACE WATER SAMPLE

Site 8 - 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-SW
FIELD SAMPLE LOCATION:		S-1
ASSOCIATED METHOD BLANK:		50, 52
COMPOUND	CSC	
Acetone	700	46+
Bis(2-ethylhexyl)phthlate	700	BDL

NOTE:

+ = Analyte was found in the blank as well as the sample
BDL = Detected, but below instrument quantitation limit
SW = Surface water location

TABLE 3-63

DATA SUMMARY - SITE 8
Fleming Key, South Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[1]
MW 8-1	13.56	13.10	0.46
MW 8-2	5.64	5.06	0.58
MW 8-3	10.72	10.24	0.48
MW 8-4	12.50	12.14	0.36
MW 8-5	9.05	8.59	0.46
MW 8-6	9.36	NM	NM
KWM-13	6.88	NM	NM
KWM-14	7.07	6.79	0.28
KWM-15	8.09	7.60	0.49
KWM-16R	8.09	7.66	0.43

NOTE:

NM Not Measured
1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 3-63

DATA SUMMARY - SITE 8
Fleming Key, South Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganic	Antimony	14	---	95.4
		Arsenic	50	50.5	109
		Cadmium	10	11.4	71.8
		Chromium	50	55.9	115
		Copper	1,000	---	1,780
		Iron	300	3,340	70,600
		Lead	50	59	1,870
		Manganese	50	85	508
		Mercury	2	2.2	11.5
		Sodium	160,000	7,090,000	10,400,000
	Volatiles	Chlorobenzene	10	---	63
Sediment Samples	Inorganic	Antimony	6.8	20.3	20.7
Surface Water	Inorganic	Arsenic	50	---	57.3
		Cadmium	10	---	19.8
		Iron	300	---	305,000
		Lead	50	---	155
		Manganese	50	---	294
		Sodium	160,000	---	9,390,000
	Pesticides/PCB	Aroclor-1242	.0046	---	1.1

NOTE:

*	Minimum values represent the smallest concentration level above CSC
---	Present when only one value above CSC exists
CSC	Concentration standard for comparison

TABLE 3-64

ANALYTICAL DETECTIONS FOR EPA METHOD 601/602VOLATILE ORGANIC COMPOUND ANALYSIS IN GROUNDWATER SAMPLES
Site 9 - Trumbo Point Annex Fuel Farm and Piers
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		09-OGR-GW	09-11-GW	90-02GM-GW	09-05GM-GW	09-KWM-09-GW	09-KWM-21-GW	09-KWM-21-GWD	09-KWM-25-EB
FIELD SAMPLE LOCATION:		MW-6R	MW 9-11	KWM-09	KWM-05	KWM-09	KWM-21	KWM-21 duplicate	equipment rinsate
ASSOCIATED METHOD BLANK:		48	48	72, 73	72, 73	72, 73	72, 73	72, 73	72, 73
COMPOUND	CSC								
Benzene	1	ND	ND	ND	ND	780	9.6	8.9	ND
Toluene	24	ND	ND	ND	ND	39	ND	ND	ND
Ethylbenzene	2	ND	ND	ND	ND	33	ND	ND	ND
Xylenes	50	1.3	ND	ND	ND	11	ND	ND	ND
Methylene chloride	4.7	ND	ND	ND	ND	ND	2.0	ND	ND
Trichlorofluoromethane	NE	ND	ND	ND	ND	ND	ND	ND	ND

NOTE:

NE = Not established
KWM/MW = Monitoring well
ND = Not detected to the instrument detection limit

TABLE 3-65

POLYNUCLEAR AROMATIC HYDROCARBONS ANALYSIS FOR GROUNDWATER SAMPLES
Site 9 - Trumbo Point Annex Fuel Farm and Piers
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		09-02GM-GW	09-05GM-GW	09-KWM-09-GW	09-KWM-21-GW	09-KWM-21-GWD	09-KWM-25-EB
FIELD SAMPLE LOCATION:		KWM-02	KWM-05	KWM-09	KWM-21	KWM-21 duplicate	equipment rinsate
ASSOCIATED METHOD BLANK:		92	92	92	92	92	92
COMPOUND	CSC						
Benzo(b)fluoranthene	10	ND	0.015	ND	ND	ND	ND
Benzo(k)fluoranthene	10	ND	ND	ND	ND	ND	0.026
Benzo(a)pyrene	10	ND	0.030	ND	ND	ND	0.011

NOTE:

ND = *Not detected to instrument detection limit*
KWM = Monitoring well

TABLE 3-66

ANALYTICAL DETECTIONS FOR EPA TEST 504
Site 9 - Trumbo Point Annex Fuel Farm and Piers
NAS-Key West
Key West, Florida
IT Project No. 595932
Units are in mg/L (ppm)

LABORATORY SAMPLE IDENTIFICATION:		09-02-GM-GW	09-05-GM-GW	09-KWM-09-GW	09-KWM-21-GW
FIELD SAMPLE LOCATION:		KWM-02	KWM-05	KWM-09	KWM-21
COMPOUND	CSC				
Dibromochloropropane	0.000025	ND	ND	ND	ND
LABORATORY SAMPLE IDENTIFICATION:	09-KWM-21D	09-KWM-25-EB	16-9-6R	9-11	trip blank
FIELD SAMPLE LOCATION:	KWM-21 duplicate	equipment rinsate	MW-6R	MW 9-11	trip blank
COMPOUND					
Dibromochloropropane	1.0	ND	ND	ND	ND

NOTE:

ND = Not detected to the instrument detection limit
KWM/MW = Monitoring well

TABLE 3-67

ANALYTICAL DETECTIONS FOR LEAD ANALYSIS IN GROUNDWATER SAMPLES
Site 9 - Trumbo Point Annex Fuel Farm and Piers
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		09-02GM-GW	09-05GM-GW	09-KWM-09-GW	09-KWM-21-GW	09-KWM-21-GWD	09-KWM-25-EB
FIELD SAMPLE LOCATION:		KWM-02	KWM-05	KWM-09	KWM-21	KWM-21 duplicate	equipment rinsate
ASSOCIATED METHOD BLANK:		93	93	93	93	93	93
COMPOUND	CSC						
Lead	50	ND	ND	32.2	ND	ND	ND

NOTE:

ND = Not detected to the instrument detection limit
KWM = Monitoring well

TABLE 3-68

DATA SUMMARY - SITE 9
Trumbo Point Annex, Fuel Farm and Piers
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATION (ft) MSL[1]
MW 9-10	9.75	NM	NM
MW 9-11	10.45	NM	NM
MW 9-12	9.56	NM	NM
KWM-01	5.80	NM	NM
KWM-02	6.11	5.00	1.11
KWM-03	8.29	NM	NM
KWM-05	6.75	5.00	1.75
MW-6R	9.75	NM	NM
KWM-07	7.33	NM	NM
KWM-08	7.05	NM	NM
KWM-09	6.99	NM	NM
MW-13	6.64	NM	NM
MW-14	6.13	NM	NM
MW-15	5.91	NM	NM
MW-16	5.74	NM	NM
MW-17	5.88	NM	NM
KWM-20	6.99	6.00	0.99
KWM-21	7.64	NM	NM
KWM-22	7.72	NM	NM
KWM-23	6.85	NM	NM

TABLE 3-68

DATA SUMMARY - SITE 9
Trumbo Point Annex, Fuel Farm and Piers
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATION (ft) MSL[1]
KWM-24	6.63	NM	NM
KWM-25	6.94	NM	NM

NOTE:

NM Not Measured
1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 3-68

DATA SUMMARY - SITE 9
Trumbo Point Annex, Fuel Farm and Piers
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
oundwater	Volatiles	Benzene	1	8.9	780
		Toluene	24	---	39
		Ethylbenzene	2	---	33

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standard for comparison

TABLE 3-69

EP TOXICITY DETECTIONS FOR SOIL BORING SAMPLES
Site 10 - Boca Chica Fire Fighting Training Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/L (ppm)

LABORATORY SAMPLE IDENTIFICATION:		BFFTA-1	BFFTA-2	BFFTA-3	BFFTA-4	BFFTA-5	BFFTA-6	BFFTA-7	MWFFTA-1	MWFFTA-2	MWFFTA-3
FIELD SAMPLE LOCATION:		B-1	B-2	B-3	B-4	B-5	B-6	B-7	MW 10-1	MW 10-2	MW 10-3
SAMPLE DEPTH (ft):		6-8	4-6	2-4	6-8	0-2	2-4	8-9	6-8	0-2	4-6
ASSOCIATED METHOD BLANK:		32	32	32	32	32	32	32	32	32	32
COMPOUND	CSC										
Barium	100.	0.048	0.039	0.036	0.042	0.039	0.041	0.031	0.013	0.035	0.033
Cadmium	1.	ND	ND	ND	ND	ND	0.005	ND	0.014	0.0013	ND
Lead	5.	ND	ND	ND	ND	ND	ND	ND	BDL	ND	ND

NOTE:

B = Soil boring
MW = Monitoring well
ND = Not detected at the instrument detection limit
BDL = Detected, but below the instrument quantitation limit

TABLE 3-70

ANALYTICAL DETECTIONS FOR APPENDIX IX INORGANIC (METALS)
ANALYSIS IN SOIL SAMPLE
Site 10 - Boca Chica Fire Fighting Training Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

LABORATORY SAMPLE IDENTIFICATION:	10-MW-01-SS
FIELD SAMPLE LOCATION:	MW 10-1
DEPTH OF SAMPLE (ft)	.5
ASSOCIATED METHOD BLANK:	83

COMPOUND	CSC	
Barium	850	BLD
mium	85*	4.7
Copper	NE	32.9
Lead	NE	14.4
Nickel	340	BDL
Vanadium	NE	BDL
Zinc	NE	54.3
Tin	NE	3.1

NOTE:

NE = Not established
BDL = Detected, but below the instrument quantitation limit
* = CSC is for Chromium Vi (Soil)

TABLE 3-71

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) FOR GROUNDWATER SAMPLES
Site 10 - Boca Chica Fire Fighting Training Area
NAS-Key West
Key West, Florida
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		field blank	10-02-GW	10-03-GW	10-18-GM-GW	10-19-GW
FIELD SAMPLE LOCATION:		equipment rinsate	MW 10-2	MW 10-3	KWM-18	KWM-19
ASSOCIATED METHOD BLANK:		7	47	47	54	47
COMPOUND	CSC					
Aluminum	NE	ND	11,500	12,300	67	2,590
Barium	1,000	BDL	226	BDL	ND	BDL
Beryllium	170	ND	BDL	BDL	ND	ND
Cadmium	10	13.5	ND	ND	ND	ND
Calcium	NE	32,900	12,700,000	10,200,000	229,000	4,920,000
Chromium	50	ND	73.5	53	ND	25
Copper	1,000	ND	BDL	30.1	10.4	91.9
Iron	300	109	2,490	4,940	1,230	2,210
Lead	50	6.7	ND	ND	ND	ND
Magnesium	NE	BDL	651,000	1,180,000	152,000	848,000
Manganese	50	ND	42.4	62.2	ND	BDL
Mercury	2	ND	ND	0.26	ND	0.39

TABLE 3-71

ANALYTICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) FOR GROUNDWATER SAMPLES
Site 10 - Boca Chica Fire Fighting Training Area
NAS-Key West
Key West, Florida
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		field blank	10-02-GW	10-03-GW	10-18-GM-GW	10-19-GW
FIELD SAMPLE LOCATION:		equipment rinsate	MW 10-2	MW 10-3	KWM-18	KWM-19
ASSOCIATED METHOD BLANK:		7	47	47	54	47
COMPOUND	CSC					
Potassium	NE	10,400	196,000	343,000	70,900	256,000
Sodium	160,000	**20,500**	5,300,000	9,340,000	1,330,000	7,180,000
Vanadium	NE	ND	58.1	BDL	ND	BDL
Zinc	5,000	371	BDL	BDL	45.5	32.6

NOTE:

NE = Not established
BDL = Detected, but below instrument quantitation limit
ND = Not detected at instrument detection limit
KWM/MW = Monitoring well

TABLE 3-72

ANALYTICAL DETECTIONS FOR VOLATILE ORGANIC COMPOUNDS (VOLATILE AND SEMI-VOLATILE) IN GROUNDWATER SAMPLES
Site 10 - Boca Chica Fire Fighting Training Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION		10-02-GW	10-03-GW	10-18-GM-GW	10-19-GW
FIELD SAMPLE LOCATION:		MW 10-2	MW 10-3	KWM-18	KWM-19
ASSOCIATED METHOD BLANK:		43, 45	44, 45	50, 52	44, 45
COMPOUND	CSC				
Acetone	700	46	ND	BDL	BDL
Benzene	1	ND	ND	11	ND
Ethylbenzene	2	ND	ND	15	ND
hthalene	10	ND	ND	39	ND
Xylenes (total)	50	ND	ND	17	ND
2-methylnaphthalene	NE	ND	ND	BDL	ND
Chloroethane	6,300	ND	ND	BDL	ND
1,1-dichloroethane	2,400	ND	ND	BDL	ND
Toluene	24	ND	ND	BDL	ND
Methylene chloride	5	BDL	BDL	ND	BDL
Carbon disulfide	3,500	BDL	BDL	ND	BDL
Bis(2-ethylhexyl)phthlate	700	BDL	ND	ND	ND

NOTE:

NE = Not established
ND = Not detected at the instrument detection limit
BDL = Detected, but below the instrument quantitation limit
KWM/MW = Monitoring well

TABLE 3-73

ANALYTICAL DETECTIONS FOR APPENDIX IX PESTICIDE/PCB ANALYSIS FOR GROUNDWATER SAMPLE
Site 10 - Boca Chica Fire Fighting Training Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		10-01-GW
FIELD SAMPLE LOCATION:		MW 10-1
ASSOCIATED METHOD BLANK:		78
COMPOUND	CSC	
Alpha-BHC	0.05	<0.25*
Beta-BHC	0.05	<0.25*
Delta-BHC	0.05	<0.25*
Gamma-BHC (lindane)	4.00	<0.25*
Heptachlor	0.0076	<0.25*
Aldrin	0.0021	<0.25*

NOTE:

* = Peak off scale and therefore out of linear range at a dilution factor of 1. Elevated contract required quantitation limit due to matrix interference at a dilution factor of 1. Re-analysis at dilution factor of 5 were below instrument quantation limit.

TABLE 3-74

ANALYTICAL DETECTIONS FOR APPENDIX IX INORGANIC (METAL) PARAMETERS FOR GROUNDWATER SAMPLE
Site 10 - Boca Chica Fire Fighting Training Area
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:		10-01-GW
FIELD SAMPLE LOCATION:		MW 10-1
ASSOCIATED METHOD BLANK:		79
COMPOUND	CSC	
Arsenic	50	39.3
.um	1,000	BDL
Chromium	50	17
Copper	1,000	38.6
Silver	50	22.6
Vanadium	NE	BDL
Zinc	5,000	25.3

NOTE:

NE = Not established
BDL = Detected, but below the instrument quantitation limit.

1/595392\P3GWMT10.SB8

TABLE 3-75

DATA SUMMARY - SITE 10
Boca Chica, Fire Fighting Training Area
NAS-Key West
Key West, Florida
IT Project No. 595392

WELL	TOP OF CASING ELEVATION (ft) MSL[1]	DEPTH TO WATER BELOW TOP OF CASING (ft)[2]	GROUNDWATER ELEVATIONS (ft) MSL[1]
MW 10-1	3.56	3.00	0.56
MW 10-2	3.36	2.60	0.76
MW 10-3	3.63	3.00	0.63
KWM-18	2.82	2.60	0.22
KWM-19	3.02	2.60	0.42

NOTE:

1 MSL = Mean Sea Level
2 Depth to water levels are the average of three depth measurements

TABLE 3-75

DATA SUMMARY - SITE 10
Boca Chica, Fire Fighting Training Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganic	Cadmium	10	---	13.5
		Chromium	50	53	73.5
		Iron	300	1,230	4,940
		Manganese	50	---	62.2
		Sodium	160,000	1,330,000	9,340,000
	Volatiles	Benzene	1	---	11
		Ethylbenzene	2	---	15
		Naphthalene	10	---	39

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standard for comparison

TABLE 3-76
VOLATILE ORGANIC ANALYSIS METHOD BLANKS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 9	METHOD BLANK 14	METHOD BLANK 18	METHOD BLANK 23	METHOD BLANK 27	METHOD BLANK 28	METHOD BLANK 39	METHOD BLANK 58	METHOD BLANK 67	METHOD BLANK 68
Chloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	<5	BDL	<5	BDL	<5	<5	<5	<5	<5	<5
Acetone	<10	<10	BDL	BDL	<10	<10	<10	<10	<10	<10
Carbon disulfide	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-dichloroethene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-dichloroethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-dichloroethene (total)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-dichloroethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2-butanone	<10	<10	<10	BDL	<10	<10	<10	<10	<10	<10
1,1,1-trichloroethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl acetate	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

TABLE 3-76
VOLATILE ORGANIC ANALYSIS METHOD BLANKS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 9	METHOD BLANK 14	METHOD BLANK 18	METHOD BLANK 23	METHOD BLANK 27	METHOD BLANK 28	METHOD BLANK 39	METHOD BLANK 58	METHOD BLANK 67	METHOD BLANK 68
Bromodichloromethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-dichloropropane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cis-1,3,-dichloropropene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dibromochloromethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-trichloroethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Benzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trans-1,3-dichloropropene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
4-methyl-2-pentanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-hexanone	<10	<10	<10	BDL	<10	<10	<10	<10	<10	<10
Tetrachloroethene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-tetrachloroethane	<5	<5	<5	BDL	<5	<5	<5	<5	<5	<5
Toluene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

TABLE 3-76
VOLATILE ORGANIC ANALYSIS METHOD BLANKS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 9	METHOD BLANK 14	METHOD BLANK 18	METHOD BLANK 23	METHOD BLANK 27	METHOD BLANK 28	METHOD BLANK 39	METHOD BLANK 58	METHOD BLANK 67	METHOD BLANK 68
Styrene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total xylenes	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

NOTE:

BDL = Detected, but below instrument quantitation limit

TABLE 3-77

VOLATILE ORGANIC ANALYSIS METHOD BLANKS
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 1	METHOD BLANK 2	METHOD BLANK 33	METHOD BLANK 34	METHOD BLANK 43	METHOD BLANK 44	METHOD BLANK 49	METHOD BLANK 50	METHOD BLANK 51	METHOD BLANK 55	METHOD BLANK 56	METHOD BLANK 57
Chloromethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Vinyl chloride	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Chloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL	BDL
Acetone	<10	<10	<10	<10	<10	<10	BDL	BDL	BDL	<10	<10	<10
Carbon disulfide	<5	<5	BDL	<5	BDL	BDL	<5	<5	<5	<5	<5	<5
1,1-dichloroethene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1-dichloroethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-dichloroethene (total)	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chloroform	<5	<5	<5	BDL	BDL	BDL	<5	<5	<5	<5	<5	<5
1,2-dichloroethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
2-butanone	<10	<10	<10	<10	<10	<10	<10	BDL	BDL	<10	<10	<10
1,1,1-trichloroethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Vinyl acetate	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,2-dichloropropane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Cis-1,3-dichloropropene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

TABLE 3-77

VOLATILE ORGANIC ANALYSIS METHOD BLANKS
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 1	METHOD BLANK 2	METHOD BLANK 33	METHOD BLANK 34	METHOD BLANK 43	METHOD BLANK 44	METHOD BLANK 49	METHOD BLANK 50	METHOD BLANK 51	METHOD BLANK 55	METHOD BLANK 56	METHO BLANK 5
Trichloroethene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Dibromochloromethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2-trichloroethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Benzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Trans-1,3-dichloropropene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Bromoform	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
4-methyl-2-pentanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-hexanone	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Tetrachloroethene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-tetrachloroethane	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Toluene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Styrene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5
Total xylenes	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5

NOTE:

BDL = Detected, but below instrument quantitation limit

TABLE 3-78

METHOD BLANKS FOR APPENDIX IX VOLATILE ORGANIC ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 74	METHOD BLANK 84
Acetone	<10	<10
Acetonitrile	<100	<200
Acrolein	<10	<10
Acrylonitrile	<10	<10
Benzene	<5	<5
Bromodichloromethane	<5	<5
Bromoform	<5	<5
Bromomethane	<10	<10
2-butanone	<10	<10
Carbon disulfide	<5	<5
Carbon tetrachloride	<5	<5
Chlorobenzene	<5	<5
Chloroethane	<10	<10
3-chloro-1-propene	<5	<5
Chloroform	<5	<5
Chloromethane	<10	<10
Chloroprene	<5	<5
1,2-dibromo-3-chloropropane	<10	<10
Dibromochloromethane	<5	<5
1,2-dibromoethane	<5	<5
Dibromomethane	<10	<10
Trans-1,4-dichloro-2-butene	<20	<20
Dichlorodifluoromethane	<20	<20
1,1-dichloroethane	<5	<5
1,2-dichloroethene	<5	<5
1,1-dichloroethene	<5	<5
Trans-1,2-dichloroethene	<5	<5
1,2-dichloropropane	<5	<5
[illegible]-1,3-dichloropropene	<5	<5
Trans-1,3-dichloropropene	<5	<5

TABLE 3-78

METHOD BLANKS FOR APPENDIX IX VOLATILE ORGANIC ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 74	METHOD BLANK 84
1,4-dioxane	<1,000	<1,000
Ethyl benzene	<5	<5
Ethyl cyanide	<100	<100
Ethyl methacrylate	<10	NR
2-hexanone	<10	<10
Iodmethane	<5	<5
Isobutyl alcohol	<2,000	<2,000
Methacrylonitrile	<10	<10
Methyl methacrylate	<10	<10
4-methyl-2-pentanone	<10	<10
Methylene chloride	<5	<5
[illegible]dine	<20,000	<20,000
Styrene	<5	<5
1,1,1,2-tetrachloroethane	<5	<5
1,1,2,2-tetrachloroethane	<5	<5
Tetrachloroethene	<5	<5
Toluene	<5	<5
1,1,1-trichloroethane	<5	<5
1,1,2-trichloroethane	<5	<5
Trichloroethene	<5	<5
Trichlorofluoromethane	<5	<5
1,2,3-trichloropropane	<5	<5
Vinyl acetate	<10	<10
Vinyl chloride	<10	<10
Xylenes (total)	<5	<5

NOTE:

NR = Not reported

TABLE 3-79

METHOD BLANKS FOR APPENDIX IX VOLATILE ORGANIC ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 80	METHOD BLANK 85
Acetone	<10	<10
Acetonitrile	<100	<200
Acrolein	<10	<10
Acrylonitrile	<10	<10
Benzene	<5	<5
Bromodichloromethane	<5	<5
Bromoform	<5	<5
Bromomethane	<10	<10
2-butanone	<10	<10
Carbon disulfide	<5	<5
Carbon tetrachloride	<5	<5
Chlorobenzene	<5	<5
Chloroethane	<10	<10
3-chloro-1-propene	<5	<5
Chloroform	<5	<5
Chloromethane	<10	<10
Chloroprene	<5	<5
1,2-dibromo-3-chloropropane	<10	<10
Dibromochloromethane	<5	<5
1,2-dibromoethane	<5	<5
Dibromomethane	<10	<10
Trans-1,4-dichloro-2-butene	<20	<20
Dichlorodifluoromethane	<20	<20
1,1-dichloroethane	<5	<5
1,2-dichloroethene	<5	<5
1,1-dichloroethene	<5	<5
Trans-1,2-dichloroethene	<5	<5
1,2-dichloropropane	<5	<5
Cis-1,3-dichloropropene	<5	<5
Trans-1,3-dichloropropene	<5	<5

TABLE 3-79

METHOD BLANKS FOR APPENDIX IX VOLATILE ORGANIC ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 80	METHOD BLANK 85
1,4-dioxane	<1,000	<1,000
Ethyl benzene	<5	<5
Ethyl cyanide	<100	<100
Ethyl methacrylate	<10	<10
2-hexanone	<10	NR
Iodmethane	<5	<5
Isobutyl alcohol	<2,000	<2,000
Methacrylonitrile	<10	<10
Methyl methacrylate	<10	<10
4-methyl-2-pentanone	<10	<10
Methylene chloride	<5	<5
Pyridine	<20,000	<20,000
Stryene	<5	<5
1,1,1,2-tetrachloroethane	<5	<5
1,1,2,2-tetrachloroethane	<5	<5
Tetrachloroethene	<5	<5
Toluene	<5	<5
1,1,1-trichloroethane	<5	<5
1,1,2-trichloroethane	<5	<5
Trichloroethene	<5	<5
Trichlorofluoromethane	<5	<5
1,2,3-trichloropropane	<5	<5
Vinyl acetate	<10	<10
Vinyl chloride	<10	<10
Xylenes (total)	<5	<5

NOTE:

NR = Not reported

TABLE 3-80

METHOD BLANKS FOR EPA 601/602 VOLATILE ORGANIC COMPOUND ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 72	METHOD BLANK 73
Dichlorodifuoromethane	<1.8	<1.8
Chloromethane	<0.8	<0.8
Vinyl Chloride	<1.8	<1.8
Bromomethane	<1.2	<1.2
Chloroethane	<5.2	<5.2
Trichlorofluoromethane	<2.0	<2.0
1,1-dichloroethene	<1.3	<1.3
Methylene chloride (dichloromethane)	<2.0	<2.0
Trans-1,2-dichloroethene	<1.0	<1.0
-dichloroethane	<0.7	<0.7
ichloromethane (chloroform)	<0.5	<.05
1,1,1-trichloroethane	<0.3	<0.3
Carbon tetrachloride	<1.2	<1.2
Benzene	<2.0	<2.0
1,2-dichloroethane	<0.3	<0.3
Trichloroethene	<1.2	<1.2
1,2-dichloropropane	<0.4	<0.4
Bromodichloromethane	<1.0	<2.0
2-chloroethyl vinyl ether	<1.3	<1.3
Cis-1,3-dichloropropene	<3.4	<3.4
Toluene	<2.0	<2.0
Trans-1,3-dichloropropene	<2.0	<2.0
1,1,2-trichloroethane	<0.2	<0.2
Tetrachloroethene	<0.3	<0.3
Dibromochloromethane	<0.9	<0.9
Chlorobenzene	<2.0	<2.0
ylbenzene	<2.0	<2.0

TABLE 3-80

METHOD BLANKS FOR EPA 601/602 VOLATILE ORGANIC COMPOUND ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 72	METHOD BLANK 73
Xylenes	<1.0	<1.0
Bromoform	<2.0	<2.0
1,1,2,2-tetrachloroethane	<0.3	<0.3
1,3-dichlorobenzene	<3.2	<3.2
1,4-dichlorobenzene	<2.4	<2.4
1,2-dichlorobenzene	<1.5	<1.5

TABLE 3-81

PERCENT SURROGATE RECOVERIES FOR VOLATILE ORGANIC ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	TOLUENE-d8 (88-110%)*	BROMOFLUOROBENZENE (86-115%)*	1,2-DICHLOROETHANE-d4 (76-114%)*
01-01-GW	97%	112%	92%
01-02-GW	94%	110%	92%
01-03-GW	90%	97%	88%
03-01-GW	97%	99%	86%
03-02-GW	92%	99%	84%
03-03-GW	97%	104%	82%
03-ER	101%	108%	77%
04-01-GW	95%	100%	91%
04-02-GW	98%	109%	90%
[illegible]2-GWD	100%	108%	91%
04-03-GW	95%	112%	93%
04-05-GW	95%	109%	91%
04-ER	101%	115%	98%
07-01-GW	93%	101%	83%
07-02-GW	92%	101%	83%
07-02-GWD	93%	98%	80%
07-03-GW	94%	97%	81%
07-04-GW	94%	100%	78%
07-05-GW	89%	95%	77%
07-06-GW	96%	101%	79%
08-01-GW	95%	99%	77%
08-02-GW	96%	107%	94%
08-03-GW	94%	97%	80%
08-03-GW MS	104%	109%	85%
08-03-GW MSD	103%	108%	87%

TABLE 3-81

PERCENT SURROGATE RECOVERIES FOR VOLATILE ORGANIC ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	TOLUENE-d8 (88-110%)*	BROMOFLUOROBENZENE (86-115%)*	1,2-DICHLOROETHANE-d4 (76-114%)*
08-04-GW	103%	111%	82%
08-05-GW	94%	98%	77%
08-06-GW	105%	107%	79%
08-06-GWD	99%	106%	76%
08-16R-GW	97%	107%	93%
08-ER	106%	111%	82%
Field Blank	102%	105%	77%
Trip Blank, 7/8	105%	102%	88%
Trip Blank, 7/9	108%	106%	90%
[illegible] Blank	109%	122%**	102%
Method Blank 1	93%	95%	90%
Method Blank 2	106%	104%	96%
Method Blank 33	102%	104%	99%
Method Blank 34	95%	98%	90%
05-01-GWD	156%**	168%**	144%**
05-01-GWO	96%	100%	86%
07-11-ER	106%	114%	100%
10-02-GW	94%	100%	85%
10-03-GW	106%	107%	98%
10-19-GW	99%	105%	88%
Trip Blank	95%	101%	89%
Method Blank 43	99%	103%	94%
Method Blank 44	102%	104%	99%
04-02-SW	96%	99%	94%
04-05-GM-GW	100%	103%	95%

TABLE 3-81

PERCENT SURROGATE RECOVERIES FOR VOLATILE ORGANIC ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	TOLUENE-d8 (88-110%)*	BROMOFLUOROBENZENE (86-115%)*	1,2-DICHLOROETHANE-d4 (76-114%)*
04-07-GW	96%	100%	88%
04-08-GM-GW	97%	103%	88%
04-08-GM-GW MS	90%	93%	89%
04-08-GM-GW MSD	103%	102%	97%
05-02-GW	99%	104%	91%
05-03-GW	97%	100%	86%
07-02-SW	98%	101%	88%
07-KWM-09-GW	101%	99%	91%
08-01-SW	103%	101%	93%
8-GM-GW	94%	97%	82%
Trip Blank	100%	98%	88%
Method Blank 49	98%	98%	94%
Method Blank 50	100%	98%	92%
Method Blank 51	102%	102%	99%
01-01-GM-GW	97%	103%	90%
01-02-GW	98%	104%	95%
01-03-GM-GW	92%	94%	86%
01-04-EB	95%	96%	93%
01-04-GWD	95%	102%	94%
01-04-GWO	98%	102%	93%
04-07-GW	100%	104%	103%
04-10-GW	98%	104%	97%
05-SW-D	100%	105%	98%
05-SW-U	98%	103%	101%
07-13-ER	96%	100%	97%

TABLE 3-81

PERCENT SURROGATE RECOVERIES FOR VOLATILE ORGANIC ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	TOLUENE-d8 (88-110%)*	BROMOFLUOROBENZENE (86-115%)*	1,2-DICHLOROETHANE-d4 (76-114%)*
07-KWM-11-GW	97%	101%	100%
07-KWM-12-GW	103%	107%	106%
08-14-GW	100%	102%	101%
08-15-GW	106%	111%	106%
Trip Blank 1	103%	104%	101%
Trip Blank 2	106%	106%	106%
01-03-GM-GW MS	95%	96%	85%
01-03-GM-GW MSD	86%**	87%	76%
Method Blank 55	101%	105%	100%
ıod Blank 56	97%	99%	91%
Method Blank 57	92%	94%	98%

NOTE:

* = Values in parenthesis represent US EPA contract required QC limits
** = Values are outside of contract required QC limits

TABLE 3-82

PERCENT SURROGATE RECOVERIES FOR VOLATILE ORGANIC ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	TOLUENE-d8 (81-117%)*	BROMOFLUOROBENZENE (74-121%)*	1,2-DICHLOROETHANE-d4 (70-121%)*
Site 4-1	98%	98%	95%
Site 4-2	97%	97%	93%
Site 4-Boring MW-4	99%	98%	95%
Method Blank 9	94%	95%	92%
Site 5, Plot 1	99%	97%	91%
Site 5, Plot 1 MS	105%	93%	91%
Site 5, Plot MSD	96%	86%	85%
Method Blank 14	98%	101%	94%
Site 3, Plot 1	101%	98%	90%
Site 3, Plot 1 MS	103%	99%	95%
Site 3, Plot 1 MSD	96%	97%	94%
Site 3, Plot 2	106%	96%	95%
Site 3, Plot 3	111%	92%	95%
Site 3, Plot 4	102%	92%	91%
Site 3, Plot 5	101%	90%	88%
Site 3, Plot 6	113%	84%	91%
Method Blank 18	98%	96%	90%
Site 5, MW-2	91%	87%	85%
Site 5, MW-3	93%	92%	88%
Method Blank 23	96%	91%	97%
Site 4, MW-3A	93%	96%	88%
Site 4, MW-4A	98%	100%	91%
Site 5, MW-5A	98%	99%	92%
Site 5, Plot 2	95%	94%	97%
Site 5, Plot 3	105%	84%	89%
Site 5, Plot 4	100%	96%	94%
Site 5, Plot 5	105%	91%	93%
Site 5, Plot 6	100%	96%	92%
NAS Site 3, Plot 2	96%	97%	90%
NAS Site 3, Plot 4	103%	83%	88%

TABLE 3-82

PERCENT SURROGATE RECOVERIES FOR VOLATILE ORGANIC ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	TOLUENE-d8 (81-117%)*	BROMOFLUOROBENZENE (74-121%)*	1,2-DICHLOROETHANE-d4 (70-121%)*
Method Blank 27	94%	95%	92%
Method Blank 28	96%	99%	90%
01-01-SED	104%	92%	89%
01-01-SED	103%	84%	83%
01-03-SED	97%	87%	79%
04-03-SED	117%	73%**	80%
04-04-SED	107%	86%	81%
04-05-SED	97%	86%	76%
04-06-SED	100%	88%	76%
04-07-SED	103%	86%	70%
Method Blank 39	97%	87%	88%
05-SED-D	98%	89%	77%
SED-U	102%	81%	79%
05-SED-U MS	100%	85%	77%
05-SED-U MSD	94%	88%	74$
Method Blank 58	96%	98%	88%
04-02-SED	106%	91%	77%
07-01-SED	107%	90%	80%
07-02-SED	111%	84%	77%
07-03-SED	99%	95%	88%
07-04-SED	110%	83%	83%
08-01-SED	127%**	76%	83%
08-02-SED	113%	82%	83%
08-03-SED	107%	88%	82%
Method Blank 67	99%	98%	86%
Method Blank 68	94%	92%	86%

NOTE:

* = Values in paraenthesis represent US EPA contract required QC limits
= Values outside of contract required QC limits

TABLE 3-83

PERCENT SURROGATE RECOVERIES FOR APPENDIX IX VOLATILE ORGANIC ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	TOLUENE-d8 (88-117%)*	BROMOFLOROBENZENE (74-121%)*	1,2-DICHLOROETHANE-d4 (70-121%*)
04-05-MW-SS	111%	88%	77%
10-MW-01-SS	100%	89%	78%
Method Blank 80	97%	99%	83%
01-SED	113%	90%	89%
04-01-SED MS	106%	89%	80%
04-01-SED MSD	103%	93%	80%
Method Blank 85	99%	98%	86%

NOTE:

* = Values in parenthesis represent US EPA contract required QC limits

TABLE 3-84

PERCENT SURROGATE RECOVERIES FOR APPENDIX IX VOLATILE ORGANIC ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	TOLUENE-d8 (88-110%)*	BROMOFLOROBENZENE (86-115%)*	1,2-DICHLOROETHANE-d4 (76-114%)*
04-04-GW	94%	96%	83%
10-01-GW	93%	95%	81%
[illegible]4-GW MS	96%	102%	84%
04-04-GW MSD	94%	100%	81%
Method Blank 74	96%	97%	85%
04-01-SW	102%	104%	87%
Method Blank 84	99%	98%	86%

NOTE:

* = Values in parenthesis represent US EPA advisory QC limits

TABLE 3-85

PERCENT SURROGATE RECOVERY FOR EPA 601/602 VOLATILE ORGANIC ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	BROMOCHLOROMETHANE*	ORTHO-CHLOROFLUOROBENZENE*	FLUOROBENZENE*
09-02-GM-GW	97%	93%	104%
09-05-GM-GW	90%	84%	95%
09-KWM-09-GW	65%	62%	78%
09-KWM-09-GW MS	84%	79%	89%
09-KWM-09-GW MSD	79%	69%	81%
.(WM-21-GW	91%	79%	102%
09-KWM-21-GWD	62%	62%	69%
09-KWM-25-EB	92%	91%	99%
Trip Blank	93%	93%	100%
Method Blank 72	75%	87%	100%
Method Blank 73	90%	92%	94%

NOTE:

* = Laboratory specific QC limits for surrogate recovery have not been established

TABLE 3-86

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS
Percent Recovery
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

VOLATILE ORGANICS	MATRIX SPIKE SITE 5, PLOT 1	MATRIX SPIKE DUPLICATE SITE 5, PLOT 1	RPD	MATRIX SPIKE SITE 3, PLOT 1	MATRIX SPIKE DUPLICATE SITE 3, PLOT 1	RPD	MATRIX SPIKE 05-SED-U	MATRIX SPIKE DUPLICATE 05-SED-U	RPD
1,1-dichloroethene	151%	145%	4	84%	78%	7	127%	120%	6
Trichloroethene	104%	105%	1	86%	85%	1	94%	92%	2
Benzene	102%	104%	2	79%	78%	1	97%	92%	5
Toluene	109%	108%	1	88%	84%	5	97%	92%	5
Chlorobenzene	112%	113%	1	96%	97%	1	101%	98%	3
SEMI-VOLATILE ORGANICS									
Phenol	79%	72%	9	74%	80%	8	77%	77%	0
2-chlorophenol	99%	89%	11	80%	90%	12	80%	78%	3
1,4-dichlorobenzene	104%	92%	12	71%	79%	11	81%	78%	4
n-nitroso-di-n-propylamine	91%	82%	10	72%	80%	11	89%	90%	1
1,2,4-trichlorobenzene	115%*	90%	24*	74%	76%	3	81%	81%	0
4-chloro-3-methylphenol	102%	91%	11	88%	87%	1	75%	75%	0
Acenaphthene	116%	106%	9	85%	85%	0	86%	84%	2
4-nitrophenol	205%*	137%*	40	74%	47%	45	83%	82%	1
2,4-dinitrotoluene	217%*	200%*	8	79%	56%	34	92%*	88%	4

TABLE 3-86

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS
Percent Recovery
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

VOLATILE ORGANICS	MATRIX SPIKE SITE 5, PLOT 1	MATRIX SPIKE DUPLICATE SITE 5, PLOT 1	RPD	MATRIX SPIKE SITE 3, PLOT 1	MATRIX SPIKE DUPLICATE SITE 3, PLOT 1	RPD	MATRIX SPIKE 05-SED-U	MATRIX SPIKE DUPLICATE 05-SED-U	RPD
Pentachlorophenol	110%*	104%	6	54%	38%	35	67%	57%	16
Pyrene	103%	81%	24	106%	79%	29	80%	84%	5
PESTICIDES									
Gamma-BHC (lindane)	0%*	0%*	0	0%*	0%*	0	70%	90%	25
Heptachlor	0%*	0%*	0	0%*	0%*	0	70%	75%	7
Aldrin	0%*	0%*	0	399%*	0%*	200*	65%	85%	27
Dieldrin	0%*	0%*	0	9,571%*	9,999%*	4	847%*	1,542%*	58*
Endrin	0%*	0%*	0	0%*	0%*	0	54%	62%	14
4,4'-DDT	-999%*	-999%*	0	-999%	9,999%*	244*	1,157%*	1,293%*	11

NOTE:

* = *Values outside US EPA advisory QC limits*
High dilutions for other pesticides in soil samples persent diluted MS and MSD comounds. Recoveries could not be calculated.

TABLE 3-87

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS
Percent Recovery
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

LABORATORY SAMPLE IDENTIFICATION:	08-03-GW			04-08-GM-GW			01-03-GM-GW			BOCA CHICADDT**		
FIELD SAMPLE LOCATION:	MW 8-3			KWM-08 (Site 4)			KWM-03 (Site 1)			SITE 1, PLOT 5		
VOLATILE ORGANICS	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
VOLATILE ORGANICS												
1,1-dichloroethene	96%	92%	4	74%	82%	10	93%	92%	1	--	--	--
Trichloroethene	101%%	101%	0	82%	85%	4	84%	79%	6	--	--	--
Benzene	87%	85%	2	72%*	78%	8	69%*	65%*	6	--	--	--
Toluene	95%	95%	0	79%	86%	8	80%	74%*	8	--	--	--
Chlorobenzene	106%	106%	0	92%	98%	6	90%	85%	6	--	--	--
SEMI-VOLATILE OGRANICS												
Phenol	57%	57%	0	58%	56%	4	53%	46%	14	48%	55%	14
2-chlorophenol	62%	57%	8	66%	64%	3	67%	64%	5	67%	79%	16
1,4-dichlorobenzene	63%	64%	2	38%	39%	3	52%	50%	4	82%	80%	2
n-nitroso-di-n-propylamine	62%	65%	5	50%	49%	2	60%	62%	3	72%	72%	0
1,2,4-trichlorobenzene	61%	63%	3	41%	42%	2	56%	54%	4	80%	81%	1
4-chloro-3-methylphenol	67%	79%	3	73%	66%	10	69%	68%	1	69%	74%	7
Acenaphthene	70%	72%	3	51%	48%	6	64%	68%	6	84%	85%	1
4-nitrophenol	52%	62%	18	57%	62%	8	57%	45%	24	38%	48%	23

TABLE 3-87

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS
Percent Recovery
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

LABORATORY SAMPLE IDENTIFICATION:	08-03-GW			04-08-GM-GW			01-03-GM-GW			BOCA CHICADDT**		
FIELD SAMPLE LOCATION:	MW 8-3			KWM-08 (Site 4)			KWM-03 (Site 1)			SITE 1, PLOT 5		
VOLATILE ORGANICS	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
2,4-dinitrotoluene	67%	67%	0	69%	61%	12	74%	76%	3	84%	84%	0
Pentachlorophenol	64%	66%	3	60%	60%	0	46%	36%	24	29%	54%	60*
Pyrene	84%	82%	2	74%	68%	8	70%	74%	6	84%	82%	2
PESTICIDES												
Gamma-GHC (lindane)	88%	84%	5	76%	80%	5	86%	71%	19*	--	--	--
Heptachlor	80%	79%	1	63%	68%	8	78%	66%	17	--	--	--
Aldrin	80%	78%	3	67%	74%	10	75%	63%	17	--	--	--
Dieldrin	82%	79%	4	76%	83%	9	84%	71%	17	--	--	--
Endrin	95%	92%	3	89%	95%	7	102%	85%	18	--	--	--
4,4'-DDT	89%	88%	1	70%	82%	16	91%	76%	18	--	--	--

NOTE:

* = Values outside US EPA advisory QC limits
** = Only semi-volatile MS and MSD performed
High dilutions for other pesticides in soil samples present diluted MS and MSD compounds. Recoveries could not be calculated

TABLE 3-88

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE FOR APPENDIX IX ANALYSIS
Percent Recovery
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA:	WATER			WATER			SOIL		
LABORATORY SAMPLE IDENTIFICATION:	04-04-GW			10-01-GW**			04-10-SED		
FIELD SAMPLE LOCATION:	MW 4-4			MW 10-1			B-5 (SITE 4)		
PARAMETER	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
VOLATILES									
1,1-dichloroethene	76%	74%	3	--	--	--	93%	92%	1
Trichloroethene	86%	83%	4	--	--	--	82%	83%	1
Benzene	76%	73%*	4	--	--	--	80%	80%	0
Toluene	82%	79%	4	--	--	--	90%	88%	2
Chlorobenzene	94%	90%	4	--	--	--	93%	94%	1
SEMI-VOLATILES									
Phenols	50%	52%	4	--	--	--	86%	85%	1
2-chlorophenol	60%	63%	5	--	--	--	84%	85%	1
1,4-dichlorobenzene	43%	44%	2	--	--	--	94%	92%	2
n-nitroso-di-n-propylamine	56%	53%	6	--	--	--	89%	88%	1

TABLE 3-88

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE FOR APPENDIX IX ANALYSIS
Percent Recovery
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA:	WATER			WATER			SOIL		
LABORATORY SAMPLE IDENTIFICATION:	04-04-GW			10-01-GW**			04-10-SED		
FIELD SAMPLE LOCATION:	MW 4-4			MW 10-1			B-5 (SITE 4)		
PARAMETER	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
1,2,4-trichlorobenzene	45%	46%	2	--	--	--	97%	94%	3
4-chloro-3-methylphenol	59%	62%	5	--	--	--	84%	84%	0
Acenaphthene	63%	62%	2	--	--	--	101%	98%	3
4-nitrophenol	46%	53%	14	--	--	--	79%	77%	3
2,4-dinitrotoluene	72%	73%	1	--	--	--	100%*	91%*	9
Pentachlorophenol	52%	48%	8	--	--	--	64%	71%	10
Pyrene	73%	72%	1	--	--	--	83%	48%	53*
PESTICIDES									
Gamma-BHC (lindane)	--	--	--	108%	108%	0	125%	62%	67*
Heptachlor	--	--	--	120%	120%	0	125%	87%	36*
Aldrin	--	--	--	92%	98%	-6	313%*	212%*	38

TABLE 3-88

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE FOR APPENDIX IX ANALYSIS
Percent Recovery
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA:	WATER			WATER			SOIL		
LABORATORY SAMPLE IDENTFICATION:	04-04-GW			10-01-GW**			04-10-SED		
FIELD SAMPLE LOCATION:	MW 4-4			MW 10-1			B-5 (SITE 4)		
PARAMETER	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
Dieldrin	--	--	--	92%	100%	-8	0%*	0%*	0
Endrin	--	--	--	124%*	140%*	-12	255%*	160%*	46*
4,4-DDT	--	--	--	104%	108%	-4	-24%*	-652%*	186*
Sulfide	--	--	--	--	--	--	98%	94%	4.2

NOTE:

* = Outside US EPA advisory QC limits
** = Matrix spikes done with the diluted sample
RPD = Relative percent difference

TABLE 3-89

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE ANALYSIS FOR 601/602 METHOD VOLATILE ORGANIC ANALYSIS
Percent Recovery
Water Sample
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION:	09-KWM-09-GW		
SAMPLE LOCATION:	KWM-09 (SITE 9)		
COMPOUND	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
Vinyl chloride	90%	88%	2.2
1,1-dichloroethylene	96%	90%	6.5
Chloroform	78%	76%	2.6
1,1,1-trichloroethane	80%	72%	11.0
Carbon tetrachloride	84%	72%	15.0
Benzene	104%	104%	0.0
1,2-dichloroethane	84%	74%	13.0
Trichloroethylene	76%	72%	5.4
Bromodichloromethane	82%	68%	19.0
Bromoform	84%	76%	10.0
1,4-dichlorobenzene	68%	62%	9.2

TABLE 3-90

TRIP BLANKS FOR TARGET ANALYTE LIST
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION	TRIP BLANK 7/9	TRIP BLANK 7/8	TRIP BLANK 1	TRIP BLANK 2	TRIP BLANK	TRIP BLANK	FIELD BLANK (Tap water)
ASSOCIATED METHOD BLANK:	2	2	57	57	43	50	2
COMPOUND							
Chloromethane	<10	<10	<10	<10	<10	<10	<10
Bromomethane	<10	<10	<10	<10	<10	<10	<10
Vinyl chloride	<10	<10	<10	<10	<10	<10	<10
Chloroethane	<10	<10	<10	<10	<10	<10	<10
Methylene chloride	3*	3*	3*	3*	3*	2+	4+
Acetone	<10	<10	<10	<10	<10	4+	2+
Carbon disulfide	<5	<5	<5	<5	2*	<5	3+
1,1-dichloroethene	<5	<5	<5	<5	<5	<5	<5
1,1-dichloroethane	<5	<5	<5	<5	<5	<5	<5
1,2-dichloroethene (total)	<5	<5	<5	<5	<5	<5	<5
Chloroform	<5	<5	<5	<5	<5	<5	19
1,2-dichloroethane	<5	<5	<5	<5	<5	<5	<5
2-butanone	<10	<10	<10	<10	<10	<10	<10

TABLE 3-90

TRIP BLANKS FOR TARGET ANALYTE LIST
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION	TRIP BLANK 7/9	TRIP BLANK 7/8	TRIP BLANK 1	TRIP BLANK 2	TRIP BLANK	TRIP BLANK	FIELD BLANK (Tap water)
ASSOCIATED METHOD BLANK:	2	2	57	57	43	50	2
1,1,1-trichloroethane	<5	<5	<5	<5	<5	<5	<5
Carbon tetrachloride	<5	<5	<5	<5	<5	<5	<5
Vinyl acetate	<10	<10	<10	<10	<10	<10	<10
Bromodichloromethane	<5	<5	<5	<5	<5	<5	<5
1,2-dichloropropane	<5	<5	<5	<5	<5	<5	<5
Cis-1,3-dichloropropene	<5	<5	<5	<5	<5	<5	<5
Trichloroethene	<5	<5	<5	<5	<5	<5	<5
Dibromochloromethane	<5	<5	<5	<5	<5	<5	100
1,1,2-trichloroethane	<5	<5	<5	<5	<5	<5	<5
Benzene	<5	<5	<5	<5	<5	<5	<5
Trans-1,3-dichloropropene	<5	<5	<5	<5	<5	<5	<5
Bromoform	<5	<5	<5	<5	<5	<5	140
4-methyl-2-pentanone	<10	<10	<10	<10	<10	<10	<10
2-hexanone	<10	<10	<10	<10	<10	<10	<10

TABLE 3-90

TRIP BLANKS FOR TARGET ANALYTE LIST
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION	TRIP BLANK 7/9	TRIP BLANK 7/8	TRIP BLANK 1	TRIP BLANK 2	TRIP BLANK	TRIP BLANK	FIELD BLANK (Tap water)
ASSOCIATED METHOD BLANK:	2	2	57	57	43	50	2
Tetrachloroethene	<5	<5	<5	<5	<5	<5	<5
1,1,2,2-tetrachloroethane	<5	<5	<5	<5	<5	<5	<5
Toluene	<5	<5	<5	<5	<5	<5	<5
Chlorobenzene	<5	<5	<5	<5	<5	<5	<5
Ethylbenzene	<5	<5	<5	<5	<5	<5	<5
Styrene	<5	<5	<5	<5	<5	<5	<5
Total xylenes	<5	<5	<5	<5	<5	<5	<5

NOTE:

* = Indicates an estimated value less than the detection limit. Additionally, analyte was found in method blank as well.
+ = Estimated value less than the dection limit. Anlyte not found in method blank.

TABLE 3-91

TRIP BLANK FOR EPA 601/602 VOLATILE ORGANIC ANALYSIS
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:	TRIP BLANK
ASSOCIATED METHOD BLANK:	72
COMPOUND	
Dichlorodifluoromethane	<1.8
Chloromethane	<0.8
Vinyl chloride	<1.8
Bromomethane	<1.2
Chloroethane	<5.2
Trichlorofluoromethane	2.7
1,1-dichloroethene	<1.3
Methylene chloride (dichloroemethane)	<2.0
Trans-1,2-dichloroethene	<1.0
1,1-dichloroethane	<0.7
Trichloromethane (chloroform)	<0.5
1,1,1-trichloroethane	<0.3
Carbon tetrachloride	<1.2
Benzene	<2.0
1,2-dichloroethane	<0.3
Trichloroethene	<1.2
1,2-dichloropropane	<0.4
Bromodichloromethane	<1.0
2-chloroethyl vinyl ether	<1.3
Cis-1,3-dichloropropene	<3.4
Toluene	<2.0
Trans-1,3-dichloroepropene	<2.0
1,1,2-trichloroethane	<0.2

TABLE 3-91

TRIP BLANK FOR EPA 601/602 VOLATILE ORGANIC ANALYSIS
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:	TRIP BLANK
ASSOCIATED METHOD BLANK:	72
COMPOUND	
Tetrachloroethene	<0.3
Dibromochloromethane	<0.9
Chlorobenzene	<2.0
Ethylbenzene	<2.0
Xylenes	<1.0
Bromoform	<2.0
1,1,2,2-tetrachloroethane	<0.3
,-dichlorobenzene	<3.2
1,4-dichloroebenzene	<2.4
1,2-dichlorobenzene	<1.5

TABLE 3-92

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 10	METHOD BLANK 15	METHOD BLANK 19	METHOD BLANK 24	METHOD BLANK 29	METHOD BLANK 40	METHOD BLANK 61	METHOD BLANK 69
Phenol	<330	<330	<330	<330	<330	<330	<330	<330
Bis(2-chloroethyl)ether	<330	<330	<330	<330	<330	<330	<330	<330
2-chlorophenol	<330	<330	<330	<330	<330	<330	<330	<330
1,3-dichlorobenzene	<330	<330	<330	<330	<330	<330	<330	<330
1,4-dichlorobenzene	<330	<330	<330	<330	<330	<300	<300	<330
Benzyl alcohol	<330	<330	<330	<330	<330	<330	<330	<330
1,2-dichlorobenzene	<330	<330	<330	<330	<330	<330	<330	<330
2-methylphenol	<330	<330	<330	<330	<330	<330	<330	<330
Bis(2-chloroisopropyl)ether	<330	<330	<330	<330	<330	<330	<330	<330
4-methylphenol	<330	<330	<330	<330	<330	<330	<330	<330
n-nitroso-di-n-propylamine	<330	<330	<330	<330	<330	<330	<330	<330
Hexachloroethane	<330	<330	<330	<330	<330	<330	<330	<330
Nitrobenzene	<330	<330	<330	<330	<330	<330	<330	<330
Isophorone	<330	<330	<330	<330	<330	<330	<330	<330

TABLE 3-92

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 10	METHOD BLANK 15	METHOD BLANK 19	METHOD BLANK 24	METHOD BLANK 29	METHOD BLANK 40	METHOD BLANK 61	METHOD BLANK 69
2-nitrophenol	<330	<330	<330	<330	<330	<330	<330	<330
2,4-dimethylphenol	<330	<330	<330	<330	<330	<330	<330	<330
Benzoic acid	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600
Bis(2-chloroethoxy)methane	<330	<330	<330	<330	<330	<330	<330	<330
2,4-dichlorophenol	<330	<330	<330	<330	<330	<330	<330	<330
1,2,4-trichlorobenzene	<330	<330	<330	<330	<330	<330	<330	<330
Naphthalene	<330	<330	<330	<330	<330	<330	<330	<330
4-chloroaniline	<330	<330	<330	<330	<330	<330	<330	<330
Hexachlorobutadiene	<330	<330	<330	<330	<330	<330	<330	<330
4-chloro-3-methylphenol	<330	<330	<330	<330	<330	<330	<330	<330
2-methylnaphthalene	<330	<330	<330	<330	<330	<330	<330	<330
Hexachlorocyclopentadiene	<330	<330	<330	<330	<330	<330	<330	<330
2,4,6-trichlorophenol	<330	<330	<330	<330	<330	<330	<330	<330
2,4,5-trichlorophenol	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600

TABLE 3-92

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 10	METHOD BLANK 15	METHOD BLANK 19	METHOD BLANK 24	METHOD BLANK 29	METHOD BLANK 40	METHOD BLANK 61	METHOD BLANK 69
2-chloronaphthalene	<330	<330	<330	<330	<330	<330	<330	<330
2-nitroaniline	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600
Dimethyl phthaltae	<330	<330	<330	<330	<330	<330	<330	<330
Acenaphthylene	<330	<330	<330	<330	<330	<330	<330	<330
2,6-dinitrotoluene	<330	<330	<330	<330	<330	<330	<330	<330
3-nitroaniline	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600
Acenaphthene	<330	<330	<330	<330	<330	<330	<330	<330
2,4-dinitrophenol	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600
4-nitrophenol	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600
Dibenzofuran	<330	<330	<330	<330	<330	<330	<330	<330
2,4-dinitrotoluene	<330	<330	<330	<330	<330	<330	<330	<330
Diethylphthalate	<330	<330	<330	<330	<330	<330	<330	<330
4-chlorophenyl-phenylether	<330	<330	<330	<330	<330	<330	<330	<330
Fluorene	<330	<330	<330	<330	<330	<330	<330	<330

TABLE 3-92

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 10	METHOD BLANK 15	METHOD BLANK 19	METHOD BLANK 24	METHOD BLANK 29	METHOD BLANK 40	METHOD BLANK 61	METHOD BLANK 69
4-nitroaniline	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600
4,6-dinitro-2-methylphenol	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600
N-nitrosodiphenylamine*	<330	<330	<330	<330	<330	<330	<330	<330
4-bromophenyl-phenylether	<330	<330	<330	<330	<330	<330	<330	<330
Hexachlorobenzene	<330	<330	<330	<330	<330	<330	<330	<330
Pentachlorophenol	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600	<1,600
Phenanthrene	<330	<330	<330	<330	<330	<330	<330	<330
Anthracene	<330	<330	<330	<330	<330	<330	<330	<330
Di-n-butylphthalate	<330	<330	<330	<330	<330	<330	<330	<330
Fluoranthene	<330	<330	<330	<330	<330	<330	<330	<330
Pyrene	<330	<330	<330	<330	<330	<330	<330	<330
Butylbenzylphthalate	<330	<330	<330	<330	<330	<330	<330	<330
3,3'-dichlorobenzidine	<660	<660	<660	<660	<660	<660	<660	<660
Benzo(a)anthracene	<330	<330	<330	<330	<330	<330	<330	<330

TABLE 3-92

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 10	METHOD BLANK 15	METHOD BLANK 19	METHOD BLANK 24	METHOD BLANK 29	METHOD BLANK 40	METHOD BLANK 61	METHOD BLANK 69
Chrysene	<330	<330	<330	<330	<330	<330	<330	<330
Bis(2-ethylhexyl)phthalate	410	<330	<330	<330	410	<330	<330	<330
Di-n-octylphthalate	<330	<330	<330	<330	<330	<330	<330	<330
Benzo(b)fluoranthene	<330	<330	<330	<330	<330	<330	<330	<330
Benzo(k)fluoranthene	<330	<330	<330	<330	<330	<330	<330	<330
Benzo(a)pyrene	<330	<330	<330	<330	<330	<330	<330	<330
Indeno(1,2,3-cd)pyrene	<330	<330	<330	<330	<330	<330	<330	<330
Dibenzo(a,h)anthracene	<330	<330	<330	<330	<330	<330	<330	<330
Benzo(g,h,i)perylene	<330	<330	<330	<330	<330	<330	<330	<330

TABLE 3-93

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 3	METHOD BLANK 4	METHOD BLANK 35	METHOD BLANK 36	METHOD BLANK 45	METHOD BLANK 52	METHOD BLANK 59	METHOD BLANK 60	METHOD BLANK 95
Phenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-chloroethyl)ether	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-chlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,3-dichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,4-dichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzyl alcohol	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2-dichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
Bis(2-chloroisopropyl)ether	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
n-nitroso-di-n-propylamine	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachloroethane	<10	<10	<10	<10	<10	<10	<10	<10	<10
Nitrobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Isophorone	<10	<10	<10	<10	<10	<10	<10	<10	<10

TABLE 3-93

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 3	METHOD BLANK 4	METHOD BLANK 35	METHOD BLANK 36	METHOD BLANK 45	METHOD BLANK 52	METHOD BLANK 59	METHOD BLANK 60	METHOD BLANK 95
2-nitrophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-dimethylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzoic acid	<50	<50	<50	<50	<50	<50	<50	<50	<50
Bis(2-chloroethyoxy)methane	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-dichlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
1,2,4-trichlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Naphthalene	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-chloroaniline	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorobutadiene	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-chloro-3-methylphenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-methylnaphthalene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorocyclopentadiene	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4,6-trichlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4,5-trichlorophenol	<50	<50	<50	<50	<50	<50	<50	<50	<50

TABLE 3-93

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 3	METHOD BLANK 4	METHOD BLANK 35	METHOD BLANK 36	METHOD BLANK 45	METHOD BLANK 52	METHOD BLANK 59	METHOD BLANK 60	METHOD BLANK 95
2-chloronaphthalene	<10	<10	<10	<10	<10	<10	<10	<10	<10
2-nitroaniline	<50	<50	<50	<50	<50	<50	<50	<50	<50
Dimethyl phthaltae	<10	<10	<10	<10	<10	<10	<10	<10	<10
Acenaphthylene	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,6-dinitrotoluene	<10	<10	<10	<10	<10	<10	<10	<10	<10
3-nitroaniline	<50	<50	<50	<50	<50	<50	<50	<50	<50
Acenaphthene	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-dinitrophenol	<50	<50	<50	<50	<50	<50	<50	<50	<50
4-nitrophenol	<50	<50	<50	<50	<50	<50	<50	<50	<50
Dibenzofuran	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-dinitrotoluene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Diethylphthalate	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-chlorophenyl-phenylether	<10	<10	<10	<10	<10	<10	<10	<10	<10
Fluorene	<10	<10	<10	<10	<10	<10	<10	<10	<10

TABLE 3-93

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 3	METHOD BLANK 4	METHOD BLANK 35	METHOD BLANK 36	METHOD BLANK 45	METHOD BLANK 52	METHOD BLANK 59	METHOD BLANK 60	METHOD BLANK 95
4-nitroaniline	<50	<50	<50	<50	<50	<50	<50	<50	<50
4,6-dinitro-2-methylphenol	<50	<50	<50	<50	<50	<50	<50	<50	<50
n-nitrosodiphenylamine*	<10	<10	<10	<10	<10	<10	<10	<10	<10
4-bromophenyl-phenylether	<10	<10	<10	<10	<10	<10	<10	<10	<10
Hexachlorobenzene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol	<50	<50	<50	<50	<50	<50	<50	<50	<50
Phenanthrene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Anthracene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Di-n-butylphthalate	<10	<10	<10	<10	<10	<10	<10	<10	<10
Fluoranthene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Pyrene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Butylbenzylphthalate	<10	<10	<10	<10	<10	<10	<10	<10	<20
3,3'-dichlorobenzidine	<20	<20	<20	<20	<20	<20	<20	<20	<10
Benzo(a)anthracene	<10	<10	<10	<10	<10	<10	<10	<10	<10

TABLE 3-93

METHOD BLANKS FOR SEMI-VOLATILE ORGANIC ANALYSIS
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 3	METHOD BLANK 4	METHOD BLANK 35	METHOD BLANK 36	METHOD BLANK 45	METHOD BLANK 52	METHOD BLANK 59	METHOD BLANK 60	METHOD BLANK 95
Chrysene	<10	<10	<10	<10	<10	<10	<10	<10	25
Bis(2-ethylhexyl)phthalate	<10	<10	<10	<10	<10	<10	<10	25	<10
Di-n-octylphthalate	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(b)fluoranthene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(k)fluoranthene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(a)pyrene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzo(g,h,i)perylene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10	<10	<10	<10	<10

TABLE 3-94

METHOD BLANKS FOR APPENDIX IX SEMI-VOLATILE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 81	METHOD BLANK 87
Phenol	<330	<330
Bis(2-chloroethyl)ether	<330	<330
2-chlorophenol	<330	<330
1,3-dichlorobenzene	<330	<330
1,4-dichlorobenzene	<330	<330
Benzyl alcohol	<330	<330
1,2-dichlorobenzene	<330	<330
2-methylphenol	<330	<330
2-chloroisopropyl)ether	<330	<330
4-methylphenol	<330	<330
N-nitroso-di-n-propylamine	<330	<330
Hexachloroethane	<330	<330
Nitrobenzene	<330	<330
Isophorone	<330	<330
2-nitrophenol	<330	<330
2,4-dimethylphenol	<330	<330
Bis(2-chloroethoxy)methane	<330	<330
2,4-dichlorophenol	<330	<330
1,2,4-trichlorobenzene	<330	<330
Napthalene	<330	<330
4-chloroaniline	<330	<330
Hexachlorobutadiene	<330	<330
4-chloro-3-methylphenol	<330	<330
2-methylnaphthalene	<330	<330

TABLE 3-94

METHOD BLANKS FOR APPENDIX IX SEMI-VOLATILE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 81	METHOD BLANK 87
Hexachlorocyclopentadiene	<330	<330
2,4,6-trichlorophenol	<330	<330
2,4,5-trichlorophenol	<1,600	<1,600
2-chloronaphthalene	<330	<330
2-nitroaniline	<1,600	<1,600
Dimethyl phthalate	<330	<330
Acenaphthylene	<330	<330
2,6-dinitrotoluene	<330	<330
[illegible]roaniline	<1,600	<1,600
Acenaphthene	<330	<330
2,4-dinitrophenol	<1,600	<1,600
4-nitrophenol	<1,600	<330
Dibenzofuran	<330	<330
2,4-dinitrotoluene	<330	<330
Diethylphthalate	<330	<330
4-chlorophenyl-phenylether	<330	<330
Fluorene	<330	<330
4-nitroaniline	<1,600	<1,600
4,6-dinitro-2-methylphenol	<1,600	<1,600
N-nitrosodiphenylamine	<330	<330
4-bromophenyl-phenylether	<330	<330
Hexachlorobenzene	<330	<330
Pentachlorophenol	<1,600	<1,600
Phenanthrene	<330	<330

TABLE 3-94

METHOD BLANKS FOR APPENDIX IX SEMI-VOLATILE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 81	METHOD BLANK 87
Anthracene	<330	<330
Di-n-butylphthalate	<330	<330
Fluroanthene	<330	<330
Pyrene	<330	<330
Butylbenzylphthalate	<330	<330
3,3'-dichlorobenzidine	<660	<660
Benzo(a)anthracene	<330	<330
Chrysene	<330	<330
(2-ethylhexyl)phthalate	<330	<330
Di-n-octylphthalate	<330	<330
Benzo(b)fluoranthene	<330	<330
Benzo(k)fluoranthene	<330	<330
Benzo(a)pyrene	<330	<330
Indeno(1,2,3-cd)pyrene	<330	<330
Dibenzo(a,h)anthracene	<330	<330
Benzo(g,h,i)perylene	<330	<330
N-nitrosodimethylamine	<330	<330
2-picoline	<2,300	<2,300
N-nitrosomethylethylamine	<330	<330
Methyl methanesulfonate	<330	<330
N-nitrosodiethylamine	<330	<330
Ethyl methanesulfonate	<330	<330
Aniline	<1,700	<1,700
Pentachloroethane	<670	<670

TABLE 3-94

METHOD BLANKS FOR APPENDIX IX SEMI-VOLATILE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 81	METHOD BLANK 87
3-methylphenol	<330	<330
N-nitrosopyrrolodine	<330	<330
Acetophenone	<330	<330
N-nitrosomorpholine	<330	<330
O-toluidine	<330	<330
N-nitrosopiperidine	<330	<330
o,o,o-triethylphosphorothioat	<330	<330
2,6-dichlorophenol	<330	<330
achloropropene	<670	<670
a,a-dimethylphenethylamine	<330	<330
N-nitrosodi-n-butylamine	<670	<670
P-phenylenediamine	<1,700	<1,700
Safrole	<330	<330
1,2,4,5-tetrachlorobenzene	<330	<330
Isosafrole	<330	<330
1,4-naphthoquinone	<330	<330
M-dinitrobenzene	<330	<330
Pentachlorobenzene	<670	<670
2-naphthylamine	<5,700	<5,700
1-naphthylamine	<4,000	<4,000
2,3,4,6-tetrachlorophenol	<330	<330
5-nitro-o-toluidine	<670	<670
Diphenylamine	<330	<330
Tetraethyl dithiopyrophosphate	<330	<330

TABLE 3-94

METHOD BLANKS FOR APPENDIX IX SEMI-VOLATILE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 81	METHOD BLANK 87
Sym-trinitrobenzene	<330	<330
Phenacetin	<330	<330
Diallate	<330	<330
4-aminobiphenyl	<1,700	<1,700
Pronamide	<1,000	<1,000
Pentachloronitrobenzene	<670	<670
Dinoseb	<670	<670
4-ditroquinoline-1-oxide	<330	<330
[illegible]thapyrilene	<1,300	<1,300
[illegible]nite	<330	<330
P-(dimethylamino)azobenzene	<1,00	<1,000
3,3'-dimethylbenzidine	<2,700	<2,700
2-acetylaminofluorene	<330	<330
7,12-dimethylbenz(a)anthracene	<670	<670
Hexachlorophene	<1,700	<1,700
3-methylcholanthrene	<1,000	<1,000

TABLE 3-95

METHOD BLANKS FOR APPENDIX IX SEMI-VOLATILE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 75	METHOD BLANK 76	METHOD BLANK 86
Phenol	<10	<10	<10
Bis(2-chloroethyl)ether	<10	<10	<10
2-chlorophenol	<10	<10	<10
1,3-dichlorobenzene	<10	<10	<10
1,4-dichlorobenzene	<10	<10	<10
Benzyl alcohol	<10	<10	<10
1,2-dichlorobenzene	<10	<10	<10
2-methylphenol	<10	<10	<10
Bis(2-chloroisopropyl)ether	<10	<10	<10
4-methylphenol	<10	<10	<10
N-nitroso-di-n-propylamine	<10	<10	<10
Hexachloroethane	<10	<10	<10
Nitrobenzene	<10	<10	<10
Isophorone	<10	<10	<10
2-nitrophenol	<10	<10	<10
2,4-dimethylphenol	<10	<10	<10
Bis(2-chloroethoxy)methane	<10	<10	<10
2,4-dichlorophenol	<10	<10	<10
1,2,4-trichlorobenzene	<10	<10	<10
Napthalene	<10	<10	<10
4-chloroaniline	<10	<10	<10
Hexachlorobutadiene	<10	<10	<10
4-chloro-3-methylphenol	<10	<10	<10
2-methylnaphthalene	<10	<10	<10

TABLE 3-95

METHOD BLANKS FOR APPENDIX IX SEMI-VOLATILE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 75	METHOD BLANK 76	METHOD BLANK 86
Hexachlorocyclopentadiene	<10	<10	<10
2,4,6-trichlorophenol	<10	<10	<10
2,4,5-trichlorophenol	<50	<50	<50
2-chloronaphthalene	<10	<10	<10
2-nitroaniline	<50	<50	<50
Dimethyl phthalate	<10	<10	<10
Acenaphthylene	<10	<10	<10
2,6-dinitrotoluene	<10	<10	<10
[illegible]roaniline	<50	<50	<50
Acenaphthene	<10	<10	<10
2,4-dinitrophenol	<50	<50	<50
4-nitrophenol	<50	<50	<10
Dibenzofuran	<10	<10	<10
2,4-dinitrotoluene	<10	<10	<10
Diethylphthalate	<10	<10	<10
4-chlorophenyl-phenylether	<10	<10	<10
Fluorene	<10	<10	<10
4-nitroaniline	<50	<50	<50
4,6-dinitro-2-methylphenol	<50	<50	<50
N-nitorsodiphenylamine	<10	<10	<10
4-bromophenyl-phenylether	<10	<10	<10
Hexachlorobenzene	<10	<10	<10
Pentachlorophenol	<50	<50	<50
Phenanthrene	<10	<10	<10

TABLE 3-95

METHOD BLANKS FOR APPENDIX IX SEMI-VOLATILE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 75	METHOD BLANK 76	METHOD BLANK 86
Anthracene	<10	<10	<10
Di-n-butylphthalate	<10	<10	<10
Fluroanthene	<10	<10	<10
Pyrene	<10	<10	<10
Butylbenzylphthalate	<10	<10	<10
3,3'-dichlorobenzidine	<20	<20	<20
Benzo(a)anthracene	<10	<10	<10
Chrysene	<10	<10	<10
[illegible](2-ethylhexyl)phthalate	<10	<10	<10
[illegible]-n-octylphthalate	<10	<10	<10
Benzo(b)fluoranthene	<10	<10	<10

TABLE 3-96

PERCENT SURROGATE RECOVERIES FOR SEMI-VOLATILE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (35-114%)*	2-FLUOROBIPHENYL (43-116%)*	TERPHENYL-d14 (33-141%)*	PHENOL-d5 (10-94%)*	2-FLUOROPHENOL (21-100%)*	2,4,6-TRIBROMOPHENOL (10-123%)*
01-01-GW	71%	71%	89%	37%	52%	60%
01-02-GW	50%	53%	85%	14%	22%	46%
02-03-GW	54%	57%	83%	40%	53%	59%
03-01-GW	59%	61%	86%	36%	54%	63%
03-02-GW	51%	54%	83%	34%	51%	61%
03-03-GW	62%	64%	73%	34%	50%	64%
03-ER	58%	60%	97%	34%	49%	67%
04-01-GW	60%	61%	88%	49%	62%	68%
04-02-GW	62%	62%	86%	38%	51%	68%
04-02-GWD	56%	55%	79%	42%	54%	63%
04-03-GW	54%	54%	90%	48%	61%	66%
04-05-GW	68%	66%	92%	42%	57%	72%
04-ER	79%	77%	83%	28%	20%**	34%
07-01-GW	65%	65%	87%	45%	58%	63%
07-02-GW	75%	63%	88%	47%	62%	68%
07-02-GWD	68%	67%	86%	50%	61%	65%
07-03-GW	64%	63%	87%	46%	55%	64%

TABLE 3-96

PERCENT SURROGATE RECOVERIES FOR SEMI-VOLATILE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (35-114%)*	2-FLUOROBIPHENYL (43-116%)*	TERPHENYL-d14 (33-141%)*	PHENOL-d5 (10-94%)*	2-FLUOROPHENOL (21-100%)*	2,4,6-TRIBROMOPHENOL (10-123%)*
07-04-GW	47%	50%	95%	56%	66%	65%
07-05-GW	47%	59%	92%	55%	63%	69%
07-06-GW	70%	67%	88%	57%	68%	70%
08-01-GW	80%	76%	95%	46%	56%	70%
08-02-GW	75%	74%	82%	49%	63%	70%
08-03-GW	65%	66%	82%	50%	66%	68%
08-03-GW MS	67%	65%	89%	59%	65%	59%
08-03-GW MSD	67%	66%	86%	59%	63%	62%
08-04-GW	76%	76%	92%	46%	57%	64%
08-05-GW	55%	56%	69%	40%	58%	60%
08-06-GW	66%	65%	89%	43%	62%	64%
08-06-GWD	67%	65%	92%	47%	62%	72%
08-16R-GW	54%	58%	91%	48%	62%	67%
08-ER	41%	44%	88%	35%	54%	71%
Field Blank	64%	64%	102%	0%**	24%	55%
Method Blank 3	70%	69%	86%	35%	53%	62%
Method Blank 4	85%	79%	93%	39%	58%	69%

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TABLE 3-96

PERCENT SURROGATE RECOVERIES FOR SEMI-VOLATILE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (35-114%)*	2-FLUOROBIPHENYL (43-116%)*	TERPHENYL-d14 (33-141%)*	PHENOL-d5 (10-94%)*	2-FLUOROPHENOL (21-100%)*	2,4,6-TRIBROMOPHENOL (10-123%)*
Method Blank 35	72%	72%	105%	30%	38%	52%
Method Blank 36	88%	78%	100%	38%	54%	64%
05-01-GWD	71%	65%	77%	37%	54%	66%
05-01-GWO	81%	74%	105%	37%	54%	74%
10-02-GW	53%	48%	83%	44%	55%	78%
10-03-GW	50%	48%	88%	50%	63%	84%
10-19-GW	65%	67%	85%	45%	61%	76%
Method Blank 45	82%	82%	94%	34%	46%	77%
04-02-SW	50%	41%**	78%	43%	56%	57%
04-05-GM-GW	57%	49%	71%	41%	58%	57%
04-07-GW	55%	45%	76%	48%	60%	61%
04-08-GM-GW	61%	47%	80%	40%	55%	59%
05-02-GW	50%	40%**	65%	32%	46%	52%
05-03-GW	73%	70%	78%	34%	52%	86%
07-02-SW	63%	52%	83%	52%	67%	64%
07-KMW-09-GW	50%	49%	77%	44%	61%	62%
08-01-SW	58%	58%	69%	44%	60%	51%

TABLE 3-96

PERCENT SURROGATE RECOVERIES FOR SEMI-VOLATILE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (35-114%)*	2-FLUOROBIPHENYL (43-116%)*	TERPHENYL-d14 (33-141%)*	PHENOL-d5 (10-94%)*	2-FLUOROPHENOL (21-100%)*	2,4,6-TRIBROMOPHENOL (10-123%)*
10-18-GM-GW	66%	54%	68%	45%	69%	67%
04-07-GW MS	52%	43%	78%	62%	67%	60%
04-07-GW MSD	53%	42%**	75%	60%	64%	56%
Method Blank 52	82%	66%	83%	28%	37%	52%
01-01-GM-GW	63%	57%	74%	33%	47%	68%
01-02-GW	59%	53%	75%	37%	52%	58%
01-03-GM-GW	69%	61%	76%	37%	52%	63%
01-04-EB	69%	71%	100%	29%	44%	68%
01-04-GWD	62%	53%	71%	24%	37%	58%
01-04-GWO	64%	56%	80%	27%	41%	66%
04-10-GW	54%	47%	64%	49%	64%	62%
05-SW-D	57%	52%	81%	52%	65%	66%
05-SW-U	58%	47%	63%	48%	64%	54%
07-13-ER	62%	64%	93%	29%	46%	65%
07-KWM-11-GW	58%	52%	77%	46%	61%	66%
07-KWM-12-GW	47%	47%	82%	46%	61%	70%
08-14-GW	57%	56%	76%	47%	65%	81%

TABLE 3-96

PERCENT SURROGATE RECOVERIES FOR SEMI-VOLATILE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (35-114%)*	2-FLUOROBIPHENYL (43-116%)*	TERPHENYL-d14 (33-141%)*	PHENOL-d5 (10-94%)*	2-FLUOROPHENOL (21-100%)*	2,4,6-TRIBROMOPHENOL (10-123%)*
08-15-GW	67%	63%	58%	37%	55%	47%
01-03-GM-GW MS	67%	55%	70%	56%	66%	57%
01-03-GM-GW MSD	65%	58%	69%	50%	58%	48%
Method Blank 59	85%	72%	90%	31%	48%	80%
Method Blank 60	74%	56%	86%	25%	40%	75%
Boca Chica DDT	82%	71%	85%	39%	59%	75%
Boca Chica DDT MS	84%	72%	79%	51%	60%	56%
Boca Chica DDT MSD	83%	72%	83%	58%	73%	69%
Method Blank 95	88%	77%	91%	36%	54%	77%

NOTE:

* = Values in parenthesis represent US EPA contract required QC limits
** = Values are outside of contract required QC limits

TABLE 3-97

PERCENT SURROGATE RECOVERIES FOR SEMI-VOLATILE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (23-120%)*	2-FLUOROBIPHENYL (30-116%)*	TERPHENYL-d14 (18-137%)*	PHENOL-d5 (24-113%)*	2-FLUOROPHENOL (25-121%)*	2,4,6-TRIBROMOPHENOL (18-122%)*
Site 4-1	56%	58%	63%	55%	53%	42%
Site 4-2	67%	70%	75%	49%	23%**	11%**
Site 4-Boring MW-4	68%	78%	80%	72%	75%	67%
Method Blank 10	72%	79%	76%	73%	70%	71%
Site 5, Plot 1	93%	99%	95%	88%	98%	110%
Site 5, Plot 1 MS	120%	118%**	149%**	93%	99%	132%**
Site 5, Plot 1 MSD	105%	98%	134%	82%	90%	112%
Method Blank 15	90%	78%	100%	75%	79%	78%
Site 3, Plot 1	62%	67%	101%	64%	64%	70%
Site 3, Plot 1 MS	84%	84%	134%	84%	82%	90%
Site 3, Plot 1 MSD	77%	87%	94%	90%	90%	66%
Site 3, Plot 2	72%	81%	160%**	75%	67%	91%
Site 3, Plot 3	31%	37%	40%	34%	38%	28%
Site 3, Plot 4	79%	81%	148%**	76%	76%	88%
Site 3, Plot 5	82%	81%	93%	79%	82%	86%
Site 3, Plot 6	68%	77%	88%	75%	80%	74%
Method Blank 19	70%	78%	112%	73%	79%	77%

TABLE 3-97

PERCENT SURROGATE RECOVERIES FOR SEMI-VOLATILE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (23-120%)*	2-FLUOROBIPHENYL (30-116%)*	TERPHENYL-d14 (18-137%)*	PHENOL-d5 (24-113%)*	2-FLUOROPHENOL (26-121%)*	2,4,6-TRIBROMOPHENOL (18-122%)*
Site 5, MW-2	81%	84%	91%	78%	82%	85%
Site 5, MW-3	87%	90%	98%	89%	90%	96%
Method Blank 24	70%	71%	88%	72%	74%	78%
Site 4, MW-3B	60%	67%	72%	56%	40%	42%
Site 4, MW-4B	36%	40%	47%	38%	39%	42%
Site 4, MW-5C	51%	56%	64%	46%	35%	26%
NAS Site 3, Plot 2	69%	73%	81%	72%	70%	84%
NAS Site 3, Plot 4	68%	81%	98%	71%	77%	87%
Site 5, Plot 2	77%	89%	117%	77%	79%	74%
Site 5, Plot 3	60%	73%	125%	60%	63%	69%
Site 5, Plot 4	74%	79%	125%	78%	81%	70%
Site 5, Plot 5	69%	78%	109%	72%	70%	74%
Site 5, Plot 6	75%	82%	88%	77%	78%	84%
Method Blank 29	72%	79%	76%	73%	70%	71%
01-01-SED	93%	86%	95%	82%	79%	54%
01-02-SED	102%	83%	94%	95%	102%	76%
01-03-SED	91%	75%	89%	92%	96%	69%

TABLE 3-97

PERCENT SURROGATE RECOVERIES FOR SEMI-VOLATILE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (23-120%)*	2-FLUOROBIPHENYL (30-116%)*	TERPHENYL-d14 (18-137%)*	PHENOL-d5 (24-113%)*	2-FLUOROPHENOL (26-121%)*	2,4,6-TRIBROMOPHENOL (18-122%)*
04-03-SED	102%	93%	112%	89%	92%	90%
04-04-SED	90%	82%	94%	78%	81%	68%
04-05-SED	91%	82%	88%	78%	79%	56%
04-06-SED	85%	70%	82%	85%	89%	63%
04-07-SED	96%	88%	103%	81%	83%	77%
Method Blank 40	85%	69%	85%	75%	80%	92%
05-SED-D	94%	75%	94%	83%	84%	64%
05-SED-U	91%	76%	93%	82%	80%	65%
05-SED-U MS	95%	79%	90%	84%	87%	62%
05-SED-U MSD	94%	77%	94%	85%	83%	61%
Method Blank 61	79%	68%	84%	68%	67%	65%
04-02-SED	92%	76%	90%	83%	83%	62%
07-01-SED	90%	74%	90%	81%	82%	68%
07-02-SED	80%	68%	78%	72%	73%	62%
07-03-SED	81%	69%	86%	70%	71%	59%
07-04-SED	83%	72%	78%	82%	86%	62%
08-01-SED	85%	69%	87%	67%	56%	37%

TABLE 3-97

PERCENT SURROGATE RECOVERIES FOR SEMI-VOLATILE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (23-120%)*	2-FLUOROBIPHENYL (30-116%)*	TERPHENYL-d14 (18-137%)*	PHENOL-d5 (24-113%)*	2-FLUOROPHENOL (26-121%)*	2,4,6-TRIBROMOPHENOL (18-122%)*
08-02-SED	78%	66%	82%	65%	59%	35%
08-03-SED	86%	74%	82%	81%	77%	52%
Method Blank 69	88%	70%	90%	71%	68%	57%

NOTE:

* = Values in parenthesis represent US EPA contract required QC limits
** = Values are outside of contract required QC limits

TABLE 3-98

PERCENT SURROGATE RECOVERY FOR APPENDIX IX SEMI-VOLATILE ORGANIC ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (23-120%)*	2-FLUORO-BIPHENYL (30-116%)*	TERPHENYL-d-14 (18-137%)*	PHENOL-d5 (24-113%)*	2-FLUORO-PHENOL (26-121%)*	2,4,6-TRIBROMOPHENOL (18-122%)*
04-05-MW-SS	94%	83%	98%	92%	95%	75%
10-MW-01-SS	99%	87%	103%	90%	89%	54%
Method Blank 81	85%	71%	86%	73%	72%	75%
04-01-SED	114%	98%	102%	93%	90%	83%
04-01-SED MS	106%	90%	102%	96%	99%	68%
04-01-SED MSD	96%	87%	97%	95%	98%	78%
Method Blank 87	85%	71%	86%	73%	72%	75%

NOTE:

* = Values in parenthesis represent US EPA contract required QC limits

TABLE 3-99

PERCENT SURROGATE RECOVERY FOR APPENDIX IX SEMI-VOLATILE ORGANIC ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	NITROBENZENE-d5 (35-114%)*	2-FLUORO-BIPHENYL (43-116%)*	TERPHENYL-d14 (33-141%)*	PHENOL-d5 (10-94%)*	2-FLUORO-PHENOL (21-100%)*	2,4,6-TRIBROMOPHENOL (10-123%)*
04-04-GW	55%	43%	67%	36%	48%	46%
10-01-GW	63%	52%	65%	39%	59%	65%
04-04-GW MS	54%	52%	78%	52%	62%	56%
04-04-GW MSD	54%	50%	78%	56%	64%	55%
Method Blank 75	88%	76%	97%	31%	43%	71%
Method Blank 76	62%	56%	96%	29%	46%	74%
04-01-SW	56%	48%	73%	49%	64%	62%
Method Blank 86	82%	67%	83%	30%	39%	60%

NOTE:

* = Values in parenthesis represent US EPA contract required QC limits

TABLE 3-100

METHOD BLANKS FOR PESTICIDE AND PCB ANALYSIS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 11	METHOD BLANK 16	METHOD BLANK 20	METHOD BLANK 25	METHOD BLANK 30	METHOD BLANK 41	METHOD BLANK 64	METHOD BLANK 70
Alpha-BHC	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Beta-BHC	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Delta-BHC	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Gamma-BHC (lindane)	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Heptachlor	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Aldrin	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Heptachlor epoxide	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Endosulfan I	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0	<8.0
Dieldrin	<16	<16	<16	<16	<16	<16	<16	<16
4,4'-DDE	<16	<16	<16	<16	<16	<16	<16	<16
Endrin	<16	<16	<16	<16	<16	<16	<16	<16
Endosulfan II	<16	<16	<16	<16	<16	<16	<16	<16
4,4'-DDD	<16	<16	<16	<16	<16	<16	<16	<16
Endosulfan sulfate	<16	<16	<16	<16	<16	<16	<16	<16
4,4'-DDT	<16	<16	<16	<16	<16	16	<16	<16
Methoxychlor	<80	<80	<80	<80	<80	<80	<80	<80
Endrin Ketone	<16	<16	<16	<16	<16	<16	<16	<16
Alpha-chlordane	<80	<80	<80	<80	<80	<80	<80	<80

TABLE 3-100

METHOD BLANKS FOR PESTICIDE AND PCB ANALYSIS
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 11	METHOD BLANK 16	METHOD BLANK 20	METHOD BLANK 25	METHOD BLANK 30	METHOD BLANK 41	METHOD BLANK 64	METHOD BLANK 70
Gamma-chlordane	<80	<80	<80	<80	<80	<80	<80	<80
Toxaphene	<160	<160	<160	<160	<160	<160	<160	<160
Aroclor 1016	<80	<80	<80	<80	<80	<80	<80	<80
Aroclor 1221	<80	<80	<80	<80	<80	<80	<80	<80
Aroclor 1232	<80	<80	<80	<80	<80	<80	<80	<80
Aroclor 1242	<80	<80	<80	<80	<80	<80	<80	<80
Aroclor 1248	<80	<80	<80	<80	<80	<80	<80	<80
Aroclor 1254	<160	<160	<160	<160	<160	<160	<160	<160
Aroclor 1260	<160	<160	<160	<160	<160	<160	<160	<160

TABLE 3-101

METHOD BLANKS FOR PESTICIDE/PCB ANALYSIS
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595932
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 5	METHOD BLANK 6	METHOD BLANK 37	METHOD BLANK 46	METHOD BLANK 53	METHOD BLANK 62	METHOD BLANK 63
Alpha-BHC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Beta-BHC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Delta-BHC	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Gamma-BHC (lindane)	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Heptachlor	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Aldrin	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Heptachlor epoxide	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Endosulfan I	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dieldrin	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDE	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endrin	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan II	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDD	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Endosulfan sulfate	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
4,4'-DDT	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Methoxychlor	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Endrin Ketone	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10

TABLE 3-101

METHOD BLANKS FOR PESTICIDE/PCB ANALYSIS
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595932
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 5	METHOD BLANK 6	METHOD BLANK 37	METHOD BLANK 46	METHOD BLANK 53	METHOD BLANK 62	METHOD BLANK 63
Alpha-chlordane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Gamma-chlordane	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Toxaphene	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1016	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor 1221	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor 1232	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor 1242	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor 1248	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Aroclor 1254	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Aroclor 1260	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

TABLE 3-102

METHOD BLANKS FOR APPENDIX IX ORGANOCHLORINE PESTICIDE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 82*	METHOD BLANK 89
Alpha-BHC	<8.0	<8.0
Beta-BHC	<8.0	<8.0
Delta-BHC	<8.0	<8.0
Gamma-BHC (lindane)	<8.0	<8.0
Heptachlor	<8.0	<8.0
Aldrin	<8.0	<8.0
Heptachlor epoxide	<8.0	<8.0
Endosulfan I	<8.0	<8.0
[illegible]drin	<16	<16
4,4-DDE	<16	<16
Endrin	<16	<16
Endosulfan II	<16	<16
4,4-DDD	<16	<16
Endosulfan sulfate	<16	<16
4,4-DDT	<16	<16
Methoxychlor	<80	<80
Endrin ketone	<16	<16
Alpha-chlordane	NZ	<80
Gamma-chlordane	NZ	<80
Chlordane	<80	NZ
Toxaphene	<160	<160
Aroclor 1016	<80	<80
Aroclor 1221	<80	<80
Aroclor 1232	<80	<80

TABLE 3-102

METHOD BLANKS FOR APPENDIX IX ORGANOCHLORINE PESTICIDE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 82*	METHOD BLANK 89
Aroclor 1242	<80	<80
Aroclor 1248	<80	<80
Aroclor 1254	<160	<160
Aroclor 1260	<160	<160
Isodrin	<8	<0.05
Kepone	<16	<0.1
Chlorobenzilate	<160	<0.50

NOTE:

* = Method blank 82 based on dry weight
NZ = Not analyzed

TABLE 3-103

METHOD BLANKS FOR APPENDIX IX ORGANOCHLORINE PESTICIDE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 77	METHOD BLANK 78
Alpha-BHC	<0.05	<0.05
Beta-BHC	<0.05	<0.05
Sigma-BHC	<0.05	<0.05
Gamma-GHC (lindane)	<0.05	<0.05
Heptachlor	<0.05	<0.05
Aldrin	<0.05	<0.05
Heptachlor epoxide	<0.05	<0.05
Endosulfan I	<0.05	<0.05
Dieldrin	<0.10	<0.10
4,4-DDE	<0.10	<0.10
Endrin	<0.10	<0.10
Endosulfan II	<0.10	<0.10
4,4-DDD	<0.10	<0.10
Endosulfan sulfate	<0.10	<0.10
4,4-DDT	<0.10	<0.10
Methyoxychlor	<0.50	<0.50
Chlordane	<0.50	<0.50
Toxaphene	<1.0	<1.0
Aroclor 1016	<0.50	<0.50
Aroclor 1221	<0.50	<0.50
Aroclor 1232	<0.50	<0.50
Aroclor 1242	<0.50	<0.50
Aroclor 1248	<0.50	<0.50
Aroclor 1254	<1.0	<1.0

TABLE 3-103

METHOD BLANKS FOR APPENDIX IX ORGANOCHLORINE PESTICIDE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 77	METHOD BLANK 78
Aroclor 1260	<1.0	<1.0
Endrin aldehyde	<0.10	<0.10
Isodrin	<0.05	<0.05
Kepone	<0.10	<0.10
Chlorobenzilate	<0.50	<0.50

TABLE 3-104

PERCENT SURROGATE RECOVERY FOR PESTICIDE ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	DIBUTYLCHLORENDATE (20-150%)*	SAMPLE IDENTIFICATION	DIBUTYLCHLORENDATE (20-150%)*
Site 4-1	89%	Site 5, Plot 4	D
Site 4-2	105%	Site 5, Plot 5	D
Site 4, Boring MW-4	102%	Site 5, Plot 6	80%
Method Blank 11	103%	Method Blank 30	103%
Site 5, Plot 1	D	01-01-SED	57%
Site 5, Plot 1 MS	D	10-02-SED	74%
Site 5, Plot 1 MSD	D	01-03-SED	78%
Method Blank 16	85%	04-03-SED	78%
Site 3, Plot 1	D	04-04-SED	84%
Site 3, Plot 1 MS	D	04-05-SED	60%
Site 3, Plot 1 MSD	D	04-06-SED	84%
Site 3, Plot 2	D	04-07-SED	34%
Site 3, Plot 3	D	Method Blank 41	89%
3, Plot 4	D	Method Blank	77%
Site 3, Plot 5	D	05-SED-D	92%
Site 3, Plot 6	D	05-SED-U	122%
Method Blank 20	106%	05-SED-U MS	76%
Site 5, MW-2	D	05-SED-U MSD	96%
Site 5, MW-3	17%**	04-02-SED	73%
Method Blank 25	93%	07-01-SED	77%
Site 4, MW-3B	130%	07-02-SED	72%
Site 4, MW-4B	121%	07-03-SED	81%
Site 4, MW-5C	108%	07-04-SED	85%
NAS Site 3, Plot 2	113%	08-01-SED	82%
NAS Site 3, Plot 4	D	08-02-SED	88%
Site 5, Plot 2	D	08-03-SED	63%
Site 5, Plot 3	D	Method Blank 70	82%

NOTE:

* = Values in parenthesis represent US EPA advisory QC limits
** = Values outside of contract required QC limits
= Surrogates diluted out

TA/5-91/595392\P4%PSTDS.SB8

TABLE 3-105

PERCENT SURROGATE RECOVERY FOR PESTICIDE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	DIBUTYLCHLORENDATE (24-154%)*	SAMPLE IDENTIFICATION	DIBUTYLCHLORENDATE (24-154%)*
01-01-GW	115%	10-02-GW	92%
01-02-GW	92%	10-03-GW	89%
01-03-GW	78%	10-19-GW	92%
03-01-GW	102%	Method Blank 46	98%
03-02-GW	107%	Method Blank 53	89%
03-03-GW	106%	04-02-SW	87%
03-ER	98%	04-05-GM-GW	86%
04-01-GW	75%	04-07-GW	83%
[illegible]2-GW	87%	04-08-GM-GW	87%
04-02-GWD	81%	04-08-GM-GW MS	83%
04-03-GW	94%	04-08-GM-GW MSD	90%
04-05-GW	86%	05-02-GW	78%
04-ER	92%	05-03-GW	76%
07-01-GW	90%	07-02-SW	65%
07-02-GW	95%	07-KWM-09-GW	84%
07-02-GWD	99%	08-01-SW	75%
07-03-GW	100%	10-18-GM-GW	73%
07-04-GW	86%	01-01-GM-GW	93%
07-05-GW	124%	01-02-GW	88%
07-06-GW	84%	01-03-GM-GW	84%
08-01-GW	103%	01-03-GM-GW MS	96%
08-02-GW	105%	01-03-GM-GW MSD	80%
08-03-GW	77%	01-04-EB	96%
08-03-GW MS	95%	01-04-GWD	91%

TABLE 3-105

PERCENT SURROGATE RECOVERY FOR PESTICIDE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	DIBUTYLCHLORENDATE (24-154%)*	SAMPLE IDENTIFICATION	DIBUTYLCHLORENDATE (24-154%)*
08-03-GW MSD	89%	01-04-GWO	95%
08-04-GW	93%	04-04-GW	98%
08-05-GW	90%	04-10-GW	89%
08-06-GW	91%	05-SW-D	89%
08-06-GWD	87%	05-SW-U	90%
08-16R-GW	101%	07-KWM-11-GW	86%
08-ER	98%	07-KWM-12-GW	84%
Field Blank	100%	08-14-GW	84%
Method Blank 5	103%	08-15-GW	72%
ıod Blank 6	71%	07-13-ER	88%
Method Blank 37	70%	Method Blank 62	93%
05-01-GWD	88%	Method Blank 63	98%
05-01-GWO	78%		

NOTE:

* = Values in parenthesis represent US EPA advisory QC limits

TABLE 3-106

PERCENT SURROGATE RECOVERY FOR APPENDIX IX PESTICIDE PARAMETERS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	DIBUTYLCHLORENDATE (20-150%)*
Method Blank 82	97%
04-05-MW-SS	106%
10-MW-01-SS	56%
04-01-SED	118%
[illegible]1-SED MS	76%
04-01-SED MSD	62%
Method Blank 89	97%
04-01-SED DL	115%
04-01-SED DL MS	95%
04-01-SED DL MSD	95%

NOTE:

* = Values in parenthesis represent US EPA advisory QC limits

TABLE 3-107

PERCENT SURROGATE RECOVERY FOR APPENDIX IX PESTICIDE ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392

SAMPLE IDENTIFICATION	DIBUTYLCHLORENDATE (24-154%)*
Method Blank 77	101%
Method Blank 78	98%
04-04-GW	98%
-01-GW	81%
.0-01-GW DL MS	106%
10-01-GW DL MSD	114%
04-01-SW	89%
Method Blank 88	88%
10-01-GW DL	89%

NOTE:

* = Values in parenthesis represent US EPA contract required QC limits

TABLE 3-108

METHOD BLANKS FOR INORGANIC (METALS) ANALYSIS AND CYANIDE
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 7	METHOD BLANK 8	METHOD BLANK 38	METHOD BLANK 47	METHOD BLANK 54	METHOD BLANK 65
Aluminum	<40.0	<40.0	<40.0	<40.0	<40.0	<40.0
Antimony	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Arsenic	<2.0	<2.0	<30.0	<30.0	<30.0	<30.0
Barium	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Beryllium	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Calcium	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Chromium	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Cobalt	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Copper	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Iron	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Lead	<2.0	<2.0	<30.0	<30.0	<30.0	<30.0
Magnesium	<30.0	<30.0	<30.0	<30.0	<30.0	<30.0
Manganese	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Mercury	NR	NR	NR	NR	NR	NR
Nickel	<20.0	<20.0	<20.0	<20.0	<20.0	<20.0
Potassium	<1,000.0	<1,000.00	<1,000.00	<1,000.00	<1,000.00	<1,000.00
Selenium	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0

TABLE 3-108

METHOD BLANKS FOR INORGANIC (METALS) ANALYSIS AND CYANIDE
Water Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 7	METHOD BLANK 8	METHOD BLANK 38	METHOD BLANK 47	METHOD BLANK 54	METHOD BLANK 65
Silver	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Sodium	<200.0	<200.0	<200.0	<200.0	<200.0	<200.0
Thallium	<2.0	<2.0	<2.0	<30.0	<30.0	<30.0
Vanadium	<10.0	<10.0	<10.0	<10.0	<10.0	<10.0
Zinc	7.2	9.0	<12.0	<5.0	<5.0	<5.0
Cyanide	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

TABLE 3-109

METHOD BLANKS FOR INORGANIC (METALS) ANALYSIS AND CYANIDE
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

COMPOUND	METHOD BLANK 12	METHOD BLANK 17	METHOD BLANK 21	METHOD BLANK 26	METHOD BLANK 31	METHOD BLANK 42	METHOD BLANK 66	METHOD BLANK 71
Aluminum	<4.0	<4.0	<4.0	<4.0	<4.0	4.4	<4.0	<4.0
Antimony	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Arsenic	<0.2	<0.2	<0.2	<0.2	<0.2	<3.0	<3.0	<3.0
Barium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Beryllium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Cadmium	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Calcium	<3.0	<3.0	<3.0	<3.0	<3.0	17.4	<3.0	<3.0
Chromium	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cobalt	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Copper	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Iron	<1.0	2.6	<1.0	<1.0	<1.0	3.9	<1.0	<1.0
Lead	<0.2	<0.2	<3.0	<0.2	<0.2	<3.0	<3.0	<3.0
Magnesium	<3.0	<3.0	<3.0	<3.0	<3.0	8.3	<3.0	<3.0
Manganese	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

TABLE 3-109

METHOD BLANKS FOR INORGANIC (METALS) ANALYSIS AND CYANIDE
Soil Media
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

COMPOUND	METHOD BLANK 12	METHOD BLANK 17	METHOD BLANK 21	METHOD BLANK 26	METHOD BLANK 31	METHOD BLANK 42	METHOD BLANK 66	METHOD BLANK 71
Mercury	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nickel	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Potassium	<100.0	<100.0	<100.0	<100.0	<100.0	<100.0	<100.0	<100.0
Selenium	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Silver	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sodium	<20	<20	<20	<20	<20	<20	<20	<20
Thallium	<0.2	<0.2	<0.2	<0.2	<0.2	<3.0	<3.0	<3.0
Vanadium	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Zinc	<0.5	0.8	1.3	1.6	1.3	<0.5	1.617	0.7
Cyanide	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

TABLE 3-110

METHOD BLANKS FOR APPENDIX IX INORGANIC (METALS) ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 79	METHOD BLANK 90
Antimony	<30.0	<30.0
Arsenic	<30.0	<30.0
Barium	<2.0	<2.0
Beryllium	<1.0	<1.0
Cadmium	<5.0	<5.0
Chromium	<10.0	<10.0
Cobalt	<20.0	<20.0
Copper	<10.0	<10.0
Lead	<30.0	<30.0
Mercury	NR	NR
Nickel	<20.0	<20.0
Selenium	<2.0	<2.0
Silver	<5.0	<5.0
Thallium	34.7	<30.0
Vanadium	<10.0	<10.0
Zinc	14.8	<5.0
Tin	<20.0	<20.0
Cyanide	<0.01	<0.01

NOTE:

NR = Not required

TABLE 3-111

METHOD BLANKS FOR APPENDIX IX INORGANIC (METALS) ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

COMPOUND	METHOD BLANK 83	METHOD BLANK 91
Antimony	<3	<3
Arsenic	<3	<3
Barium	<0.2	<0.2
Beryllium	<0.1	<0.1
Cadmium	<0.5	<0.5
Chromium	<1	<1
Cobalt	<2	<2
Copper	<1	<1
Lead	<3	<3
Mercury	<0.02	<0.02
Nickel	<2	<2
Selenium	<0.2	<6.0
Silver	<0.5	<0.5
Thallium	<3	<3
Vanadium	<1	<1
Zinc	<0.5	<0.5
Tin	<2	<2
Cyanide	<0.5	<0.5
Sulfide	<20	<20

TABLE 3-112

SPIKE RECOVERY AND DUPLICATES FOR INORGANICS (METALS) AND CYANIDE
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:	08-03-GW			04-08-GM-GW			01-03-GM-GW		
FIELD SAMPLE LOCATION:	MW 8-3			KWM-08 (Site 1)			KWM-03 (Site 1)		
COMPOUND	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD
Aluminum*	0.7%	90.5%	2.3	78.4%	118.5%	4.0	73.5%N	90.9%	5.3
Antimony	77.4%	86.1%	24.1	79.0%	83.4%		82.1%	84.8%	2.4
Barium	66.9%N	75.7%	1.0	64.6%N	72.3%	7.5	74.2%N	76.8%	10.9
Beryllium	70.6%N	78.7%		71.4%N	72.4%	200.0	70.0%N	69.9%	
Cadmium	84.0%	90.0%	11.6	72.0%N	84.5%		76.6%	80.8%	
Calcium			0.7	NR	NR	5.1			
Chromium	59.9%N	69.5%	2.1	62.7%N	64.5%	21.7	64.1%N	69.3%	2.5
Cobalt	62.2%N	69.5%		62.5%N	67.0%		67.4%	71.3%	
Copper	64.7%N	85.7%	0.9	68.2%N	73.4%	21.6	79.8%	82.9%	2.6
Iron*	-129.3%	67.1%	0.7	76.7%	82.9%	1.0	110.5%	80.4%	13.9
Lead	41.0%N	80.0%	0.2	71.1%N	72.2%	12.0	77.5%	80.8%	6.8
Magnesium			0.7	NR	NR	4.5			
Manganese	61.6%N	70.6%	1.2	62.5%	66.7%		66.9%N	70.1%	4.1
Mercury*	1.0%		2.5	100%	NR		122.0%		4.1
Nickel	65.9%	72.6%		63.2%	69.2%		64.8%N	69.1%	4.0

TABLE 3-112

SPIKE RECOVERY AND DUPLICATES FOR INORGANICS (METALS) AND CYANIDE
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

LABORATORY SAMPLE IDENTIFICATION:	08-03-GW			04-08-GM-GW			01-03-GM-GW		
FIELD SAMPLE LOCATION:	MW 8-3			KWM-08 (Site 1)			KWM-03 (Site 1)		
COMPOUND	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD
Potassium			0.9	NR	NR	9.1			1.5
Selenium	84.0%	0.0%		84.6%	95.1%		86.7%N	89.6%	
Silver	99.2%	84.0%		140.2%	71.0%		163.5%N	141.1%	
Sodium			0.6	NR	NR	4.7			3.7
Thallium	0.0%N	41.0%		0%	0%		0.0%N	0.0%	
Vanadium	65.5%N	73.8%	4.4	63.5%	67.4%	13.4	69.4%N	72.5%	2.7
Zinc	33.7%N	80.8%	5.0	73.7%	82.1%	8.6	76.0%	86.7%	0.4
Cyanide	10.0%	100%	NC	90%	NR	NR	70.0%	100%	NC

NOTE:

* = No US EPA advisory control limits established
All other compounds have advisory control limits of 75%-125% recovery for both water and soil samples
** = Out of US EPA advisory control limits
N = Out of US EPA advisory control limits
NC = Non-calculable RPD
RPD = Relative percent difference
NR = Not required

TABLE 3-113

SPIKE RECOVERY AND DUPLICATES FOR INORGANICS (METALS) AND CYANIDE
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

LABORATORY SAMPLE IDENTIFICATION:	Site 5, Plot 1			Site 3, Plot 1			05-SED-U		
FIELD SAMPLE LOCATION:	Plot 1 (Site 5)			Plot 1 (Site 3)			S-1 (Site 5)		
COMPOUND	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD
Aluminum*			14.9			19.6		91.1%	3.5
Antimony	78.3%			85.5%			99.3%	89.6%	
Arsenic	71.8%N	96.9%	56.3**	84.2%		3.2	88.9%	89.8%	
Barium	69.6%N	88.7%	6.1	81.2%			96.4%	94.7%	5.1
Beryllium	74.5%N	83.4%		85.4%			93.5%	86.3%	
Cadmium	356.8%N	73.5%	67.6**	75.3%			35.2%N	69.5%	17.1
Calcium			2.4			2.6			0.6
Chromium	80.9%		24.3	79.6%		0.3	85.6%	84.6%	19.8
Cobalt	74.1%N	81.1%		72.6%N	71.2%		82.9%	80.3%	
Copper	87.8%		20.5	73.9%N	72.5%	10.1**	75.3%	79.4%	25.3
Iron*	178.5%	81.8%	0.7			15.7	4.2%	77.5%	12.1
Lead	97.7%		18.5	90.6%		28.1**	80.5%	83.4%	24.9**
Magnesium			125.3**			15.4			0.5
Manganese	61.2%N	76.7%	55.3**	80.6%		1.1	82.3%	80.4%	10.3
Mercury*	108.5%			100.0%			112.1%		

TABLE 3-113

SPIKE RECOVERY AND DUPLICATES FOR INORGANICS (METALS) AND CYANIDE
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

LABORATORY SAMPLE IDENTIFICATION:	Site 5, Plot 1			Site 3, Plot 1			05-SED-U		
FIELD SAMPLE LOCATION:	Plot 1 (Site 5)			Plot 1 (Site 3)			S-1 (Site 5)		
COMPOUND	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD
Nickel	75.7%			75.4%			89.3%	87.8%	200.0
Potassium									
Selenium	68.3%N	67.5%		50.9%	55.5%		94.7%	92.1%	
Silver	138.3%N			0.0%N			0.0%N	0.0%	
Sodium			8.0						4.5
Thallium	63.5%N	82.2%		76.4%			76.3%	79.5%	
Vanadium	76.8%		3.4	86.0%			87.0%	83.9%	0.7
Zinc	109.3%		25.7**	83.5%		28.3**	67.7%	81.7%	28.3**
Cyanide	26.4%	90.0%	0.0	14.0%	90.0%	NC	20.0%	100.0%	0

NOTE:

* = No US EPA advisory control limits established
All other compounds have advisory control limits of 75%-125% recovery for both water and soil samples
** = Out of US EPA advisory control limits
N = Out of US EPA advisory control limits
NC = Non-calculable RPD
RPD = Relative percent difference

TABLE 3-114

APPENDIX IX INORGANIC (METALS) ANALYSIS
ANALYSIS FOR MATRIX SPIKE AND POST DIGESTION
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA:	WATER			SOIL		
LABORATORY SAMPLE IDENTIFICATION:	04-04-GW			04-01-SED		
FIELD SAMPLE LOCATION:	MW 4-4			B-5 (Site 4)		
COMPOUND	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD
Aluminum		90.4%				
Antimony	79.8%	85.3%		87.0%	89.8%	3.2
Arsenic	75.2%	81.7%		81.7%	86.8%	7.1
Barium	67.3%N	74.6%	0.0+	98.0%	89.5%	8.3
Beryllium	69.7%N	76.6%		80.0%	85.9%	200.0
Cadmium	72.2%N	75.1%		21.5%N	67.4%	22.0*
Chromium	65.3%N	71.1%		69.4%N	75.2%	22.6*
Cobalt	63.5%N	70.2%		72.5%N	76.6%	11.6
Copper	73.8%N	80.6%	7.3	173.6%	27.1%	9.0
Iron		76.1%				
Lead	71.2%N	74.6%	3.7	360.0%	103.2%	12.0
Manganese		71.3%				
Mercury	105.0%			124.1%N		19.7
Nickel	61.8%N	66.9%		70.3%N	79.3%	4.8
Selenium	83.0%	89.5%		82.0%	83.5%	

TABLE 3-114

APPENDIX IX INORGANIC (METALS) ANALYSIS
ANALYSIS FOR MATRIX SPIKE AND POST DIGESTION
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA:	WATER			SOIL		
LABORATORY SAMPLE IDENTIFICATION:	04-04-GW			04-01-SED		
FIELD SAMPLE LOCATION:	MW 4-4			B-5 (Site 4)		
COMPOUND	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD	SPIKE RECOVERY	POST DIGESTION	DUPLICATE RPD
Silver	77.9%	10.1%		120.6%	50.0%	200.0
Thallium	0.0%N	0.0%		71.6%N	84.5%	25.5*
Vanadium	68.2%N	76.7%		84.7%	80.9%	18.9
Zinc	68.8%N	80.6%	200	300.3%	118.3%	10.2
Tin	0.0%N					10.5
Cyanide	85%		0%			

NOTE:

N = Out of US EPA advisory control limits
* = Values outside of US EPA advisory QC limits
+ = Concentrationswere greater than instrument detection limits, but less than contract required quantitation limit

TABLE 3-115

METHOD BLANKS FOR EP TOXICITY TEST
Soil Matrix
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

COMPOUND	METHOD BLANK 13	METHOD BLANK 22	METHOD BLANK 32
Arsenic	<0.03	<0.03	<0.03
Barium	<0.002	<0.002	<0.002
Cadmium	<0.005	<0.005	<0.005
Chromium	<0.01	<0.01	<0.01
Lead	<0.03	<0.03	<0.03
Mercury	<0.001	NR	NR
Selenium	<0.06	<0.06	<0.06
Silver	<0.005	<0.005	<0.005

NOTE:

NR = Not required

TABLE 3-116

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE PERCENT RECOVERY FOR EP TOXICITY PARAMETERS
NAS-Key West
Key West, Florida
IT Project No. 595392

LABORATORY SAMPLE IDENTIFICATION:	MWSF-6			BFFTA-5		
FIELD SAMPLE LOCATION:	MW8-6			B-5 (Site 10)		
COMPOUND	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
Arsenic	100.0%	95.0%	5.1	100.0%	95.0%	5.1
Barium	87.6%	82.6%	5.9	93.0%	88.0%	5.5
Cadmium	86.0%	80.0%	7.2	112.0%	108.0%	3.6
Chromium	90.0%	85.0%	5.7	90.0%	90.0%	0
Lead	80.0%	76.0%	5.1	86.0%	86.0%	0
Selenium	110.0%	105.0%	4.6	110.0%	110.0%	0
Silver	0N	0N	0*	0N	0N	0
Mercury	80.0%	80.0%	0	90.0%	80.0%	11.8

NOTE:

RPD = Relative percent difference
N = Out of US EPA advisory control limits (75-125% recovery)
* = Values are outside US EPA advisory QC limits

TABLE 3-117

METHOD BLANKS FOR DIOXIN AND FURAN ANALYSIS - METHOD 8280
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 80	METHOD BLANK 97
DIOXINS		
',8-TCDD	<0.62	<1.3
Total TCDD	<0.42	<0.35
Total PeCDD	<0.82	<0.39
Total HxCDD	<0.69	<0.69
FURANS		
Total TCDF	<0.39	<0.36
Total PeCDF	<0.21	<0.25
Total HxCDF	<0.22	<0.27

TABLE 3-118

METHOD BLANKS FOR DIOXIN AND FURAN ANALYSIS - METHOD 8280
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/kg (ppb)

COMPOUND	METHOD BLANK 96	METHOD BLANK 98
DIOXINS		
2,3,7,8-TCDD	<0.077	<0.063
Total TCDD	<0.055	<0.026
Total PeCDD	<0.17	<0.052
Total HxCDD	<0.15	<0.071
FURANS		
Total TCDF	<0.053	<0.042
Total PeCDF	<0.051	<0.066
Total HxCDF	<0.10	<0.026

TABLE 3-119

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE FOR DIOXIN/FURAN ANALYSIS
Percent Recovery
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA:	SOIL			WATER		
LABORATORY SAMPLE IDENTIFICATION:	04-01-SED			04-01-SW		
FIELD SAMPLE LOCATION:	B-5 (Site 4)			S-1 (Site 4)		
COMPOUND	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
ISOMER SPECIFIC ANALYSIS						
2,3,7,8-TCDD	86%	95%	9.9	115%	126%	8.7
TOTALAS ANALYSIS						
2,3,7,8-TCDD	110%	96%	13.6	102%	103%	1.5
1,2,3,7,8-PeCDD	100%	100%	0	108%	102%	6.3
1,2,3,6,7,8-HxCDD	94%	85%	10	127%	119%	6.5
2,3,7,8-TCDF	110%	100%	9.5	109%	107%	1.4
1,2,3,7,8-PeCDF	97%	99%	2.0	97%	95%	2.1
1,2,3,4,7,8-HxCDF	100%	100%	0	112%	106%	5.5

NOTE:

RPD = Relative percent difference

TABLE 3-120

METHOD BLANK FOR POLYNUCLEAR AROMATIC HYDROCARBONS ANALYSIS
Water Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 92
Naphthalene	<0.008
Acenaphthylene	<0.008
Acenaphthene	<0.008
Fluroene	<0.008
Phenanthrene	<0.008
[illegible]acene	<0.008
Fluoranthene	<0.008
Pyrene	<0.008
Benzo(a)anthracene	<0.008
Chrysene	<0.008
Benzo(b)fluoranthene	<0.008
Benzo(k)fluoranthene	<0.008
Benzo(a)pyrene	<0.008
Dibenzo(a,h)anthracene	<0.008
Benzo(g,h,i)perylene	<0.008
Indeno(1,2,3-cd)pyrene	<0.008

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TABLE 3-121

METHOD BLANK FOR TOTAL ORGANIC CARBON ANALYSIS
Soil Samples
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in mg/kg (ppm)

COMPOUND	METHOD BLANK 94
Total organic carbon	<1

TABLE 3-122

METHOD BLANK FOR LEAD ANALYSIS
Water Sample
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

COMPOUND	METHOD BLANK 93
Lead	<2.0

TABLE 3-123

DUPLICATE FOR LEAD ANALYSIS
Water Sample
NAS-Key West
Key West, Florida
IT Project No. 595392
Units are in ug/L (ppb)

SAMPLE IDENTIFICATION:	09-KWM-09-GW		
SAMPLE LOCATION:	KWM-09 (Site 9)		
COMPOUND	ORGINAL ANALYSIS	DUPLICATE ANALYSIS	RPD
Lead	32.25%	32.10%	0.5%

NOTE:

RPD = Relative percent difference

TABLE 3-124

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE FOR EPA METHOD 504
NAS-Key West
Key West, Florida
IT Project No. 595392

LABORATORY SAMPLE IDENTIFICATION:	09-KWM-09		
FIELD SAMPLE LOCATION:	KWM-09 (Site 9)		
COMPOUND	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
...ylene dibromide	97%	94%	3
Dibromochloropropane	110%	100%	10

NOTE:

RPD = Relative percent difference

TABLE 3-125

MATRIX SPIKE AND MATRIX SPIKE DUPLICATE FOR EPA 614/8140,WATER/SOIL
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA:	WATER			SOIL		
LABORATORY SAMPLE IDENTIFICATION:	04-04-GW			04-01-SED		
FIELD SAMPLE LOCATION:	MW 4-4			B-5		
COMPOUND	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD	MATRIX SPIKE	MATRIX SPIKE DUPLICATE	RPD
Dimethoate	84%	62%	30	98%	109%	10.6
Methyl Parathion	99%	70%	34	92%	95%	3.2
2,4-D	47%	49%	4.2	84%	80%	4.9
2,4,5-TP	52%	55%	5.6	100%	95%	5.1

NOTE:

RPD = Relative percent difference

TABLE 4-1

ANALYICAL DETECTIONS FOR TARGET ANALYTE LIST (INORGANICS) FOR SEDIMENT SAMPLES
Site 5 - 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-U
FIELD SAMPLE LOCATION:		S-2	S-1
ASSOCIATED METHOD BLANKS:		66	66
COMPOUND	CSC		
Aluminum	NE	928	459
Barium	850	BDL	BDL
Cadmium	NE	1.8	1.9
Calcium	NE	317,000	325,000
Chromium	85*	5.6	5.3
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
Vanadium	NE	BDL	BDL
Zinc	NE	46.5E	58.6

NOTE:

NE = Not established
BDL = Detected, but below instrument quantitation limit
E = The reported value is estimated due to an interference
* = CSC is for Chromium VI (Soil)
S = Sediment/Surface Water location

TABLE 5-1

SUMMARY OF CONTAMINANTS DETECTED ABOVE CSCs AT SITE 1
Truman Annex, Refuse Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganics	Antimony	14	95.2	557
		Arsenic	50	---	62.2
		Barium	1,000	1,318	1,380
		Cadmium	10	22.2	54.5
		Chromium	50	61.1	657
		Copper	1,000	3,360	10,200
		Iron	300	793	155,000
		Lead	50	57.1	5,700
		Manganese	50	65.6	2,940
		Mercury	2	2.4	16.2
		Nickel	70	88.2	303
		Sodium	160,000	800,000	7,840,000
		Zinc	5,000	7,320	15,200
	Pesticides/PCB	Alpha-chlordane	.027	---	.98
		Gamma-chlordane	.027	---	1.1
Sediment Sample	Pesticides/PCB	Aroclor-1260	45	---	2,300
		Aroclor-1254	45	---	210

NOTE:

* = Minimum values represent the smallest concentration level above CSC
--- = Present when only one value above CSC exists
CSC = Concentrated standards for comparison

TABLE 5-2

SUMMARY OF CONTAMINANTS DETECTED ABOVE THEIR CSCs AT SITE 3
Truman Annex, DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATON
Groundwater	Inorganics	Cadmium	10	11.4	13.9
		Iron	300	425	895
		Sodium	160,000	534,000	1,140,000
	Pesticides/PCB	Alpha-BHC	.05	---	.11
		Beta	.05	.91	7.00
		Dieldrin	.05	.47	1.80
		4,4-DDD	.15	.77	2.10
		4,4-DDE	.10	---	.19
		4,4-DDT	.10	---	.21
		Heptachlor epoxide	.0039	---	.14
Soil Sample	Pesticides/PCB	4,4-DDT	1,000	1,800	220,000
		4,4-DDD	1,500	2,000	83,000
		4,4-DDE	1,000	8,600	33,000

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standards for comparison

TABLE 5-3

SUMMARY OF CONTAMINANTS DETECTED ABOVE THEIR CSCs AT SITE 4
Boca Chica, Open Disposal Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganics	Arsenic	50	---	59
		Chromium	50	---	106
		Iron	300	1,110	14,300
		Lead	50	54.8	377
		Manganese	50	---	53.6
		Sodium	160,000	5,530,000	11,000,000
		Mercury	2	---	8.4
	Pesticides/PCB	Heptachlor epoxide	38	---	120
	Volatiles	1,2-dichloroethene	4.2	---	6
Soil Samples	Pesticides/PCB	Heptachlor epoxide	38	---	120
		Aroclor-1260	45	---	940
Surface Water	Inorganics	Cadmium	10	---	13.7
		Sodium	160,000	---	13,100,000
Sediment Sample	Inorganics	Chromium	85	---	118
	Pesticides/PCB	Aldrin	21	---	84
		Heptachlor epoxide	38	---	71

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standards for comparison

TABLE 5-4

SUMMARY OF CONTAMINANTS DETECTED ABOVE THEIR CSCs AT SITE 5
Boca Chica, DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Soil Samples	Pesticides/PCB	4,4-DDT	1,000	1,000	2,800,000
		4,4-DDT	1,500	23,000	1,800,000
		4,4-DDE	1,000	---	8,400
	Inorganics	Silver	51	---	386
Groundwater	Inorganics	Iron	300	465	1,700
		Sodium	160,000	1,460,000	1,620,000
	Volatiles	Chlorobenzene	10	57	210
		1,2-dichloroethene	4.2	1,500	1,800
		Ethylbenzene	2	---	38
		Naphthalene	10	40	46
		Xylenes	50	---	76
	Pesticides/PCB	Alpha-BHC	.05	14	16
		Beta-BHC	.05	0.54	6.1
		Delta-BHC	.05	0.10	15
		4,4-DDE	.01	.16	22
		4,4-DDT	.01	.16	34
		4,4-DDD	.15	---	.76
Surface Water	Inorganics	Lead	50	---	53.6
		Sodium	160,000	6,410,000	6,590,000
	Pesticides/PCB	Beta-BHC	.05	---	.066
		4,4-DDD	.15	---	.24

TABLE 5-4

SUMMARY OF CONTAMINANTS DETECTED ABOVE THEIR CSCs AT SITE 5
Boca Chica, DDT Mixing Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Sediment Samples	Pesticides/PCB	4,4-DDD	1,500	6,000	13,000
		4,4-DDE	1,000	1,800	2,800
		4,4-DDT	1,000	1,900	2,500

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standards for comparison

TABLE 5-5

SUMMARY OF CONTAMINANTS DETECTED ABOVE THEIR CSCs AT SITE 7
Fleming Key, North Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganics	Antimony	29	90.4	141
		Cadmium	10	10.3	21.7
		Chromium	50	115	384
		Iron	300	549	121,000
		Lead	50	125	1,430
		Manganese	50	56.9	656
		Mercury	2	12.4	73
		Nickel	70	---	91.2
		Sodium	160,000	6,190,000	14,300,000
Surface Water	Inorganic	Iron	300	---	556
		Lead	50	---	72.2
		Sodium	160,000	---	11,400,000

NOTE:

*	Minimum values represent the smallest concentration level above CSC
---	Present when only one value above CSC exists
CSC	Concentration standards for comparison

TABLE 5-6

SUMMARY OF CONTAMINANTS DETECTED ABOVE THEIR CSCs AT SITE 8
Fleming Key, South Landfill
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganic	Antimony	14	---	95.4
		Arsenic	50	50.5	109
		Cadmium	10	11.4	71.8
		Chromium	50	55.9	115
		Copper	1,000	---	1,780
		Iron	300	3,340	70,600
		Lead	50	59	1,870
		Manganese	50	85	508
		Mercury	2	2.2	11.5
		Sodium	160,000	7,090,000	10,400,000
	Volatiles	Chlorobenzene	10	---	63
Sediment Samples	Inorganic	Antimony	6.8	20.3	20.7
Surface Water	Inorganic	Arsenic	50	---	57.3
		Cadmium	10	---	19.8
		Iron	300	---	305,000
		Lead	50	---	155
		Manganese	50	---	294
		Sodium	160,000	---	9,390,000
	Pesticides/PCB	Aroclor-1242	.0046	---	1.1

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standard for comparison

TABLE 5-7

SUMMARY OF CONTAMINANTS DETECTED ABOVE THEIR CSCs AT SITE 9
Trumbo Point Annex, Fuel Farm and Piers
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Volatiles	Benzene	1	8.9	780
		Toluene	24	---	39
		Ethylbenzene	2	---	33

NOTE:

- * Minimum values represent the smallest concentration level above CSC
- --- Present when only one value above CSC exists
- CSC Concentration standard for comparison

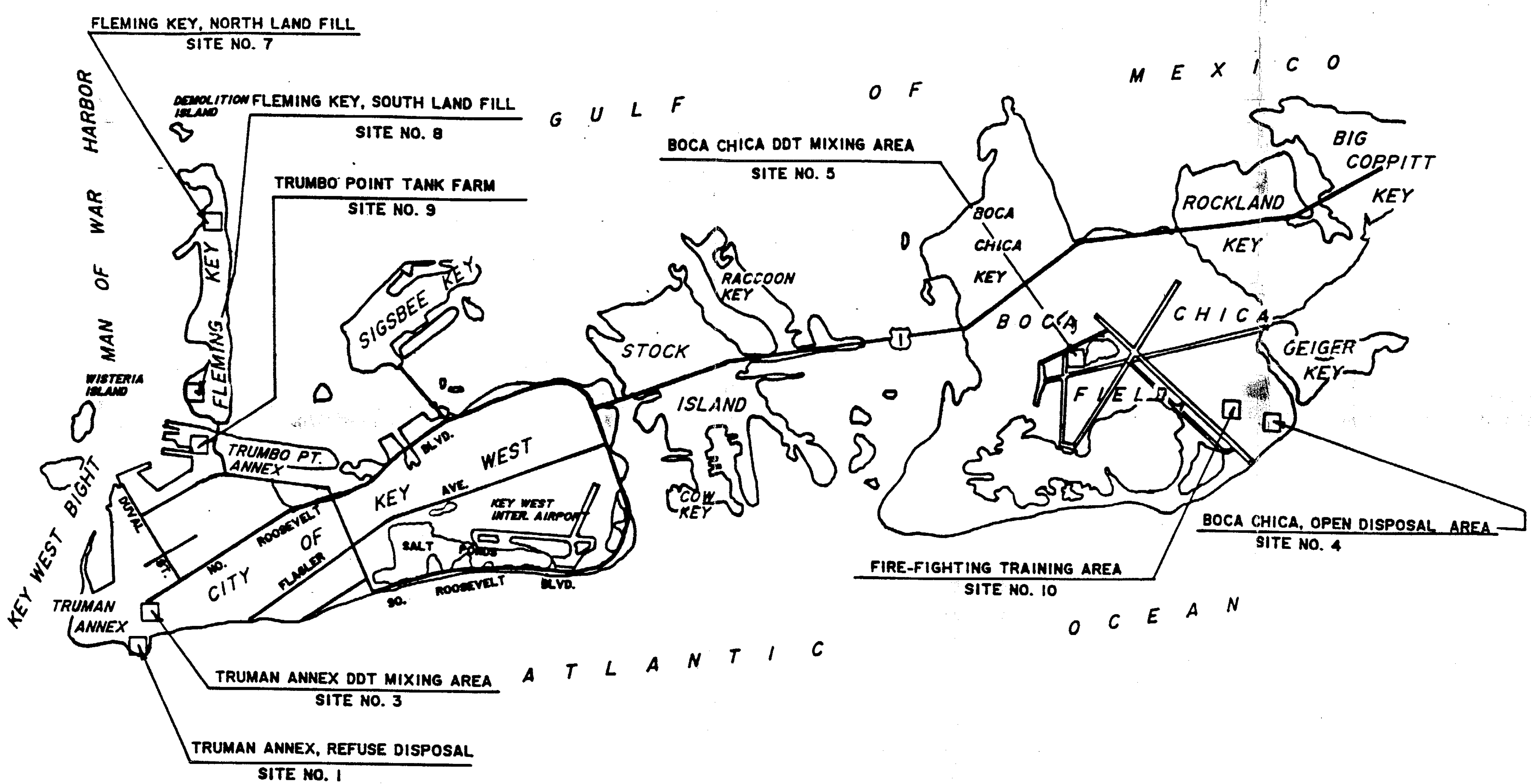
TABLE 5-8

SUMMARY OF CONTAMINANTS DETECTED ABOVE THEIR CSCs AT SITE 10
Boca Chica, Fire Fighting Training Area
NAS-Key West
Key West, Florida
IT Project No. 595392

MEDIA	CLASS	PARAMETER	CSC	MINIMUM* CONCENTRATION	MAXIMUM CONCENTRATION
Groundwater	Inorganic	Cadmium	10	---	13.5
		Chromium	50	53	73.5
		Iron	300	1,230	4,940
		Manganese	50	---	62.2
		Sodium	160,000	1,330,000	9,340,000
	Volatiles	Benzene	1	---	11
		Ethylbenzene	2	---	15
		Naphthalene	10	---	39

NOTE:

* Minimum values represent the smallest concentration level above CSC
--- Present when only one value above CSC exists
CSC Concentration standard for comparison



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS—SURVEYORS—PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

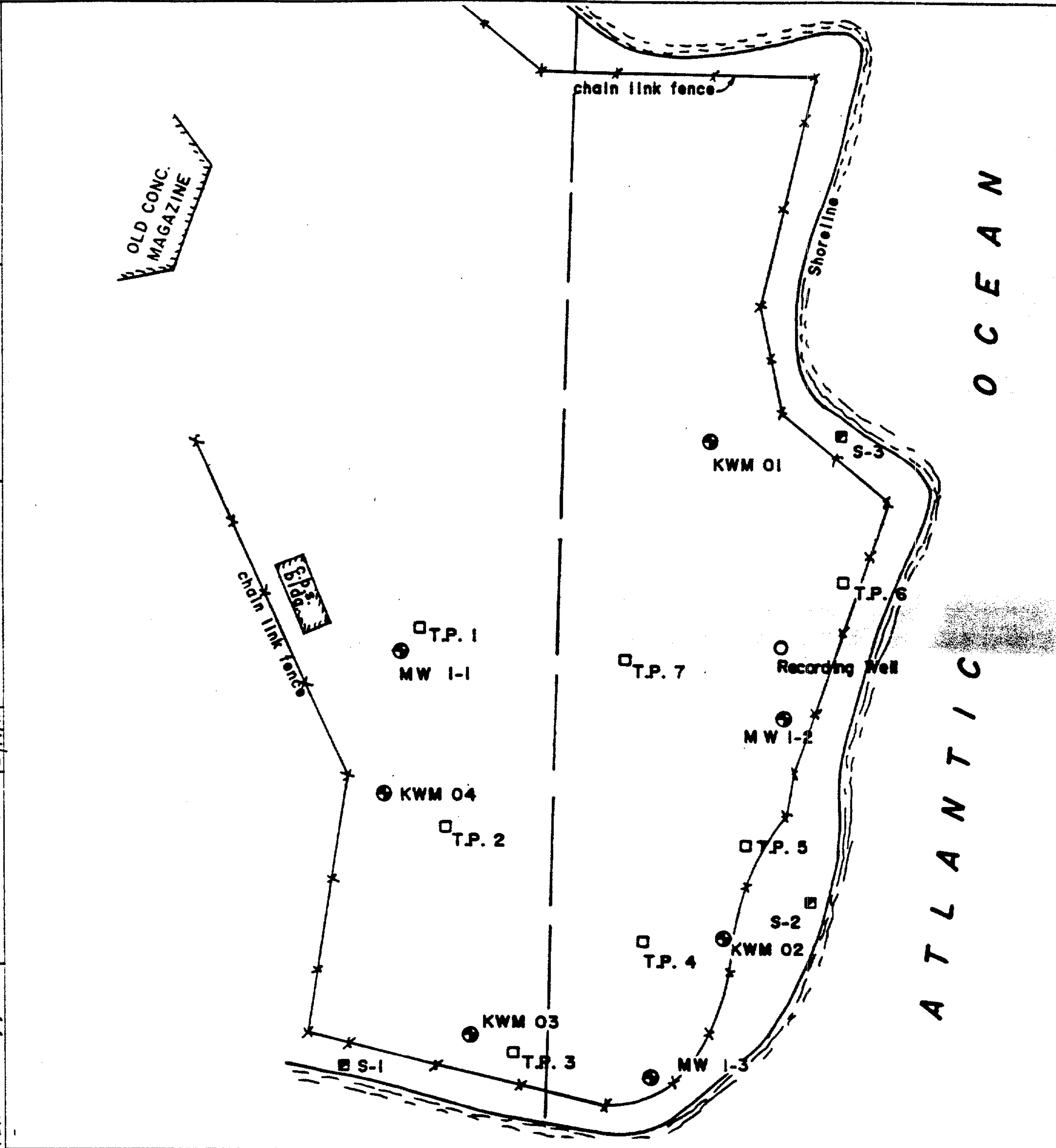
1.0 mile 0.5 0 0.5 1.0
GRAPHIC SCALE

FIGURE 1–1
LOCATION OF NAVAL ACTIVITIES AND STUDY SITES

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 9/10/90	LATE REV DATE: 10/1/90	CHECKED BY: W Barrett 10/23/90	INITIATOR: GStephens	DRAWING No.: XB200303	STORED: AGI-F:\FL\drwgs\kwst
DRAWN BY: F. Hilderbrandt	DRAWN BY: JReillyhyers	APPROVED BY: SS 5/11/91	PROJ. MGR: MHampton	PROJ. No.: 595392	ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

100 50 0 50 100
GRAPHIC SCALE

LEGEND:

⊕	KWM 01	GERAGHTY & MILLER MONITORING WELL
⊕	MW 1–1	I T CORP MONITORING WELL
○		RECORDING WELL
— — —		AIR QUALITY SURVEY TRANSECT
□	T.P. 4	TEST PIT No 4
☒	S–2	SEDIMENT SAMPLE No 2

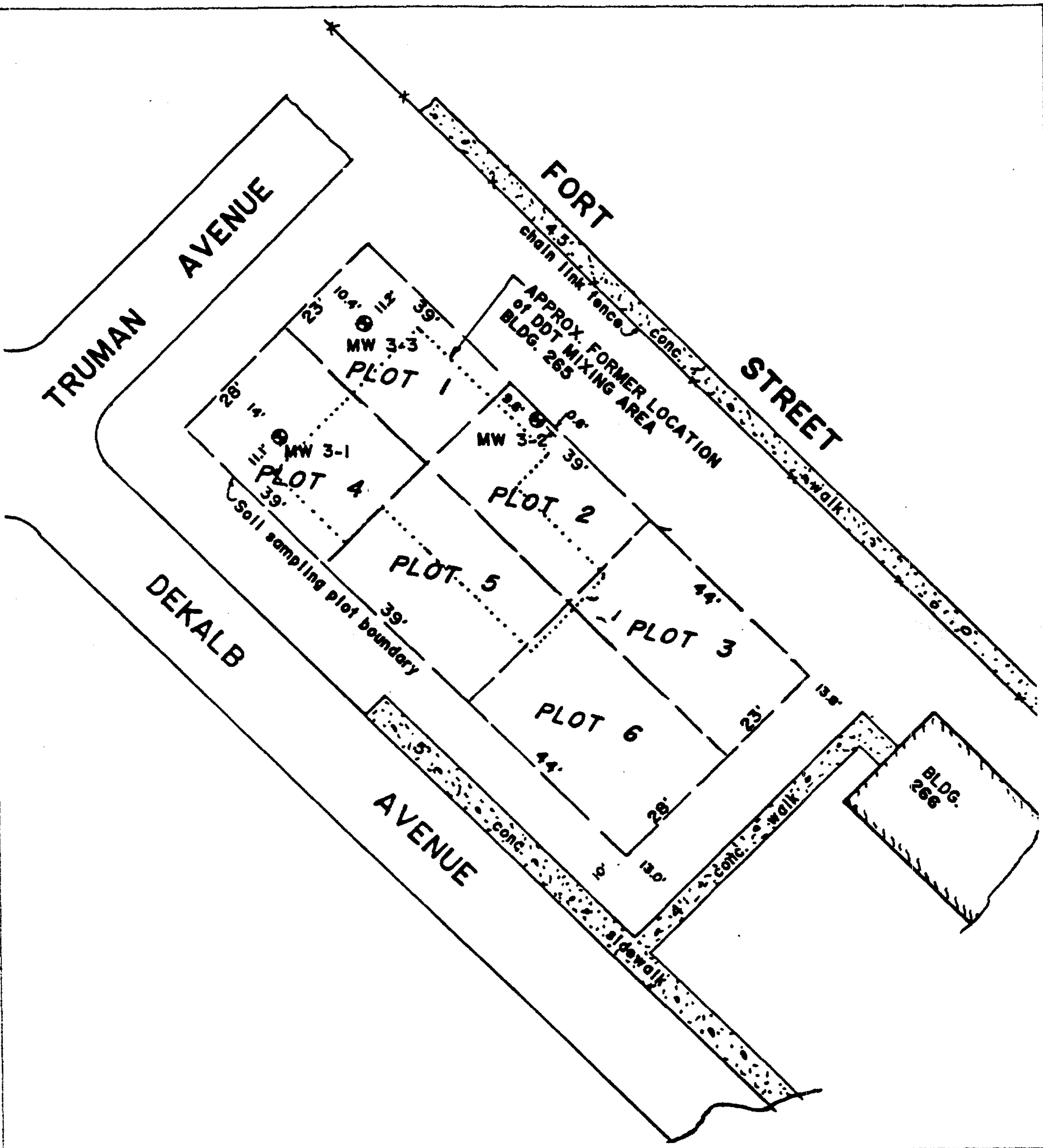
FIGURE 2–1

INVESTIGATION & SAMPLING LOCATIONS
TRUMAN ANNEX
REFUSE DISPOSAL AREA
SITE No 1

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 9/10/90 | LATE REV DATE: 10/12/90 | CHECKED BY: wBarrett 10/22/90 | INITIATOR: GStephens | DRAWING No.: XA100301 | STORED: AGI–F:\FL\drwgs\kwst
DRAWN BY: F. Hilderbrandt | DRAWN BY: JReillyhyers | APPROVED BY: SB 5/1/91 | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: – – – –



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

LEGEND:

MW 3-1 I T CORP MONITORING WELL

PLOT BOUNDARY & NUMBER

30 20 10 0 10 20 30

GRAPHIC SCALE

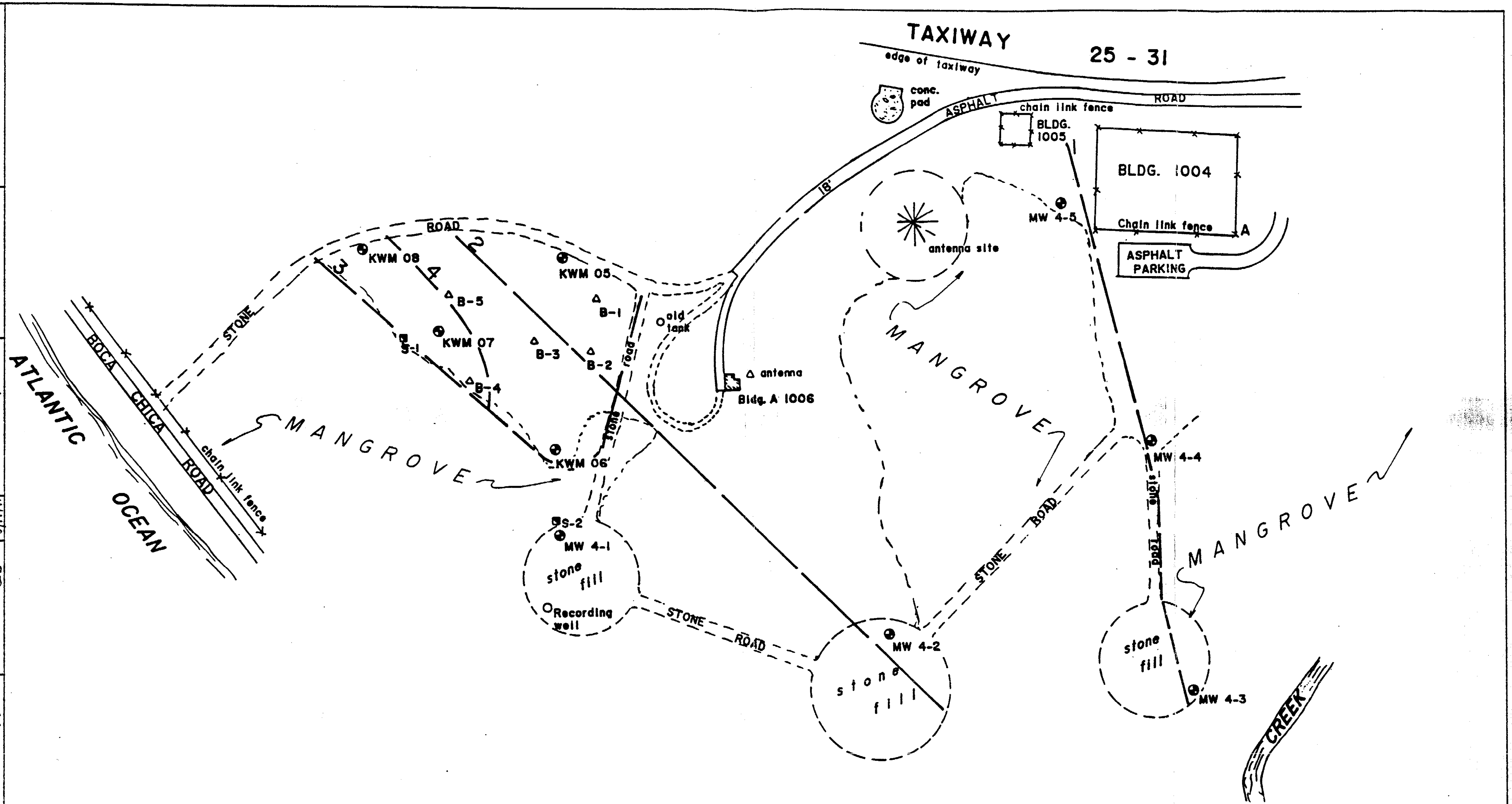
FIGURE 2-2

INVESTIGATION & SAMPLING LOCATIONS
TRUMAN ANNEX
DDT MIXING AREA
SITE No 3

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 9/10/90 | DRAWN BY: F. Hilderbrandt
LATE REV DATE: 10/10/90 | DRAWN BY: JReillyhyers
CHECKED BY: WHB 6/19/91 | APPROVED BY: ?B 5/17/91
INITIATOR: GStephens | PROJ. MGR: MHampton
DRAWING No.: XA100302 | PROJ. No.: 595392
STORED: AGI-F:\FL\drwgs\kwst | ARCHIVED: - - - -



START DATE: 9/10/90 | LATE REV DATE: 10/13/90 | CHECKED BY: W Bauer 10/22/90 | INITIATOR: GStephens | DRAWING No.: XB200317 | STORED: AG-F:\FL\drwgs\kwst

DRAWN BY: F. Hilderbrandt | DRAWN BY: JReillyhyers | APPROVED BY: S B 5/1/91 | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: - - - -

SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

LEGEND:

- KWM 08 — GERAGHTY & MILLER MONITORING WELL
- MW 4–2 — I T CORP MONITORING WELL
- △ B–5 — SURFACE SOIL SAMPLE No 5
- S–1 — SURFACE WATER & SEDIMENT SAMPLE
- 2 — — — AIR QUALITY SURVEY TRANSECT AND NUMBER

200 100 0 100 200

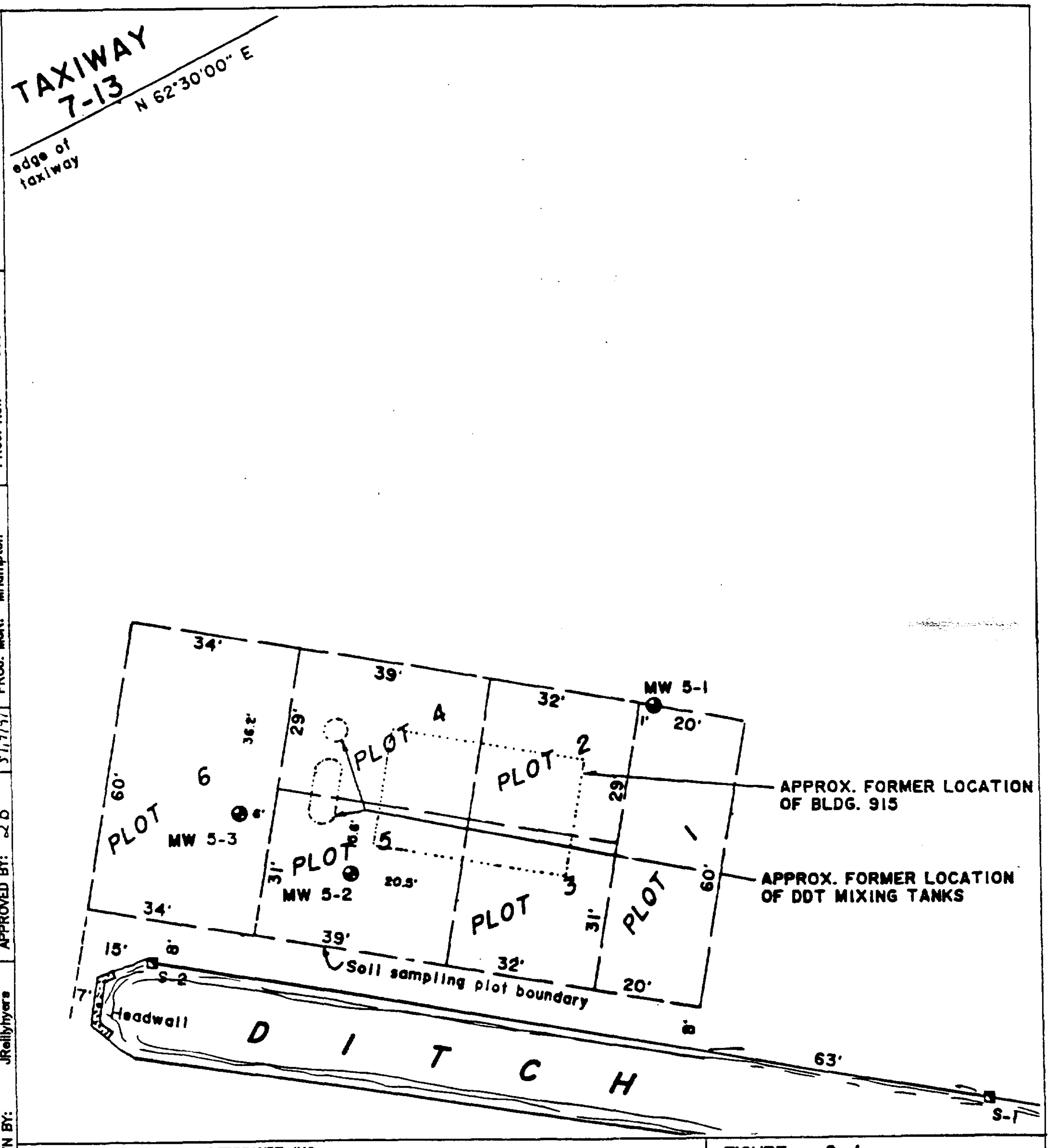
GRAPHIC SCALE

FIGURE 2–3

INVESTIGATION & SAMPLING LOCATIONS
BOCA CHICA
OPEN DISPOSAL AREA
SITE No 4

NAS–KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

LEGEND:

- MW 5-1 — I T CORP MONITORING WELL
- S-1 — SURFACE WATER & SEDIMENT SAMPLE No 1
- PLOT 1 — PLOT BOUNDARY & NUMBER

30 20 10 0 10 20 30

GRAPHIC SCALE

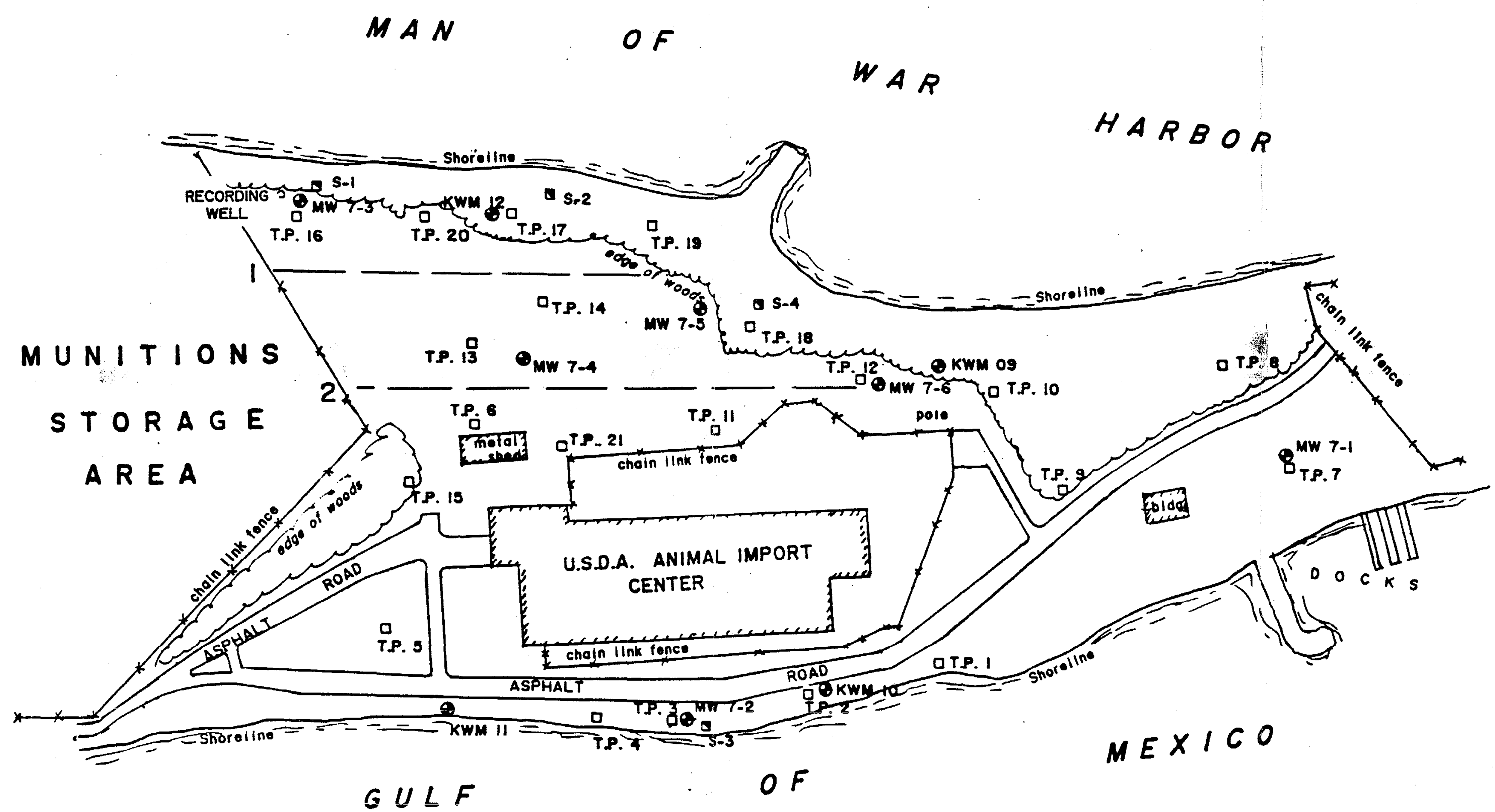
FIGURE 2-4

INVESTIGATION & SAMPLING LOCATIONS
BOCA CHICA
DDT MIXING AREA
SITE No 5

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

STORED: AGI-F:\FL\cwrgs\kwst | ARCHIVED: - - - -
DRAWING No.: XA100308 | PROJ. No.: 595392
INITIATOR: GStephens | PROJ. MGR: MHampton
CHECKED BY: W Barrett 10/23/90 | APPROVED BY: SB 5/1/91
LATE REV DATE: 10/10/90 | DRAWN BY: JReillyhyers
START DATE: 9/10/90 | DRAWN BY: F. Hilderbrandt



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

GRAPHIC SCALE: 200 100 0 100 200

LEGEND:

⊕	KWM 09	GERAGHTY & MILLER MONITORING WELL
⊕	MW 7–2	I T CORP MONITORING WELL
○		RECORDING WELL
□	T.P. 14	TEST PIT No 14
◪	S–1	SURFACE WATER & SEDIMENT SAMPLE
2 — —		AIR QUALITY SURVEY TRANSECT AND NUMBER

FIGURE 2–5

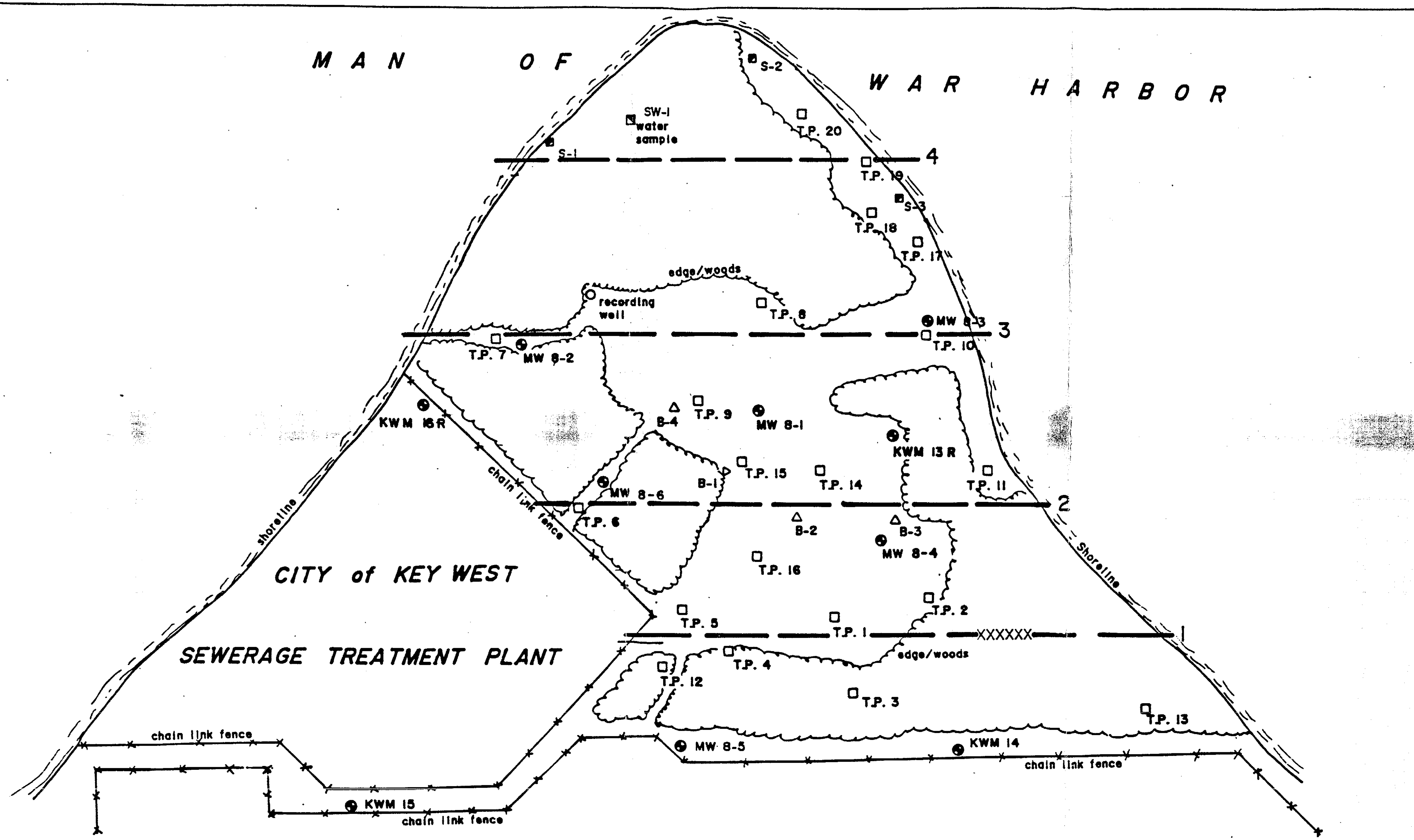
INVESTIGATION & SAMPLING LOCATIONS
FLEMING KEY
NORTH LANDFILL
SITE No 7

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 9/10/90 | LATE REV DATE: 10/13/90 | CHECKED BY: W Burnett 10/22/90 | INITIATOR: GStephens | DRAWING No.: XB200306 | STORED: AGI-F:\FL\drwgs\kwst

DRAWN BY: F. Hilderbrandt | DRAWN BY: JReillyhyers | APPROVED BY: | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS—SURVEYORS—PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

200 100 0 100 200
GRAPHIC SCALE

LEGEND:

KWM 14	GERAGHTY & MILLER MONITORING WELL
MW 8-2	I T CORP MONITORING WELL
KWM 16R	REPLACEMENT MONITORING WELL
	RECORDING WELL
S-1	SEDIMENT SAMPLE No 1
T.P. 4	TEST PIT No 4
B-1	BORING No 1
XXXXXXX	HIGH LEVELS OF ORGANIC VAPORS
2 — — —	AIR QUALITY SURVEY TRANSECT AND NUMBER

FIGURE 2-6

INVESTIGATION & SAMPLING LOCATIONS
FLEMING KEY
SOUTH LANDFILL
SITE No 8

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 9/10/90 | DRAWN BY: F. Hilderbrandt | LATE REV DATE: 10/13/90 | DRAWN BY: JReillyhyere | CHECKED BY: WBarrett | APPROVED BY: SB | INITIATOR: GStephens | PROJ. MGR: MHampton | DRAWING No.: XB200318 | PROJ. No.: 595392 | STORED: AGI-F:\FL\drwgs\kwst | ARCHIVED: - - - -

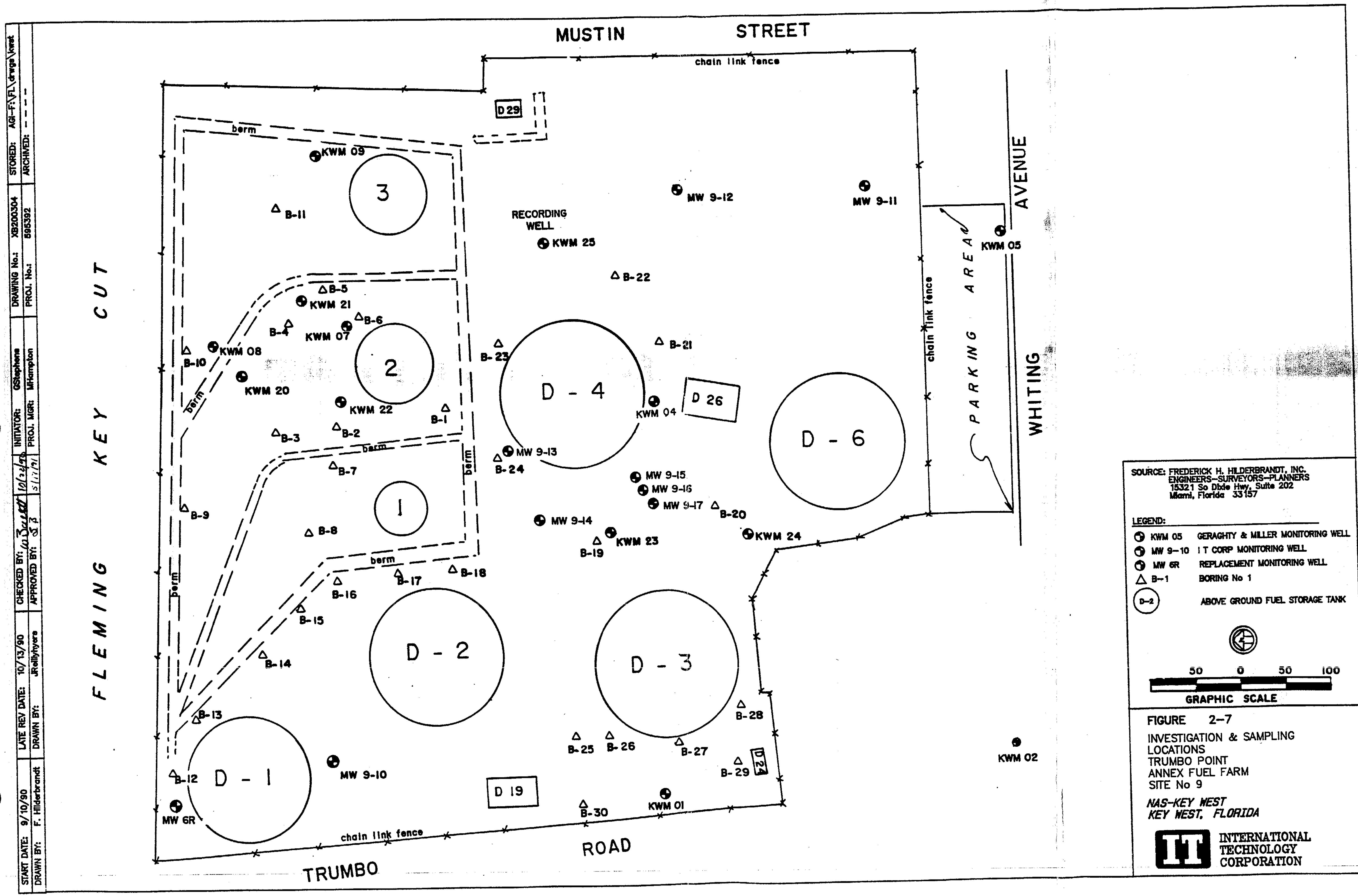
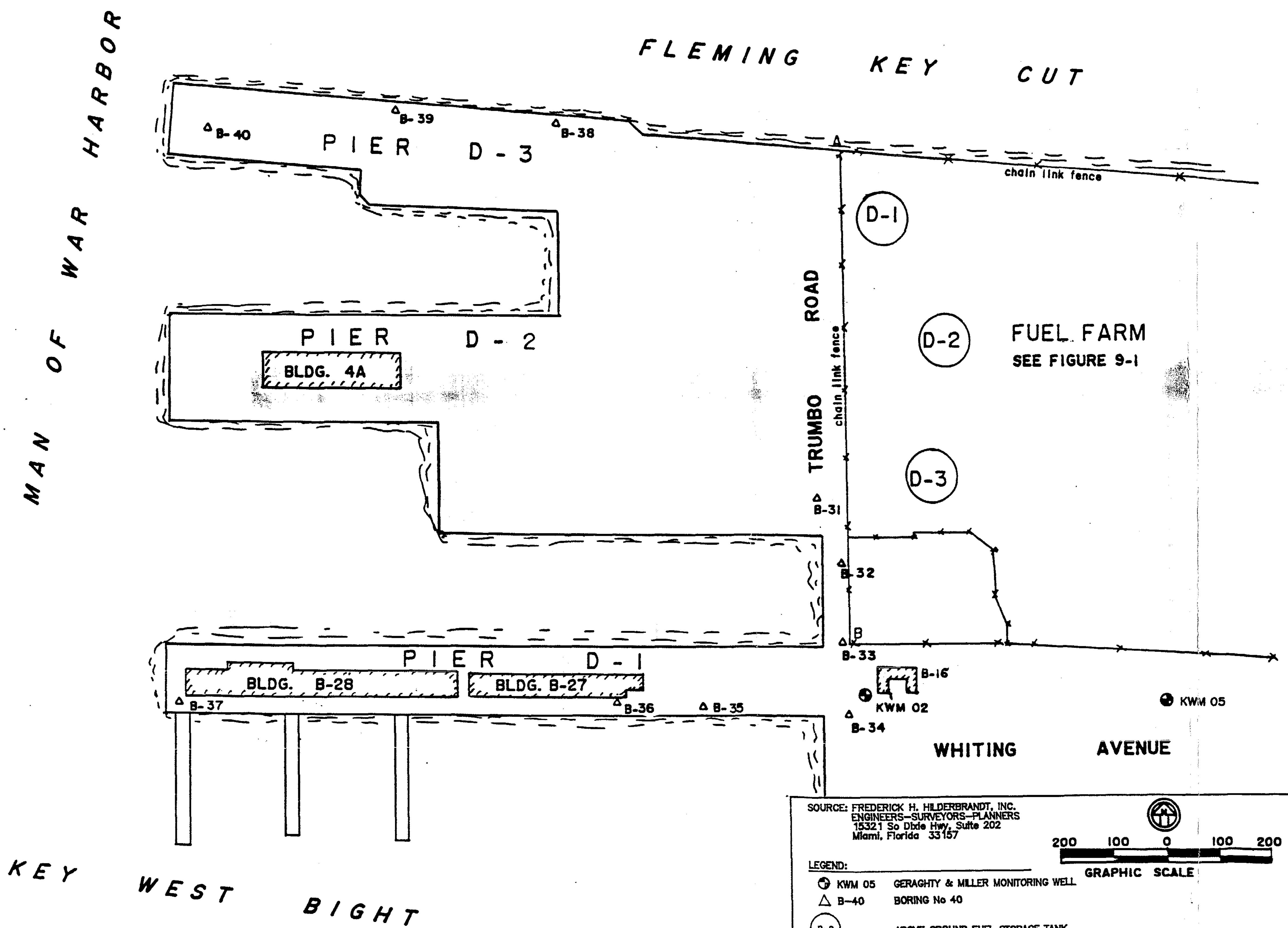


FIGURE 2-7
INVESTIGATION & SAMPLING LOCATIONS
TRUMBO POINT
ANNEX FUEL FARM
SITE No 9

NAS-KEY WEST
KEY WEST, FLORIDA



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

200 100 0 100 200
GRAPHIC SCALE

LEGEND:

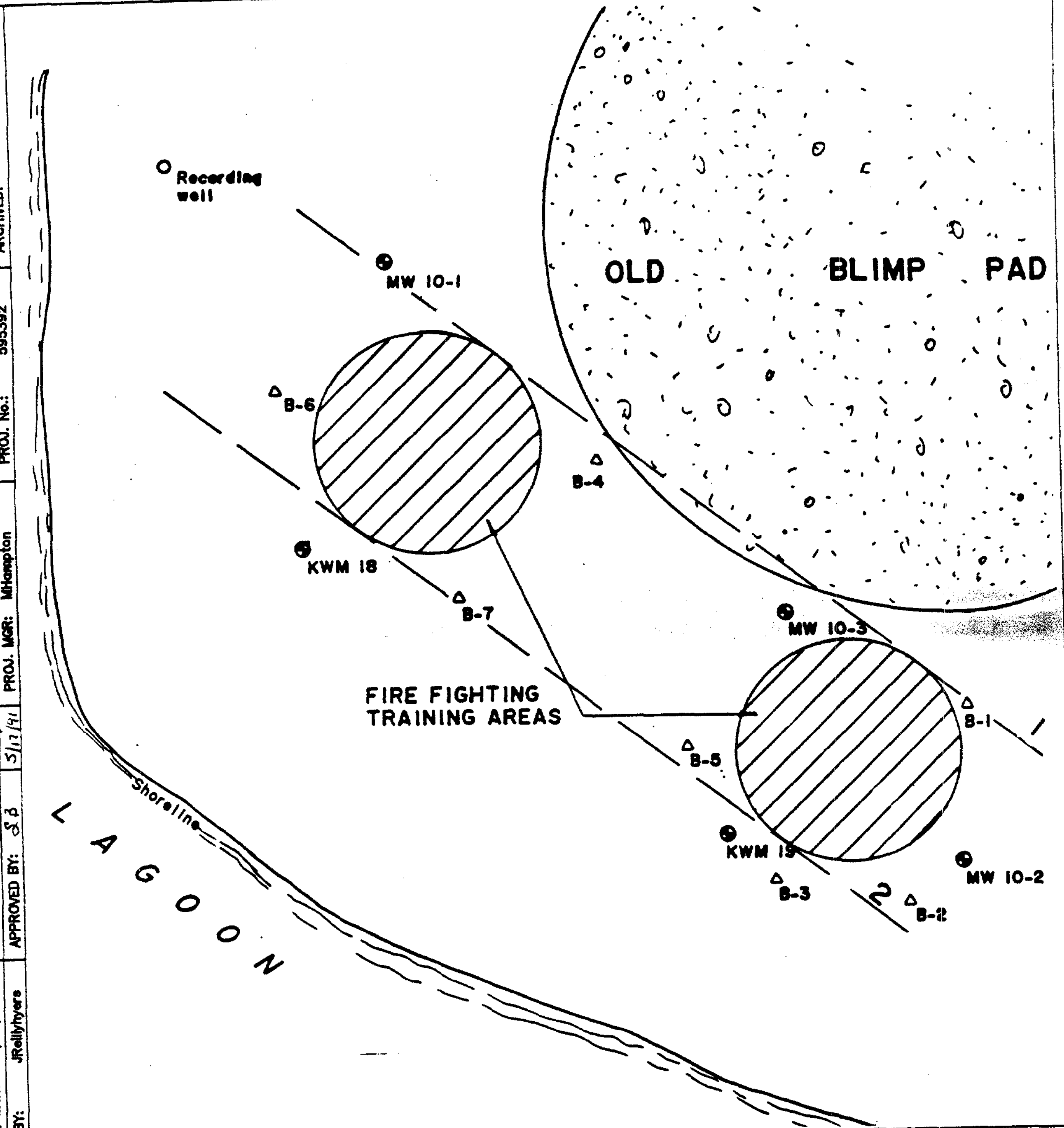
KWM 05	GERAGHTY & MILLER MONITORING WELL
B-40	BORING No 40
D-2	ABOVE GROUND FUEL STORAGE TANK

FIGURE 2-8
INVESTIGATION & SAMPLING LOCATIONS
TRUMBO POINT
ANNEX PIERS
SITE No 9

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 9/10/90	LATE REV DATE: 10/13/90	CHECKED BY: W Bauett 10/22/92	INITIATOR: GStephens	DRAWING No.: XB200305	STORED: AGI–F:\FL\dwgs\kwst
DRAWN BY: F. Hilderbrandt	DRAWN BY: JReillyhyers	APPROVED BY: SB 5/17/91	PROJ. MGR: MHampton	PROJ. No.: 595392	ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS—SURVEYORS—PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

60 40 20 0 20 40 60
GRAPHIC SCALE

LEGEND:

- KWM 18 GERAGHTY & MILLER MONITORING WELL
- MW 10—1 I T CORP MONITORING WELL
- RECORDING WELL
- B—2 BORING No 2
- 2 — — — AIR QUALITY SURVEY TRANSECT AND NUMBER

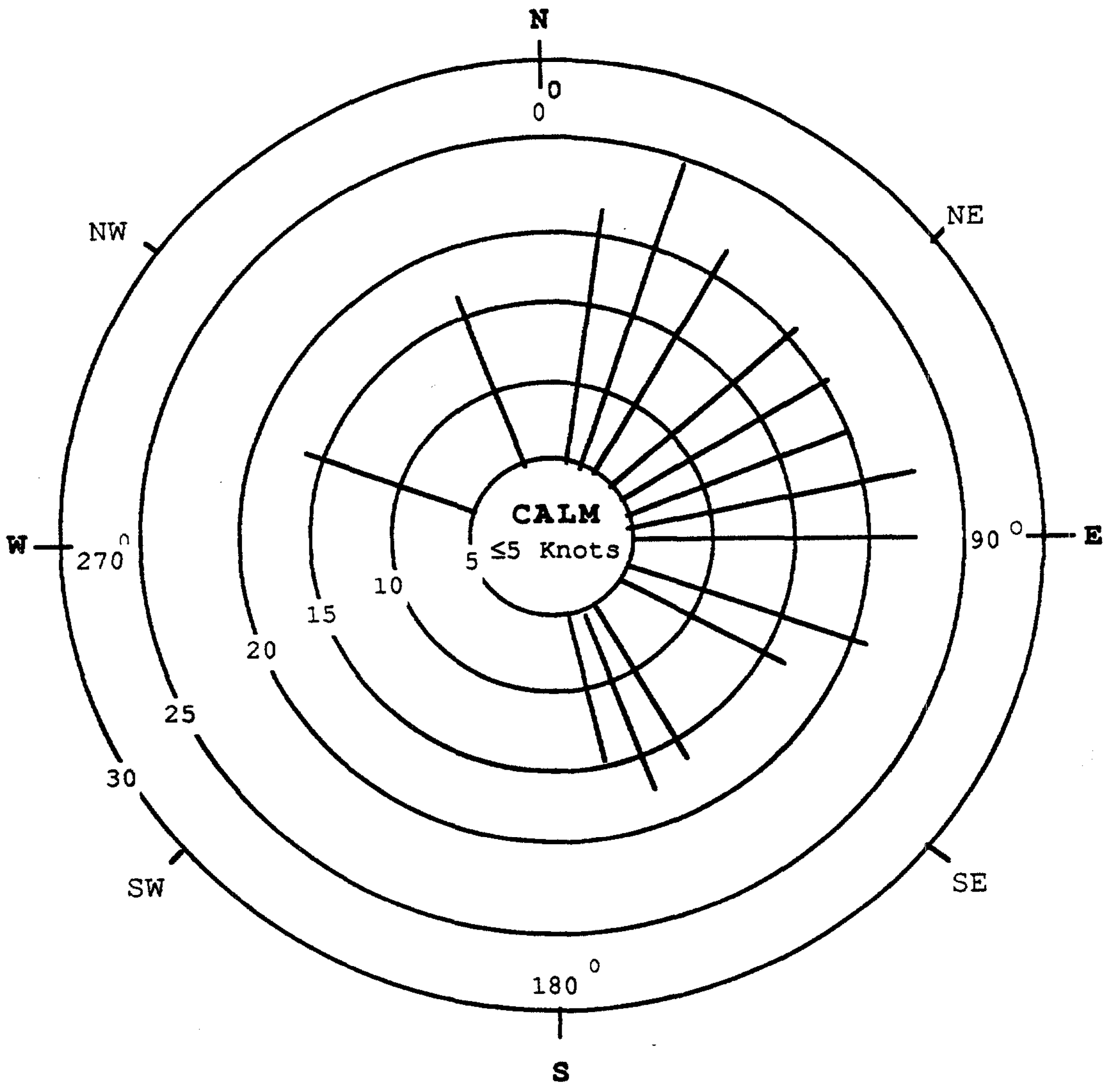
FIGURE 2-9

INVESTIGATION & SAMPLING LOCATIONS
BOCA CHICA, FIRE FIGHTING TRAINING AREA
SITE No 10

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

STORED: AGI-F:\FL\...\kwst
ARCHIVED: - - - -
DRAWING No.: XA100307
PROJ. No.: 595392
INITIATOR: GStephens
PROJ. MGR: MHampton
CHECKED BY: 10/22/91
APPROVED BY: SB 5/17/91
LATE REV DATE: 10/10/90
DRAWN BY: JReillyhyers
START DATE: 9/10/90
DRAWN BY: F. Hilderbrandt



Average Wind Speed = 19.1 knots

NNE = 25.93%

ENE = 25.93%

E = 7.36%

ESE = 22.19 %

SSE = 11.1%

WNW = 3.73%

NNW = 3.73%

FIGURE 3-1a

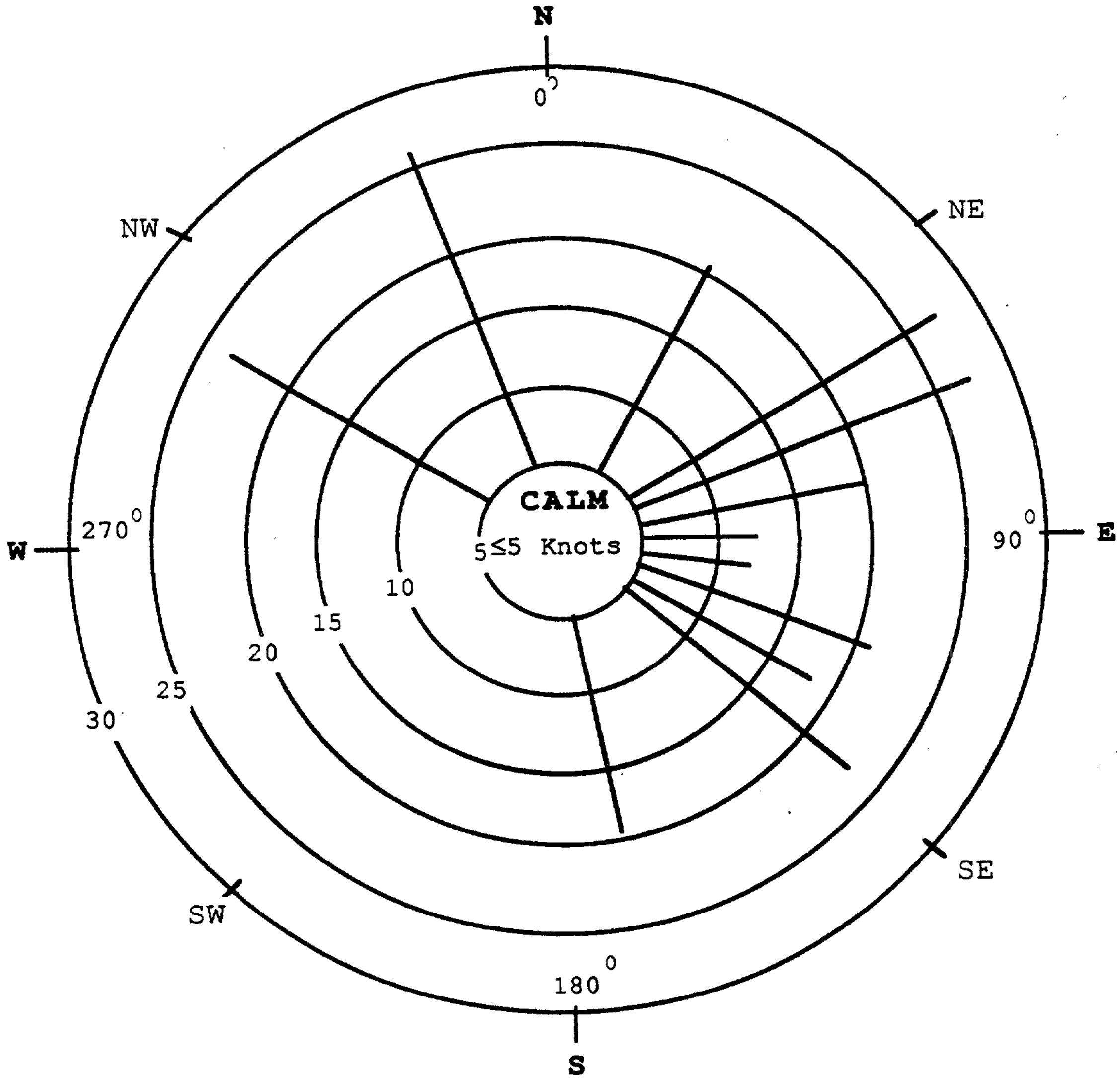
FREQUENCY OF WIND SPEED AND DIRECTION

KEY WEST, FLORIDA
JANUARY 1990

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 10/09/90 DRAWN BY: SPillai
LATE REV DATE: 10/10/90 DRAWN BY: JReilly/hyers
CHECKED BY: W Russell 10/24/90 APPROVED BY: SB 5/1/91
INITIATOR: GStephens PROJ. MGR: MHampton
DRAWING No.: XA100348 PROJ. No.: 595392
STORED: AGI-F:\FL\...gs\kwst ARCHIVED: - - - -



Average Wind Speed = 18.46 knots

NNE = 7.14%

ENE = 14.28%

E = 7.14%

ESE = 50.00%

SSE = 7.14%

WNW = 3.57%

NNW = 10.73%

FIGURE 3-1b

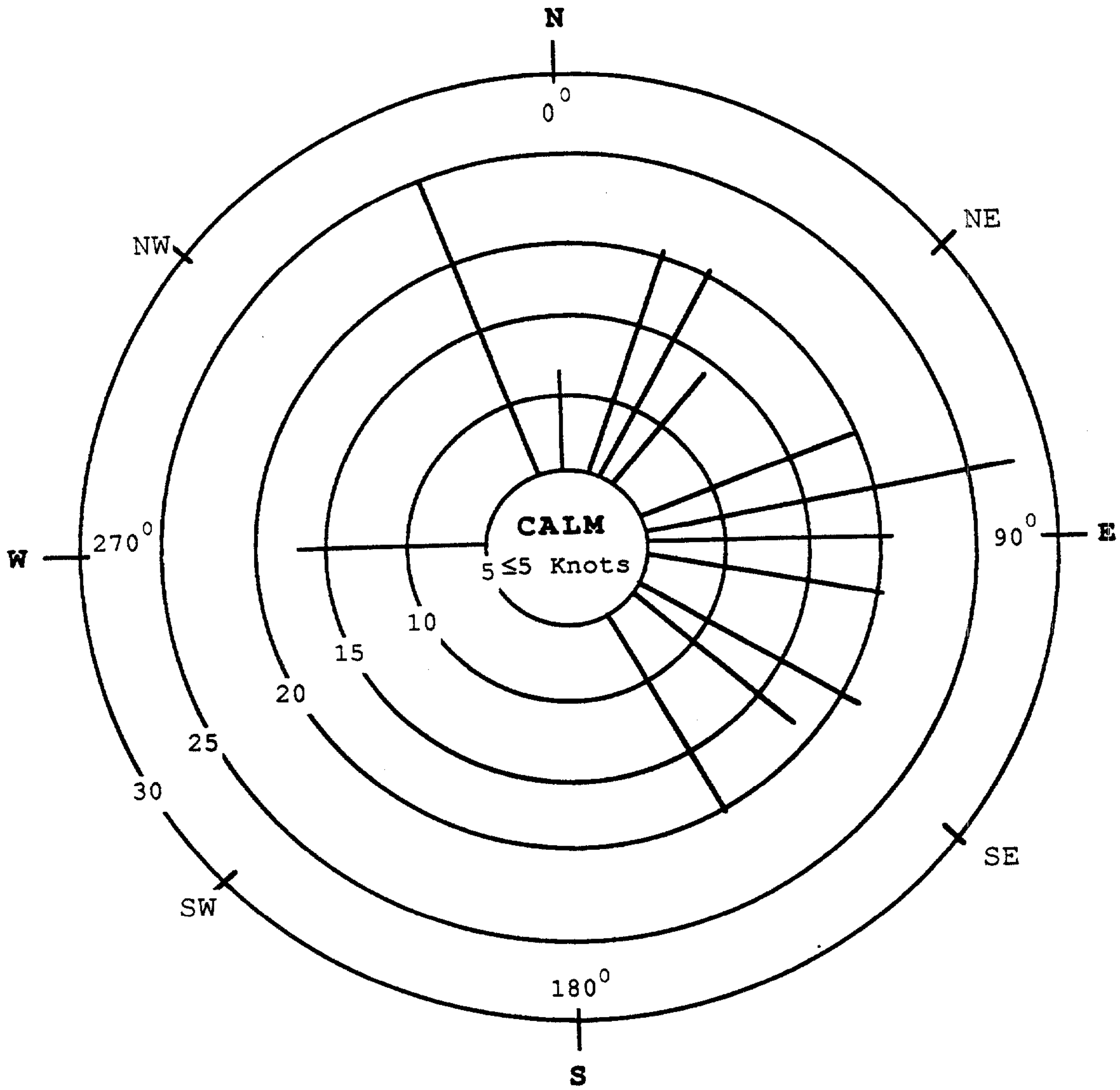
FREQUENCY OF WIND SPEED AND DIRECTION

KEY WEST, FLORIDA
FEBRUARY 1990

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 10/09/90 | DRAWN BY: SPillai
LATE REV DATE: 10/10/90 | DRAWN BY: JReilly/tyers
CHECKED BY: 10/10/90 | APPROVED BY: 5/17/91
INITIATOR: GStephens | PROJ. MGR: MHampton
DRAWING No.: XA100349 | PROJ. No.: 595392
STORED: AGI-F:\FL\...ge\kwst | ARCHIVED: - - - -



Average Wind Speed = 18.4 knots

N = 3.33%

NNE = 10.00%

ENE = 33.33%

E = 13.33%

ESE = 26.66%

SSE = 3.33%

NNW = 6.67%

W = 3.33%

FIGURE 3–1c

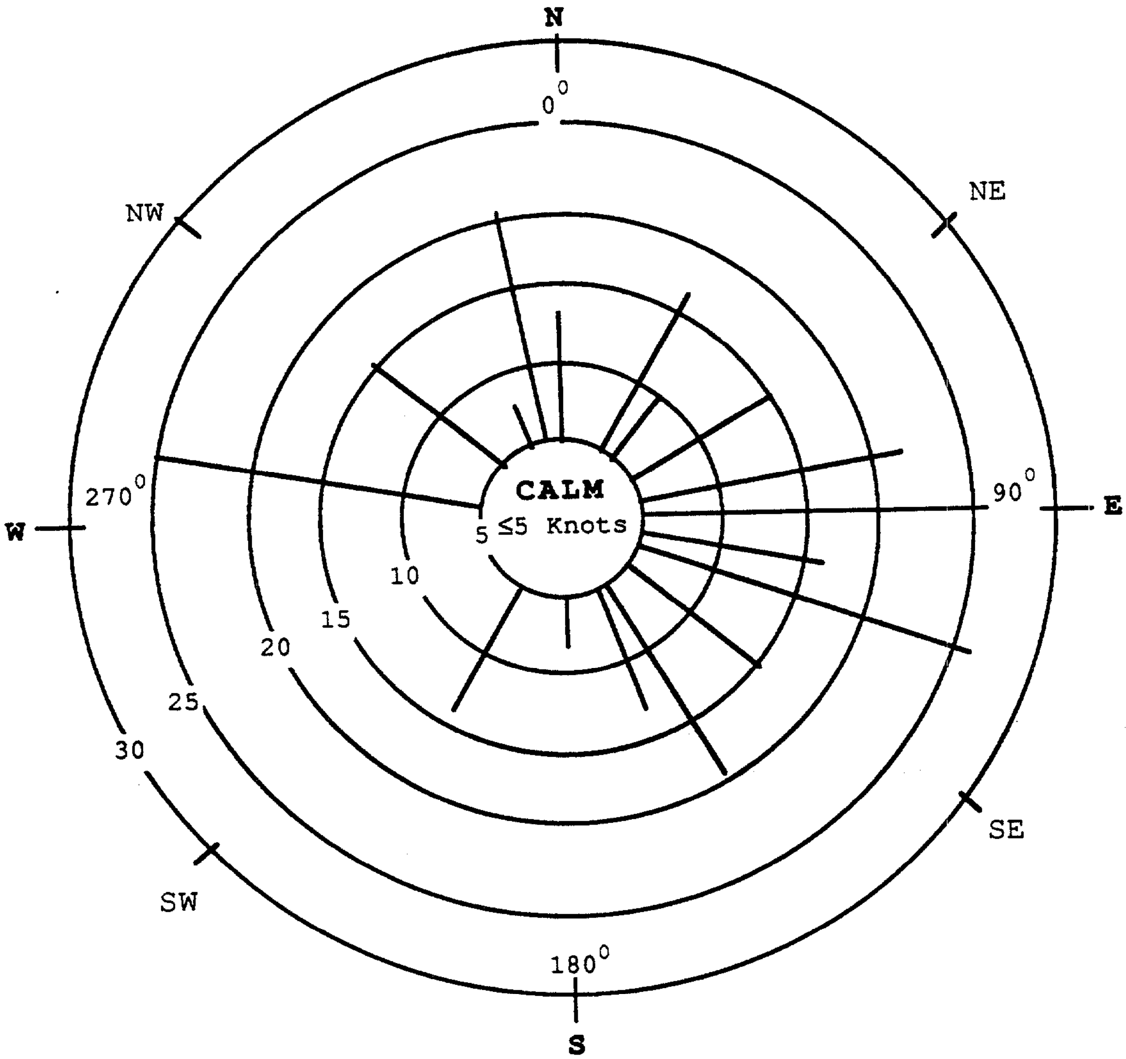
FREQUENCY OF WIND SPEED AND DIRECTION

KEY WEST, FLORIDA
MARCH 1990

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 10/09/90 | DRAWN BY: SPillai | LATE REV DATE: 10/10/90 | DRAWN BY: JReillyhyers | CHECKED BY: W Burnett 10/24/90 | APPROVED BY: SB 5/13/91 | INITIATOR: GStephens | PROJ. MGR: MHampton | DRAWING No.: XA100350 | PROJ. No.: 595392 | STORED: AGI-F:\FL...s\kwst | ARCHIVED: - - - -



Average Wind Speed = 16.6 knots

N	= 3.45%	S	= 3.45%
NNE	= 6.90%	WNW	= 6.90%
ENE	= 10.34%	NNW	= 10.35%
E	= 13.79%		
ESE	= 31.03%		
SSE	= 10.34%		
SSW	= 3.45%		

FIGURE 3-1d

FREQUENCY OF WIND SPEED AND DIRECTION

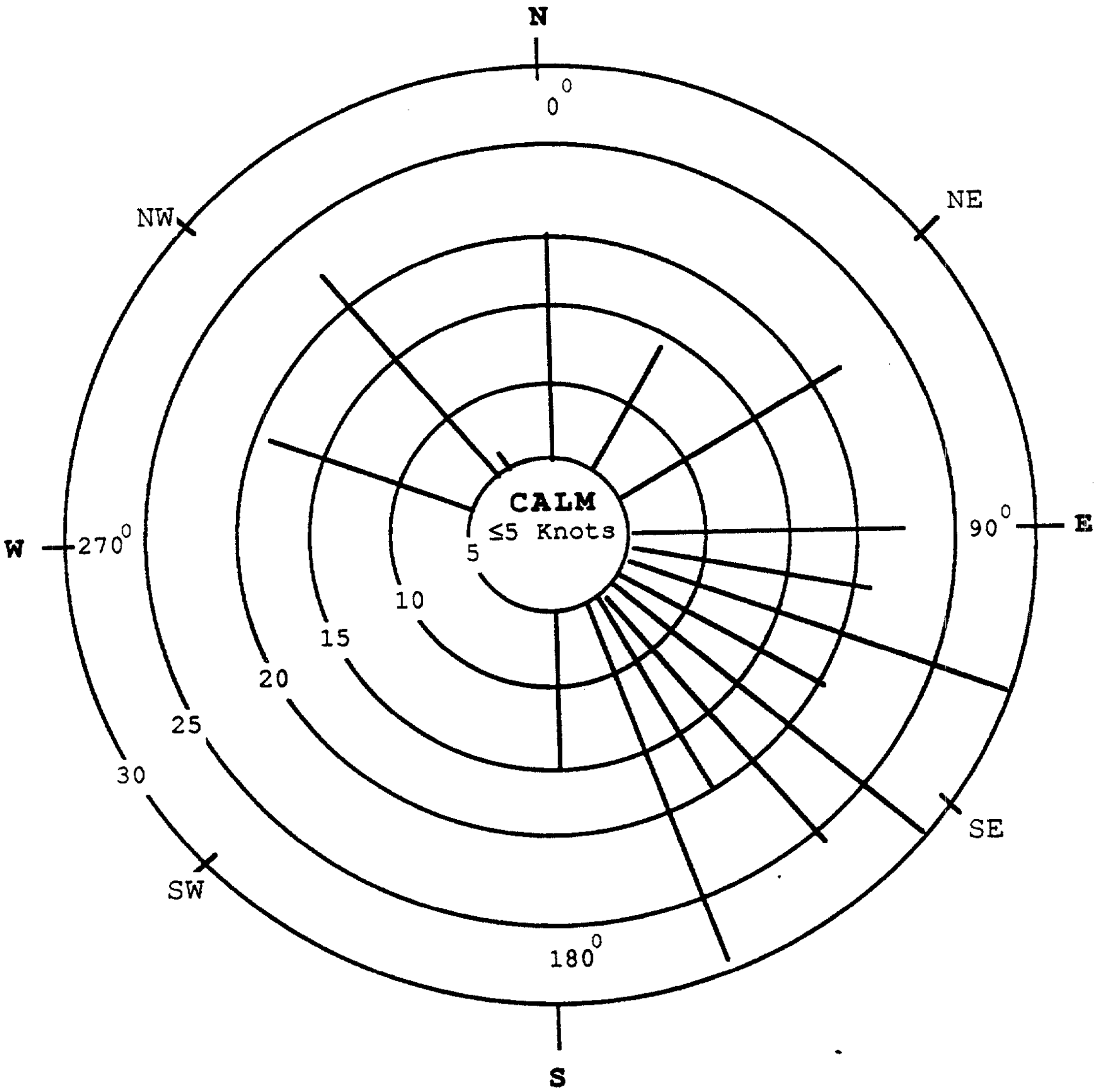
KEY WEST, FLORIDA
APRIL 1990

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

STORED: AGI-F:\FL\drwgs\kwst | ARCHIVED: - - - -
DRAWING No.: XA100351 | PROJ. No.: 595392
INITIATOR: GStephens | PROJ. MGR: MHampton
CHECKED BY: J Bassett 10/22/90 | APPROVED BY: SB 3/17/91
LATE REV DATE: 10/10/90 | DRAWN BY: JReillyhyers
START DATE: 10/09/90 | DRAWN BY: SPIlld

START D. 10/09/90 | DRAWN BY: SPillai
LATE REV DATE: 10/10/90 | DRAWN BY: JReillyhyers
CHECKED BY: W Barrett | APPROVED BY:
INITIATOR: GStephens | PROJ. MGR: MHampton
DRAWING No.: XA100352 | PROJ. No.: 595392
STORED: AGI-F:\FI...\kwst | ARCHIVED: - - -



Average Wind Speed = 18.77 knots

N	=	3.33%	WNW	=	3.33%
NNE	=	3.33%	NNW	=	6.67%
ENE	=	6.67%			
E	=	16.67%			
ESE	=	40.00%			
SSE	=	16.67%			
S	=	3.33%			

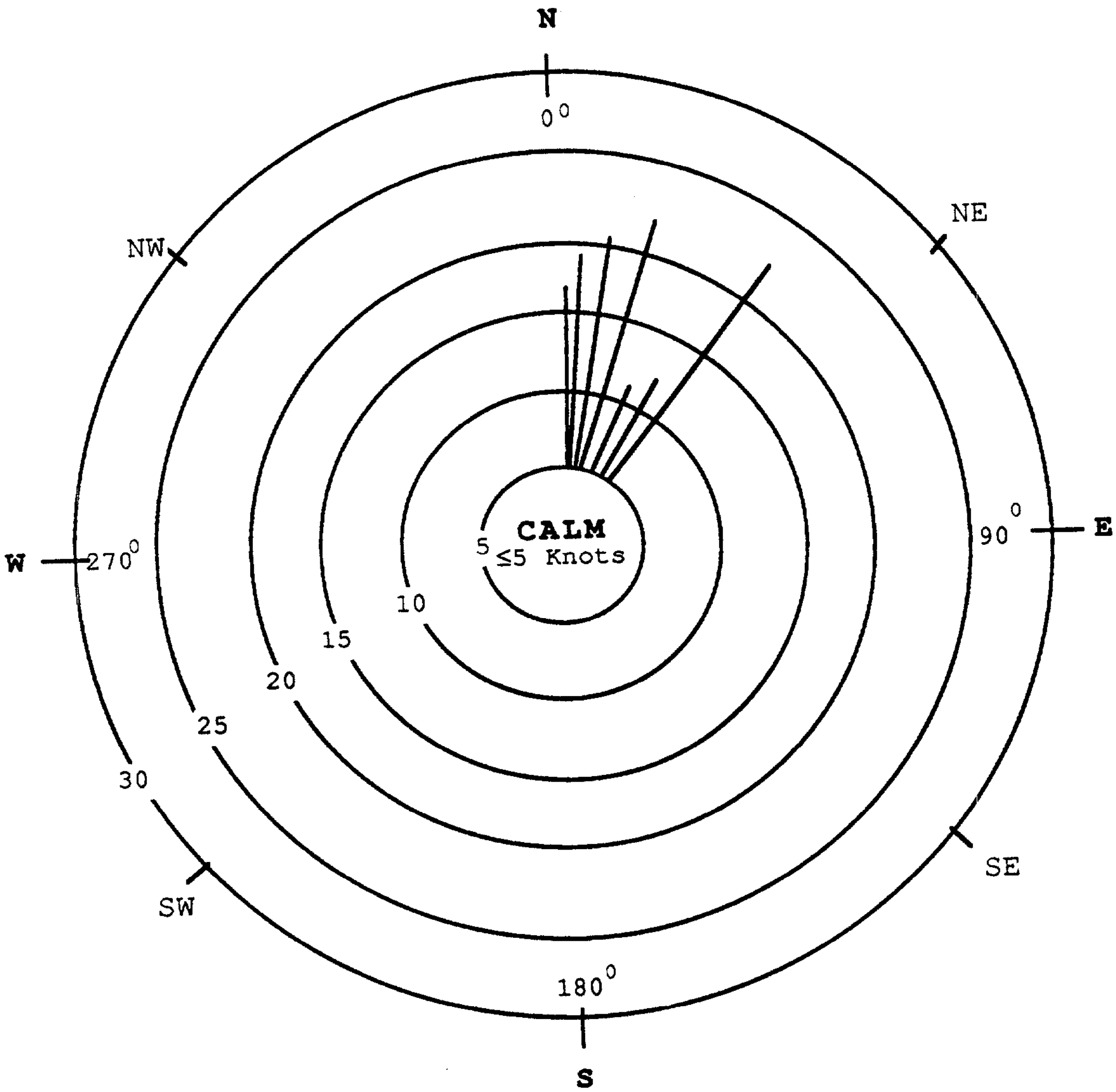
FIGURE 3-1e

FREQUENCY OF WIND SPEED AND DIRECTION

KEY WEST, FLORIDA
MAY 1990

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION



Average Wind Speed = 14.8 knots

— NNE = 100.00%

FIGURE 3–1f

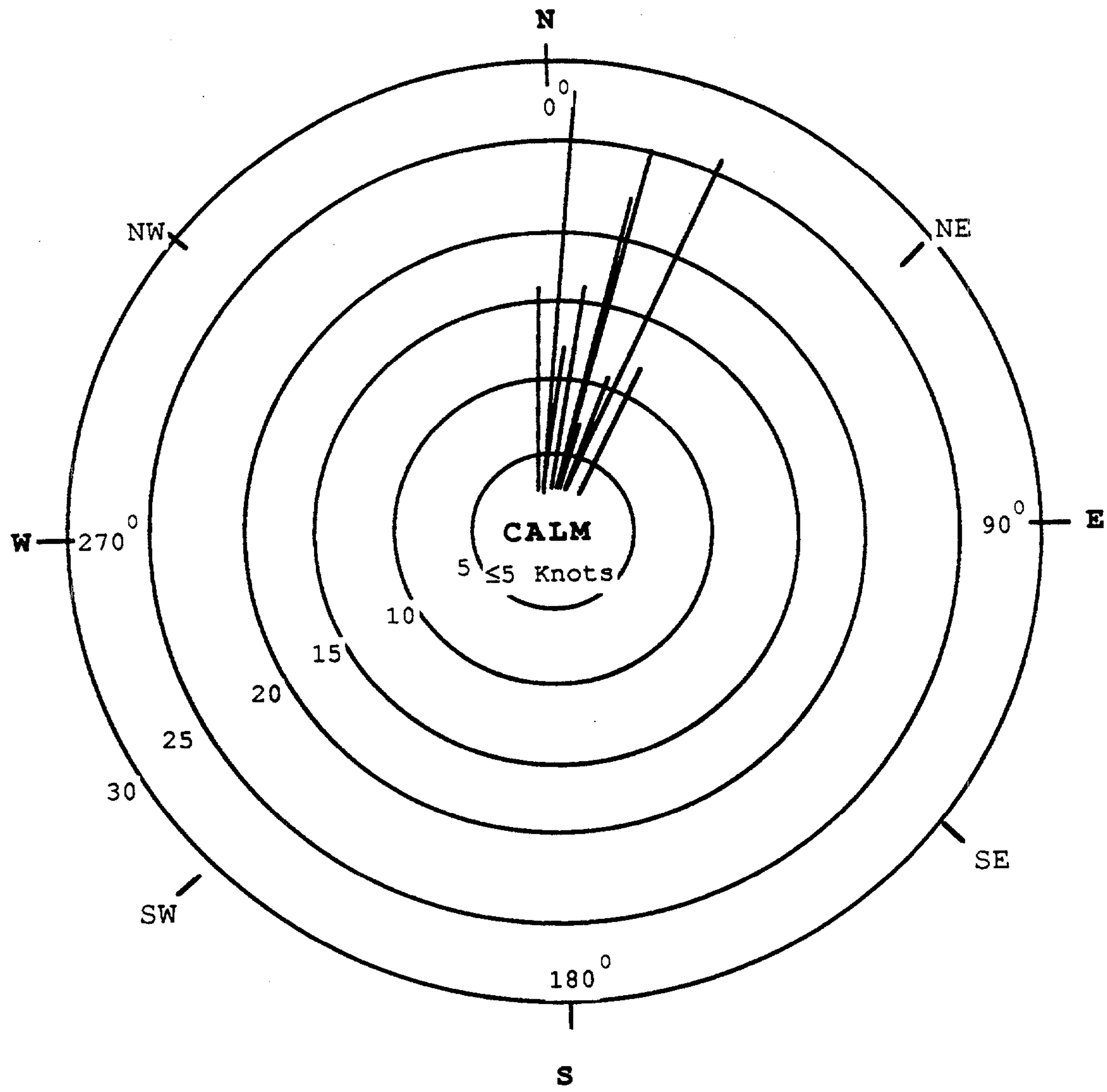
FREQUENCY OF WIND SPEED AND DIRECTION

KEY WEST, FLORIDA
JUNE 1990

NAS–KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DA. 10/09/90	LATE REV DATE: 10/10/90	CHECKED BY:	INITIATOR: GStephens	DRAWING No.: XA100353	STORED: AGI-F:\FL\kwst
DRAWN BY: SPillai	DRAWN BY: JReillyhyers	APPROVED BY: SS	PROJ. MGR: MHampton	PROJ. No.: 595392	ARCHIVED: - - -



Average Wind Speed = 16.97 knots

NNE = 100.00%

FIGURE 3-1g

FREQUENCY OF WIND SPEED AND DIRECTION

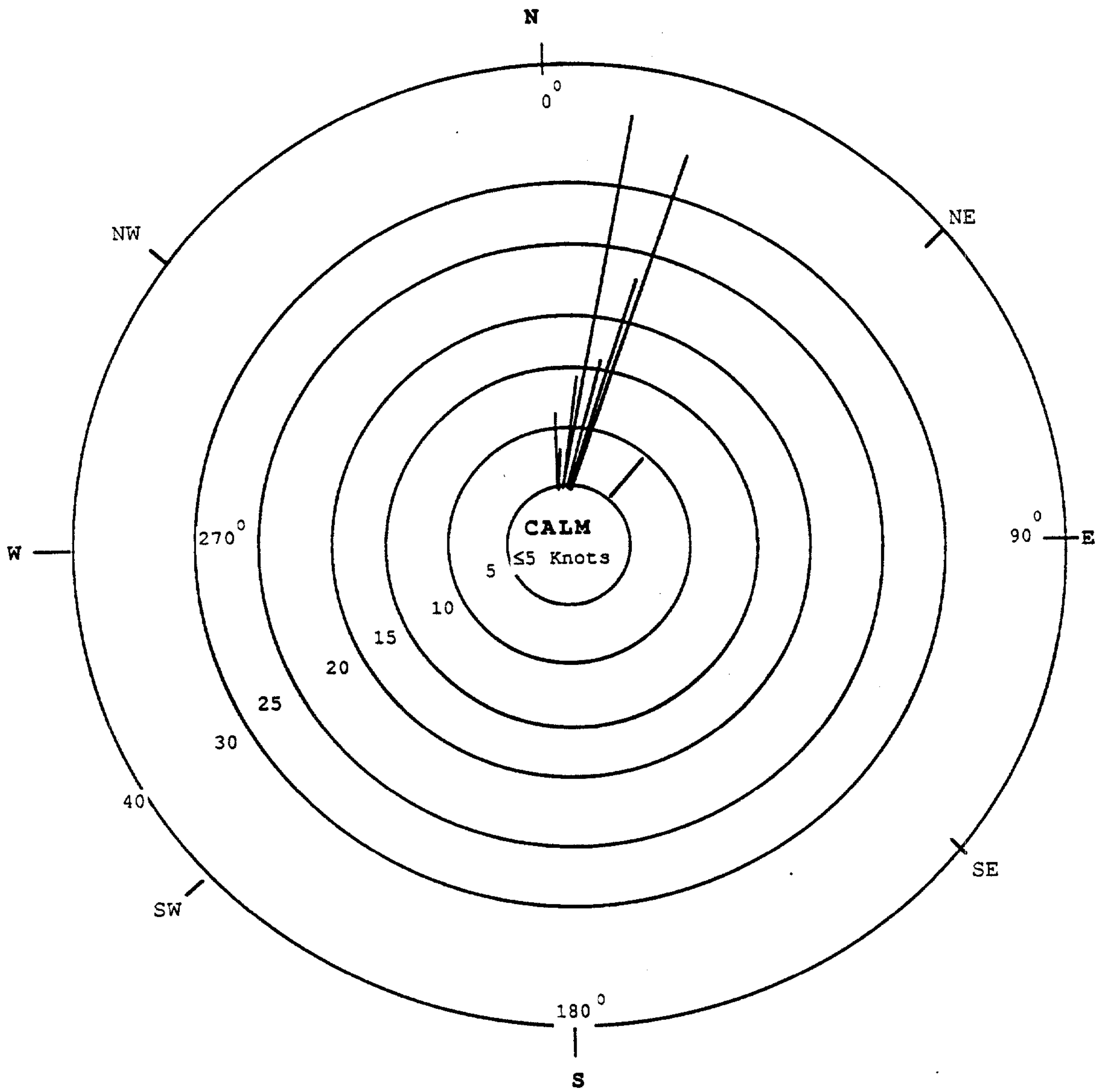
KEY WEST, FLORIDA
JULY

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START 10/09/90 | LATE REV DATE: 10/10/90 | CHECKED BY: W Barrett | INITIATOR: GStephens | DRAWING No.: XA100354 | STORED: AGI-F:
DRAWN BY: SPillai | DRAWN BY: JReillyhyers | APPROVED BY: SB 5/17/91 | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: - - - -

ygs\kwst



Average Wind Speed = 15.65 knots

NNE = 100.00%

FIGURE 3-1h

FREQUENCY OF WIND SPEED AND DIRECTION

KEY WEST, FLORIDA
AUGUST 1990

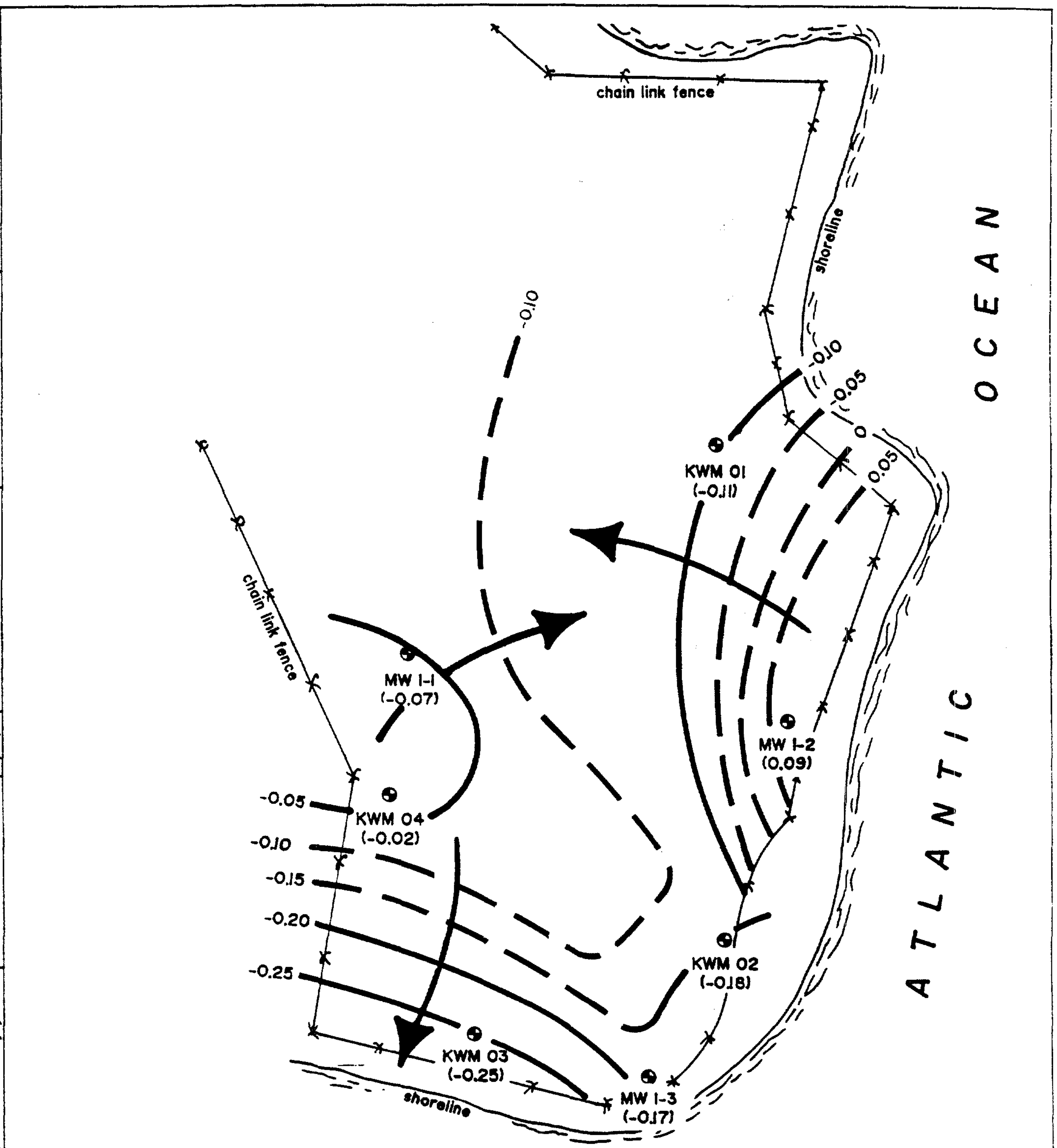
NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START L. 10/09/90 | LATE REV DATE: 10/10/90 | CHECKED BY: W Bauer | INITIATOR: GStephens | DRAWING No.: XA100355 | STORED: AGI-F:\F...s\kwst
DRAWN BY: SPillai | DRAWN BY: JReillyhyers | APPROVED BY: SB | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: - - - -

START DA. 9/10/90 | LATE REV DATE: 10/12/90 | CHECKED BY: W Brandt 10/24 | INITIATOR: GStephens | DRAWING No.: XA100319 | STORED: AGI-F:\FL s\kwst

DRAWN BY: F. Hilderbrandt | DRAWN BY: JReillyhyers | APPROVED BY: S B 5/17/91 | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
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Miami, Florida 33157

100 50 0 50 100

GRAPHIC SCALE

LEGEND:

KWM 04 (–0.02) GERAGHTY & MILLER MONITORING WELL w/GW ELEVATION NOTED

MW 1–2 (0.09) I T CORP MONITORING WELL w/GW ELEVATION NOTED

–0.20 GROUND WATER ELEVATION CONTOUR (dashed where inferred)

DIRECTION OF GROUND WATER FLOW

NOTE:
CONTOUR INTERVAL 0.05 FEET

FIGURE 3–2

GROUND WATER ELEVATION
CONTOUR MAP
TRUMAN ANNEX
REFUSE DISPOSAL AREA
SITE No 1

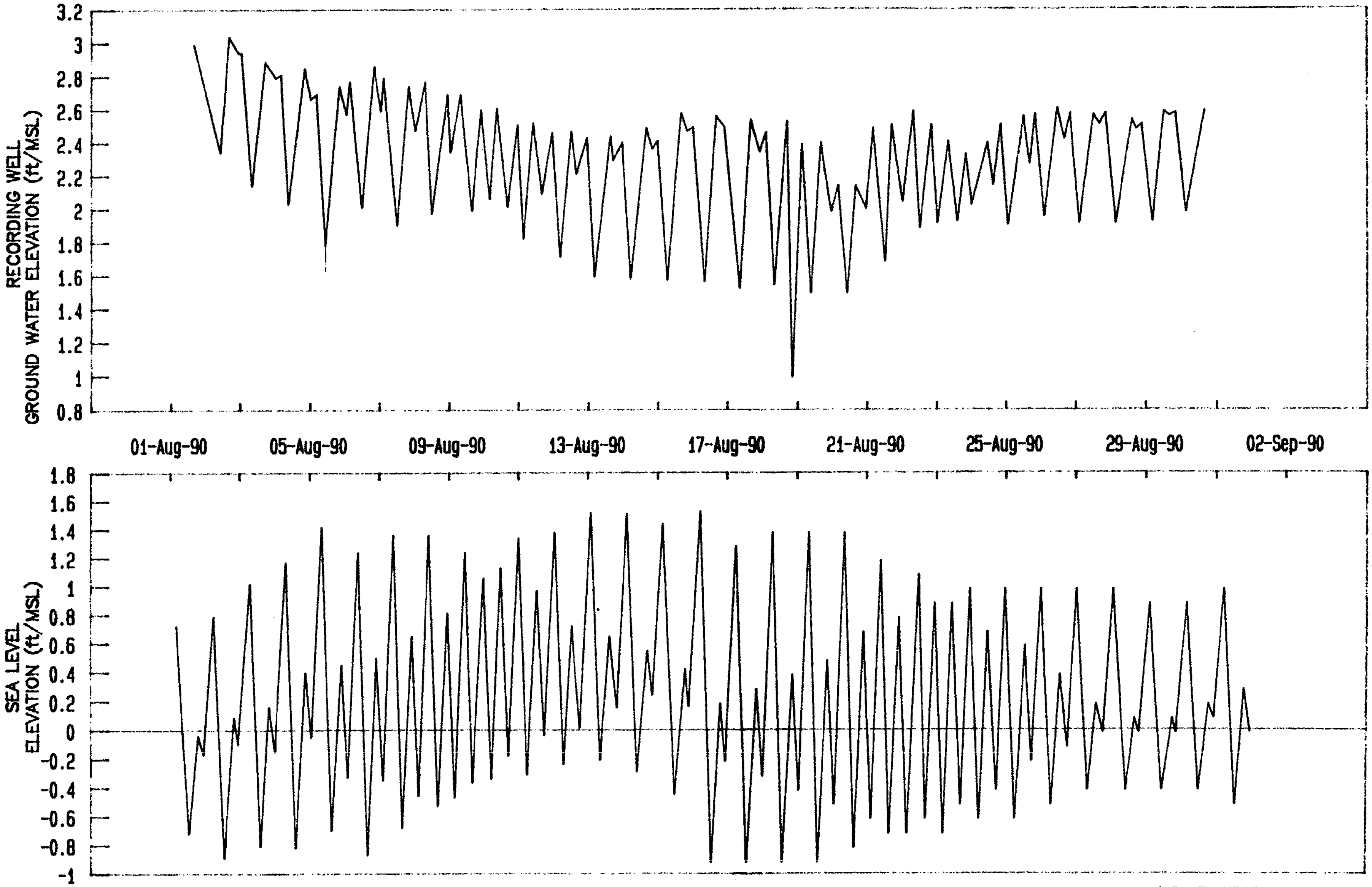
NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL
TECHNOLOGY
CORPORATION

FIGURE 3-3

CHANGES in GROUND WATER LEVELS in RELATION to SEA LEVEL FLUCTUATIONS

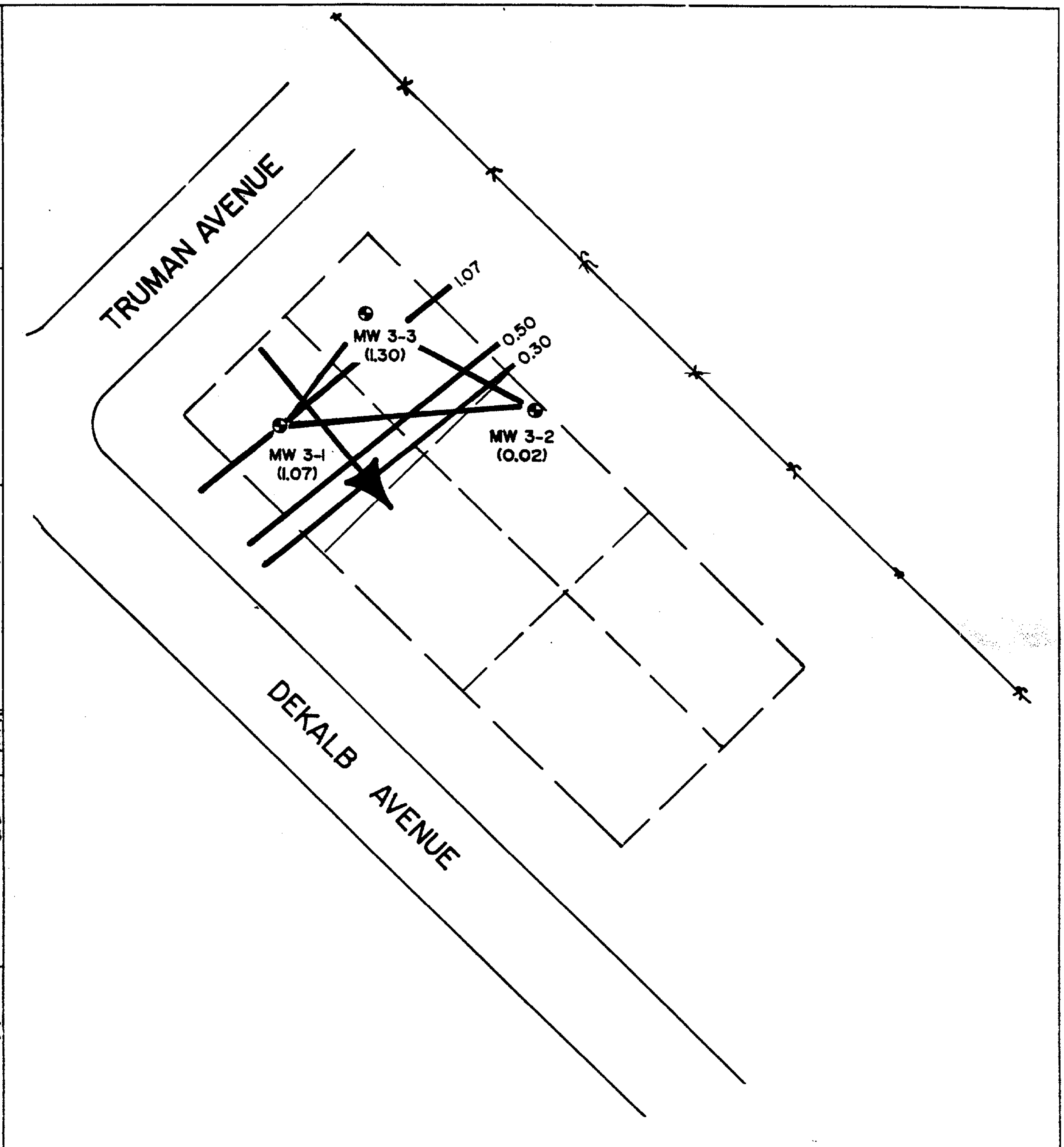
SITE 1 – TRUMAN ANNEX REFUSE DISPOSAL AREA



NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 10/9/90	LATE REV DATE:	CHECKED BY:	5/7/91	INITIATOR: WBarrett	DRAWING No.: FA200343	STORED: AGI-F:\FL\drwgs\kwst
DRAWN BY: JReillyhyan	DRAWN BY:	APPROVED BY:	5/7/91	PROJ. MGR: MHampton	PROJ. No.: 595392	ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
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Miami, Florida 33157

LEGEND:

MW 3-1 (1.07)	I T CORP MONITORING WELL w/GW ELEVATION NOTED
	CALCULATED GROUND WATER ELEVATION CONTOUR
	DIRECTION OF GROUND WATER FLOW

30 20 10 0 10 20 30

GRAPHIC SCALE

FIGURE 3-4

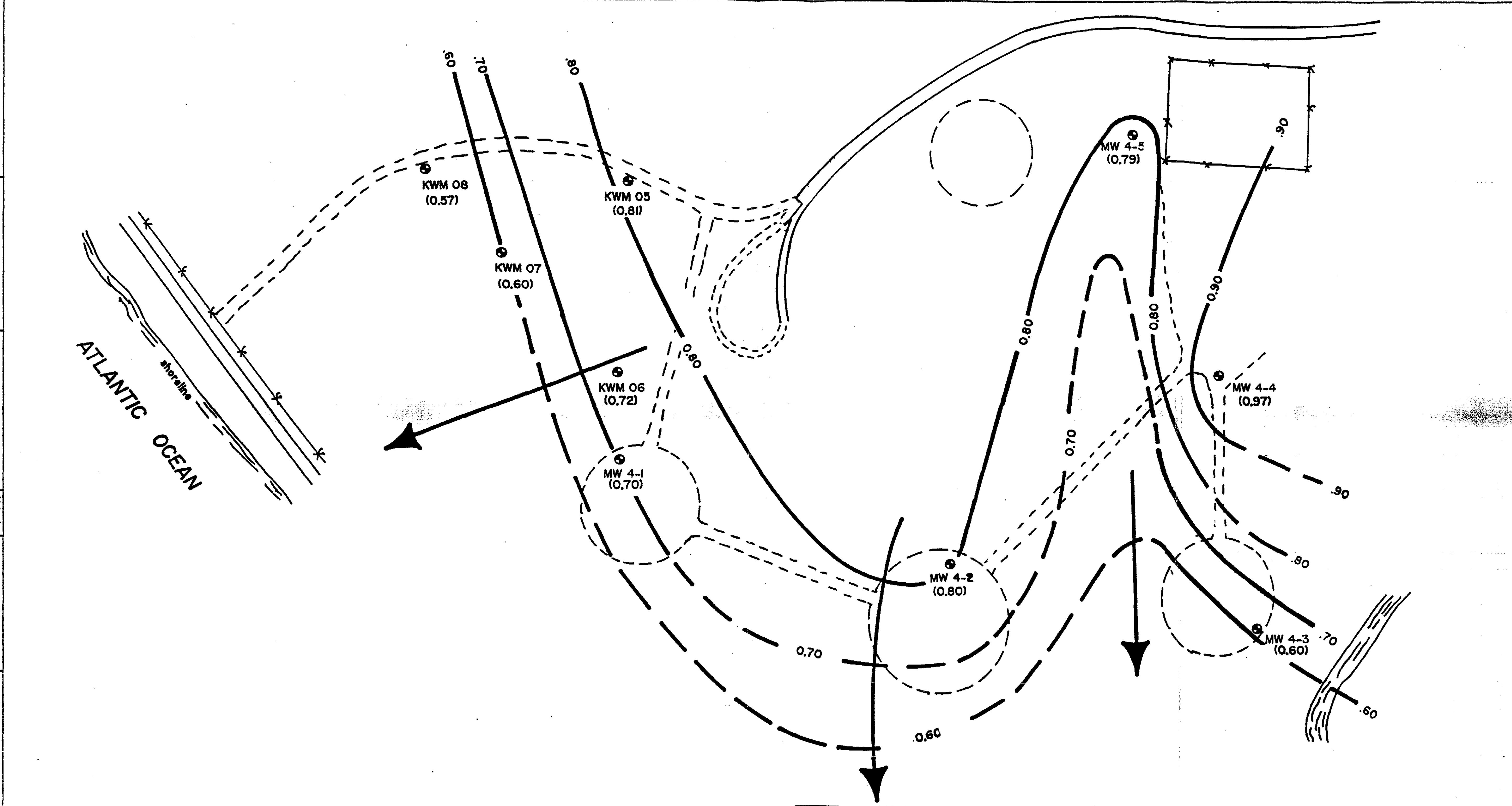
GROUND WATER ELEVATION CONTOUR MAP via 3 POINT PROBLEM
TRUMAN ANNEX—DDT MIXING AREA
SITE No 3

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 3/10/90 | LATE REV DATE: 10/12/90 | CHECKED BY: W Barrett 10/27/ | INITIATOR: GStephens | DRAWING No.: XA100322 | STORED: AGI-F:\FL\kwst

DRAWN BY: F. Hilderbrandt | DRAWN BY: JReillyhyers | APPROVED BY: SB 5/17/91 | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

LEGEND:

- KWM 08 (0.57) — GERAGHTY & MILLER MONITORING WELL w/GW ELEVATION NOTED
- MW 4-2 (0.80) — I T CORP MONITORING WELL w/GW ELEVATION NOTED
- 0.70 — GROUND WATER ELEVATION CONTOUR (dashed where inferred)
- DIRECTION OF GROUND WATER FLOW

200 100 0 100 200

GRAPHIC SCALE

NOTE:
CONTOUR INTERVAL 0.10 FEET

FIGURE 3–5

GROUND WATER ELEVATION CONTOUR MAP
BOCA CHICA
OPEN DISPOSAL AREA
SITE No 4

NAS-KEY WEST
KEY WEST, FLORIDA

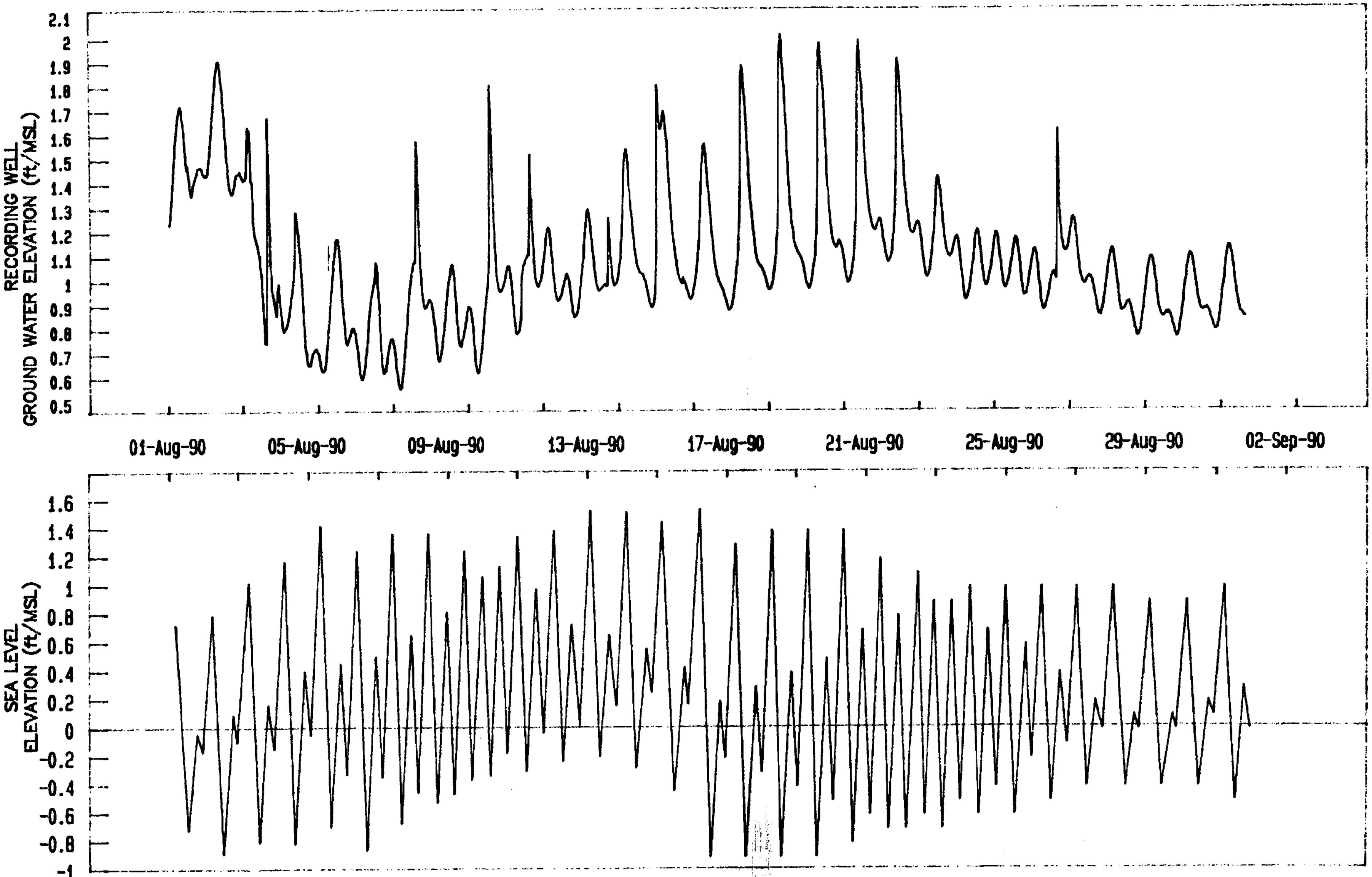
INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 9/10/90	LATE REV DATE: 10/13/90	CHECKED BY: w Burk 10/24/90	INITIATOR: GStephens	DRAWING No.: XB200325	STORED: AGI-F:\FL\drwgs\kwst	
DRAWN BY: F. Hilderbrandt	DRAWN BY: JReillyhyers	APPROVED BY: JB 5/1/91	PROJ. MGR: MHampton	PROJ. No.: 595392	ARCHIVED: - - - -	

FIGURE 3-6

CHANGES in GROUND WATER LEVELS in RELATION to SEA LEVEL FLUCTUATIONS

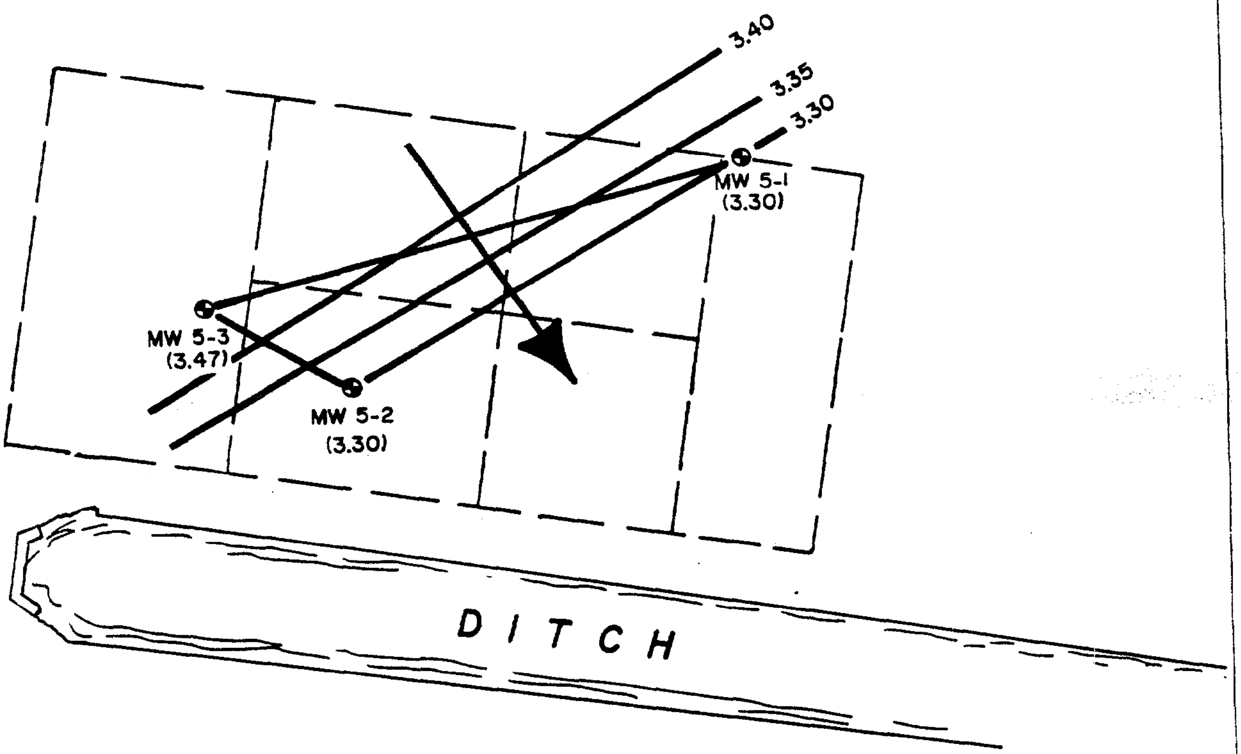
SITE 4 – BOCA CHICA OPEN DISPOSAL AREA



NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 9/10/90
DRAWN BY: F. Hilderbrandt
LATE REV DATE: 10/12/90
DRAWN BY: JReillyhyers
CHECKED BY: WBauer 10/22
APPROVED BY: JB 3/12/91
INITIATOR: GStephens
PROJ. MGR: MHampton
DRAWING No.: XA100320
PROJ. No.: 595392
STORED: AGI-F:\F...\kwst
ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

LEGEND:

MW 5–1 (3.30) — I T CORP MONITORING WELL w/GW ELEVATION NOTED

CALCULATED GROUND WATER ELEVATION CONTOUR

DIRECTION OF GROUND WATER FLOW

30 20 10 0 10 20 30

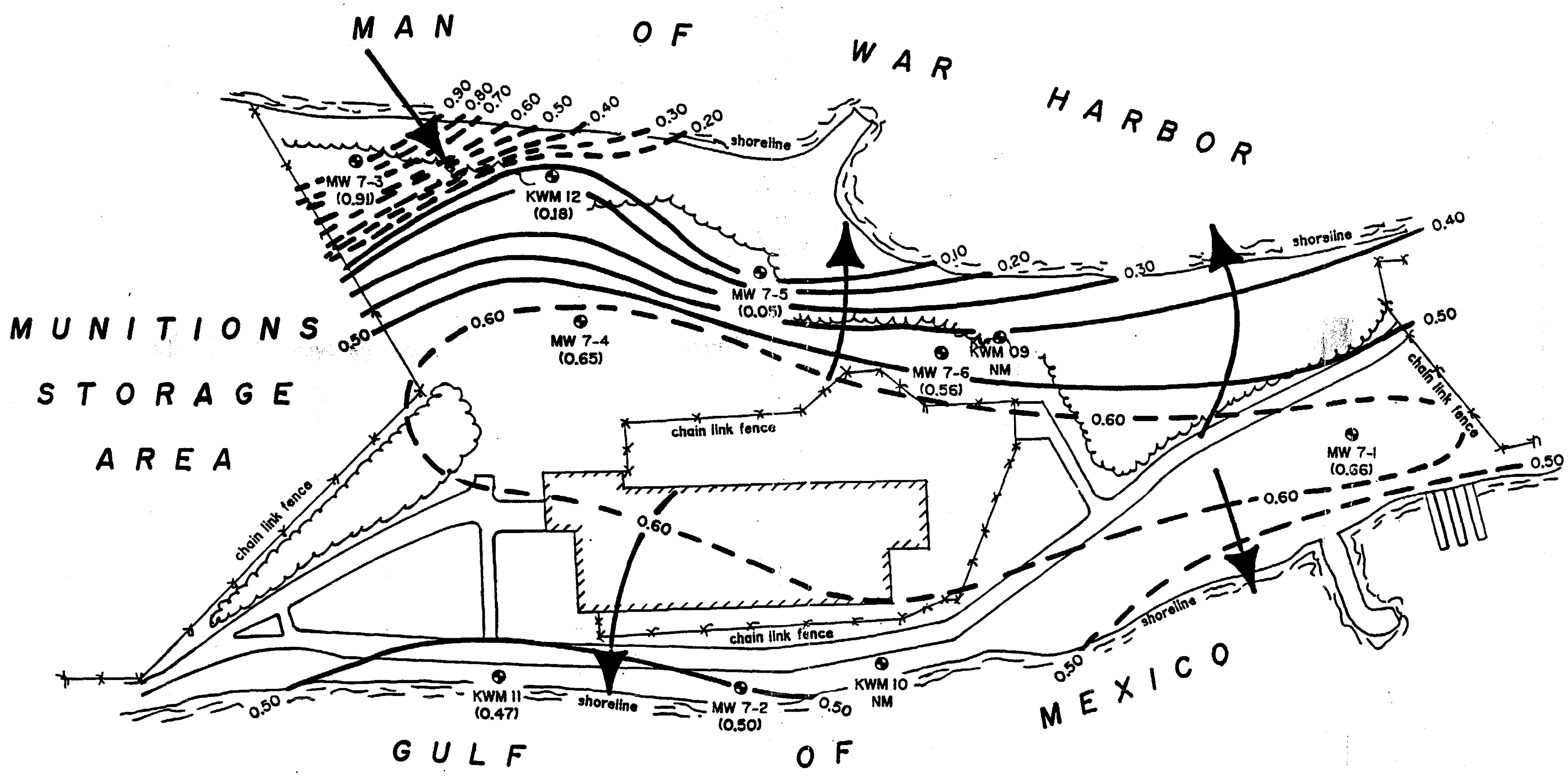
GRAPHIC SCALE

FIGURE 3–7

GROUND WATER ELEVATION CONTOUR MAP via 3 POINT PROBLEM
BOCA CHICA–DDT MIXING AREA
SITE No 5

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION



START DATE: 9/10/90	LATE REV DATE: 10/13/90	CHECKED BY:	INITIATOR: GStephens	DRAWING No.: XB200326	STORED: AGI-F:\FL\drwgs\kwest
DRAWN BY: F. Hilderbrandt	DRAWN BY: JReillyhyers	APPROVED BY:	PROJ. MGR: MHampton	PROJ. No.: 595392	ARCHIVED: - - - -

SOURCE: FREDERICK H. HILDERBRANDT, INC.
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Miami, Florida 33157

LEGEND:

KWM 12 (0.18) GERAGHTY & MILLER MONITORING WELL w/GW ELEVATION NOTED

MW 7-2 (0.50) I T CORP MONITORING WELL w/GW ELEVATION NOTED

0.60 GROUND WATER ELEVATION CONTOUR (dashed where inferred)

DIRECTION OF GROUND WATER FLOW

NM NOT MEASURED

200 100 0 100 200

GRAPHIC SCALE

NOTE:
CONTOUR INTERVAL 0.10 FEET

FIGURE 3-8

GROUND WATER ELEVATION
CONTOUR MAP
FLEMING KEY
NORTH LANDFILL
SITE No 7

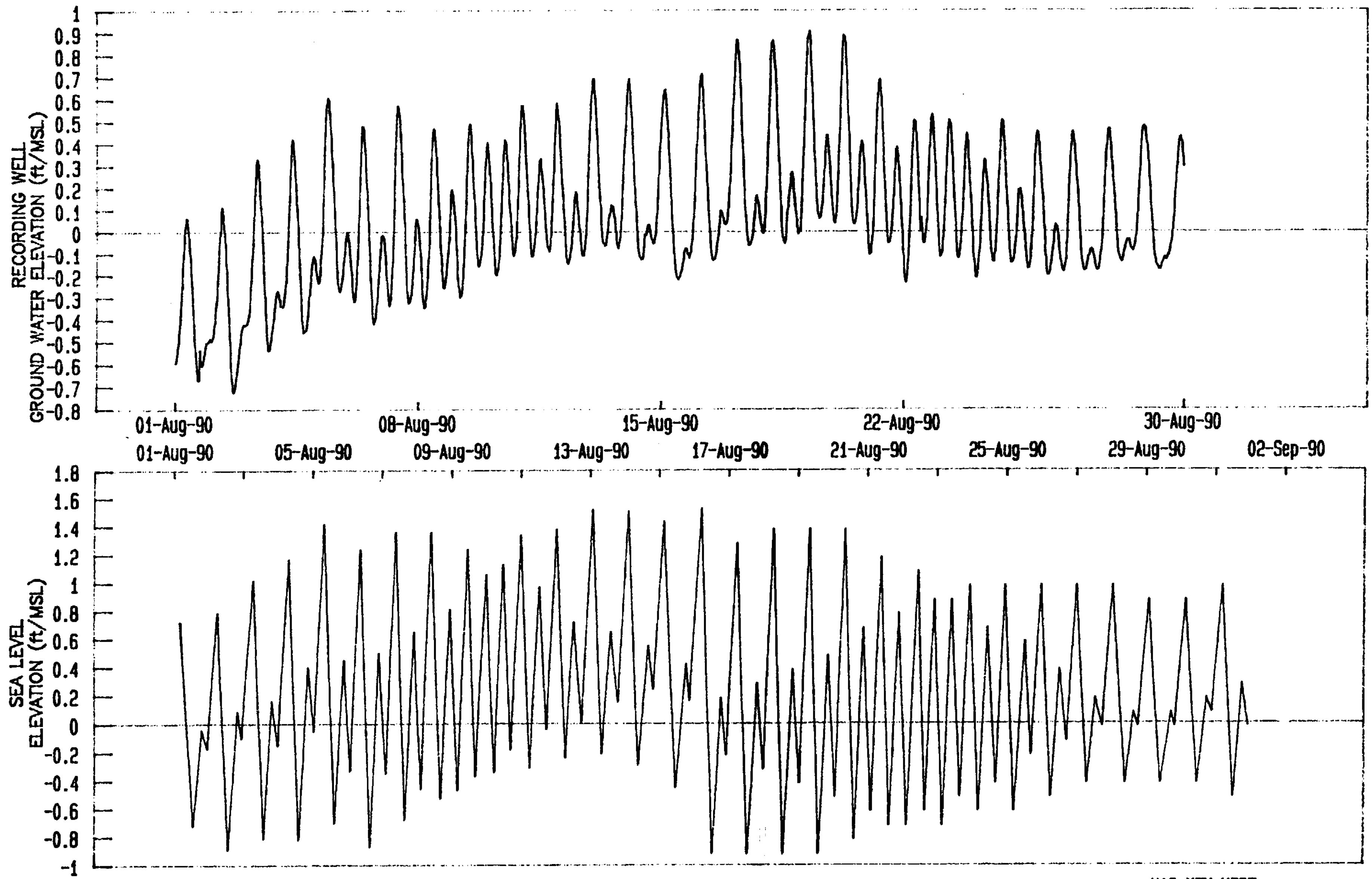
NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 3-9

CHANGES in GROUND WATER LEVELS in RELATION to SEA LEVEL FLUCTUATIONS

SITE 7 – FLEMING KEY/NORTH LANDFILL



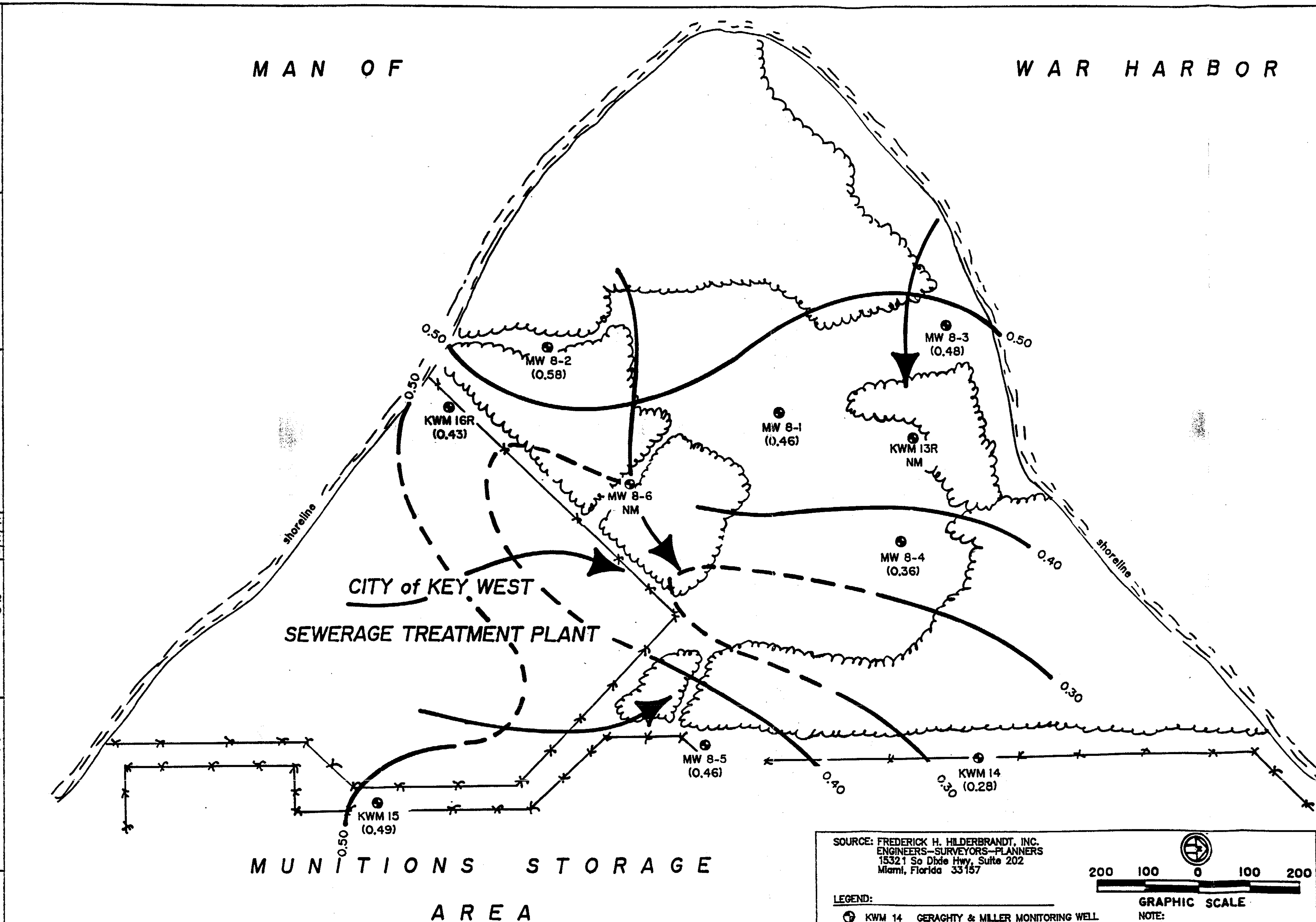
NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 10/9/90 DRAWN BY: JReillyhyers LATE REV DATE: DRAWN BY: CHECKED BY: APPROVED BY: INITIATOR: WBarrett PROJ. MGR: MHampton DRAWING No.: FA200345 PROJ. No.: 595392 STORED: AGI-F:\FL\drwgs\test ARCHIVED:

START DATE: 9/10/90 | LATE REV DATE: 10/13/90 | CHECKED BY: | INITIATOR: GStephens | DRAWING No.: XB200324 | STORED: AGI-F:\FL\drwgs\kwst

DRAWN BY: F. Hilderbrandt | DRAWN BY: JReillyhyers | APPROVED BY: | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS-SURVEYORS-PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

GRAPHIC SCALE: 200 100 0 100 200

NOTE: CONTOUR INTERVAL 0.10 FEET

LEGEND:

- KWM 14 (0.28) — GERAGHTY & MILLER MONITORING WELL w/ GW ELEVATION NOTED
- MW 8-2 (0.58) — I T CORP MONITORING WELL w/GW ELEVATION NOTED
- KWM 16R — REPLACEMENT MONITORING WELL
- 0.90 — GROUND WATER ELEVATION CONTOUR (dashed where inferred)
- DIRECTION OF GROUND WATER FLOW
- NM — NOT MEASURED

FIGURE 3-10

GROUND WATER ELEVATION CONTOUR MAP
FLEMING KEY
SOUTH LANDFILL
SITE No 8

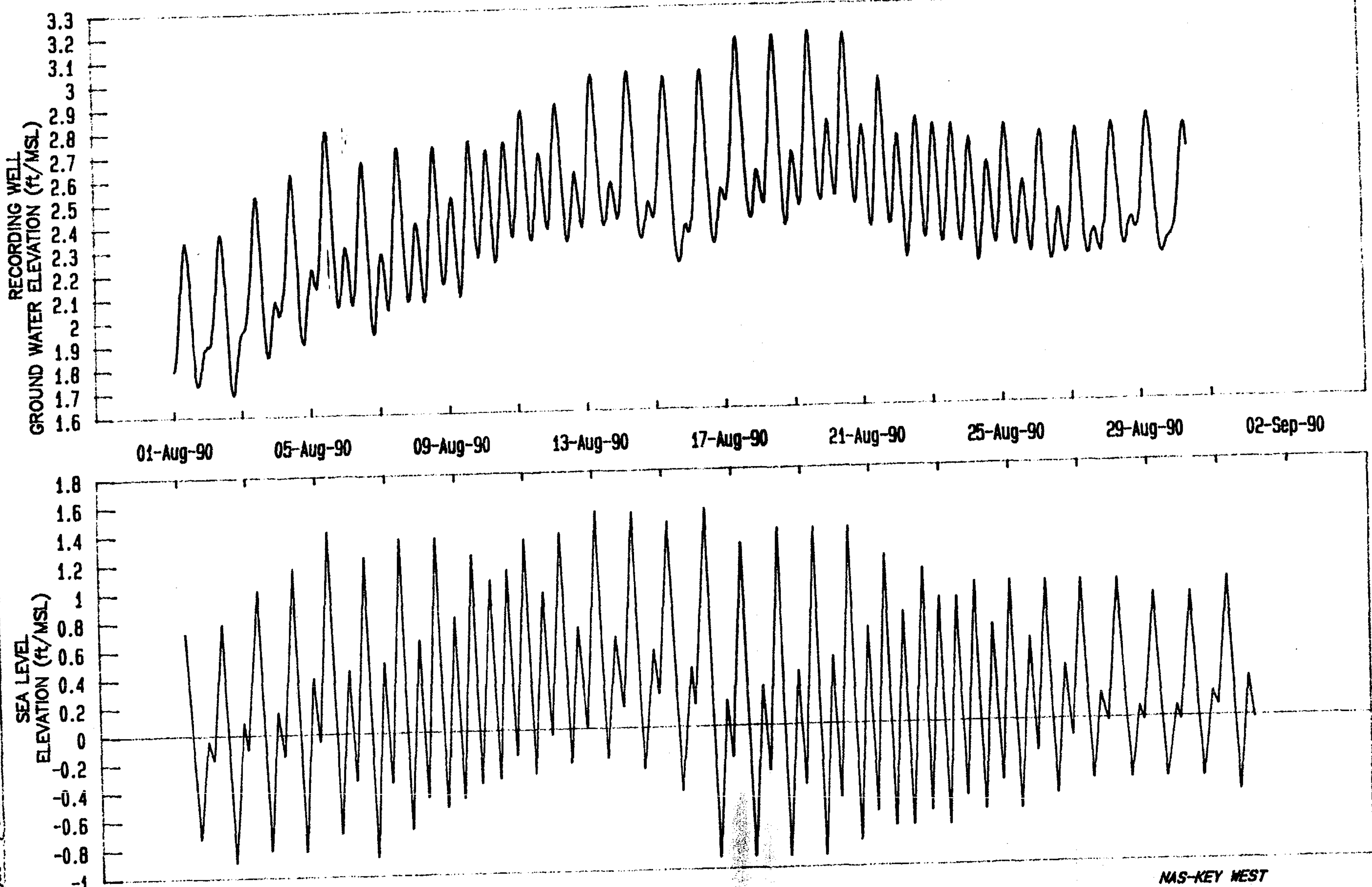
NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 3-11

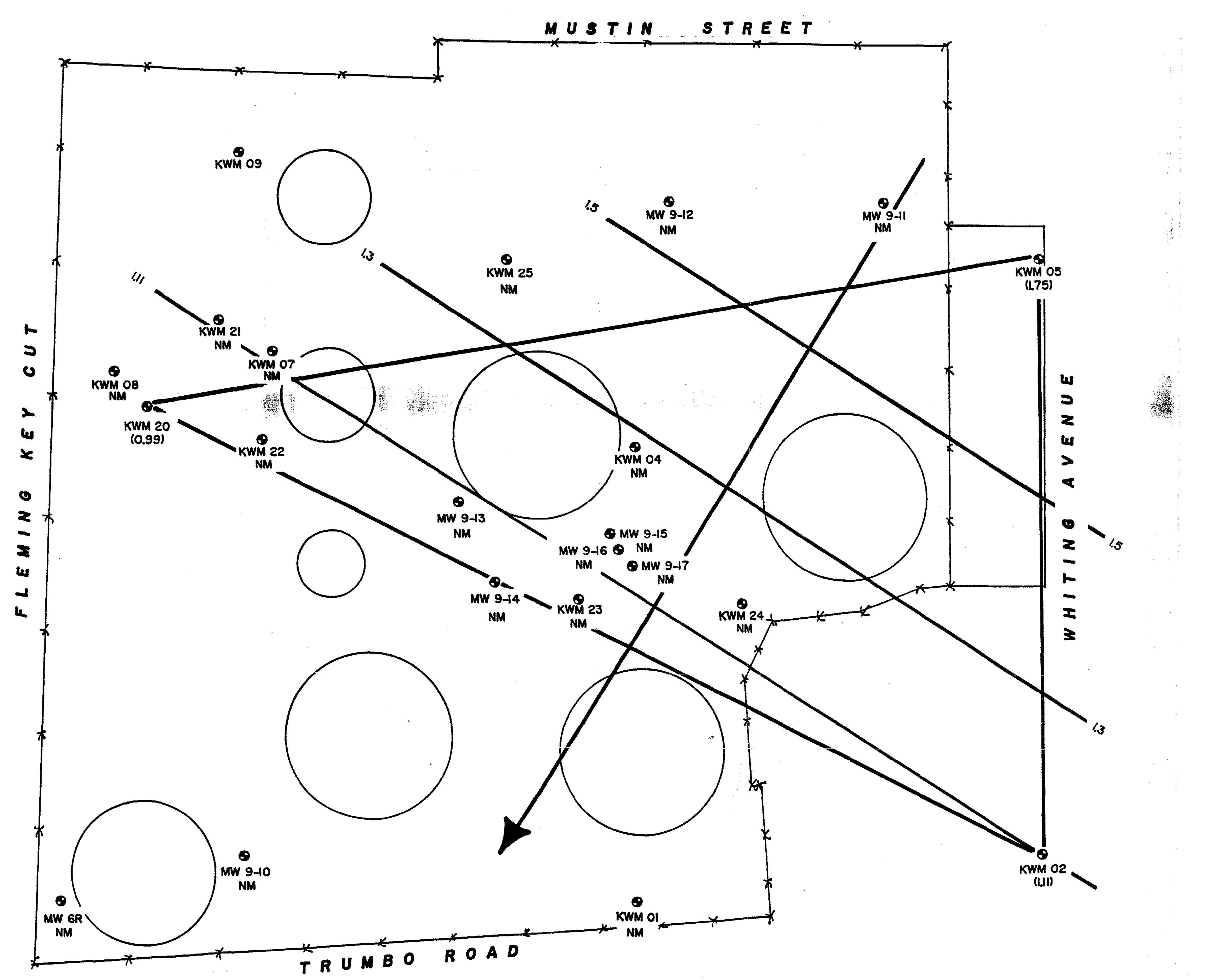
CHANGES in GROUND WATER LEVELS in RELATION to SEA LEVEL FLUCTUATIONS

SITE 8 – FLEMING KEY/SOUTH LANDFILL



NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION



START DATE: 9/10/90	LATE REV DATE: 10/13/90	CHECKED BY: W Barrett 10/26/90	INITIATOR: GStephens	DRAWING No.: XB200328	STORED: AGI-F:\FL\drwgs\kwst
DRAWN BY: F. Hilderbrandt	DRAWN BY: JReillyhyers	APPROVED BY: S B 5/11/91	PROJ. MGR: MHampton	PROJ. No.: 595392	ARCHIVED: - - - -

SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

LEGEND:

- KWM 20 (0.99) — GERAGHTY & MILLER MONITORING WELL w/GW ELEVATION NOTED
- MW 9-10 — I T CORP MONITORING WELL
- MW 6R — REPLACEMENT MONITORING WELL
- 1.20 — CALCULATED GROUND WATER ELEVATION CONTOUR
- DIRECTION OF GROUND WATER FLOW
- NM — NOT MEASURED

50 0 50 100

GRAPHIC SCALE

FIGURE 3-12

GROUND WATER ELEVATION CONTOUR MAP via 3 POINT PROBLEM
TRUMBO POINT ANNEX FUEL FARM
SITE No 9

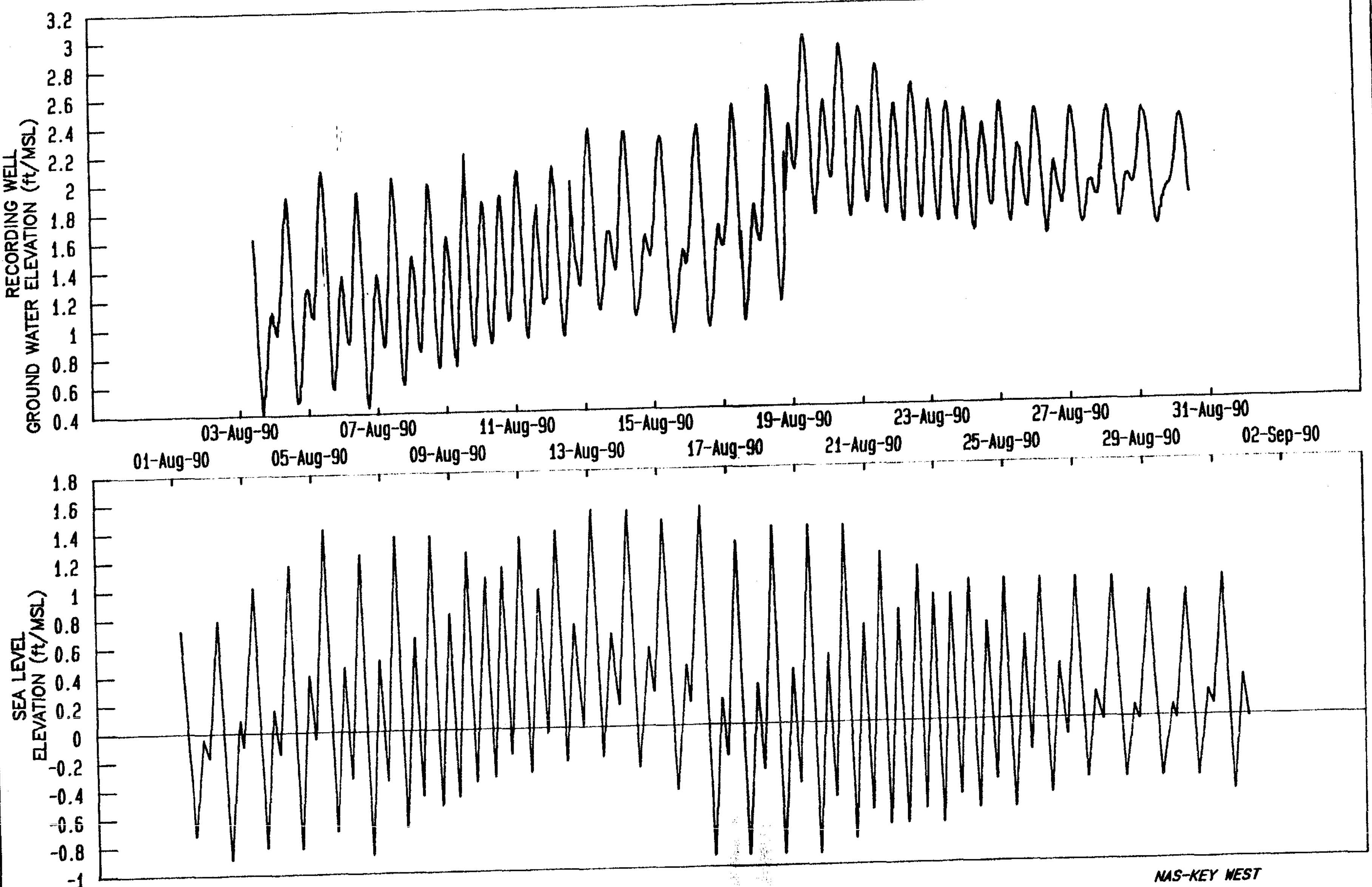
NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

FIGURE 3-13

CHANGES in GROUND WATER LEVELS in RELATION to SEA LEVEL FLUCTUATIONS

SITE 9 - TRUMAN POINT ANNEX/FUEL FARM



NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

STORED: AGI-F:\FL\drngs\kwnt | ARCHIVED: - - - -
DRAWING No.: FA200347 | PROJ. No.: 595392
INITIATOR: WBarrett | PROJ. MGR: MHampton
CHECKED BY: MB 5/1/91 | APPROVED BY: SR 5/17/91
LATE REV DATE: | DRAWN BY:
START DATE: 10/9/90 | DRAWN BY: JReilly/ware

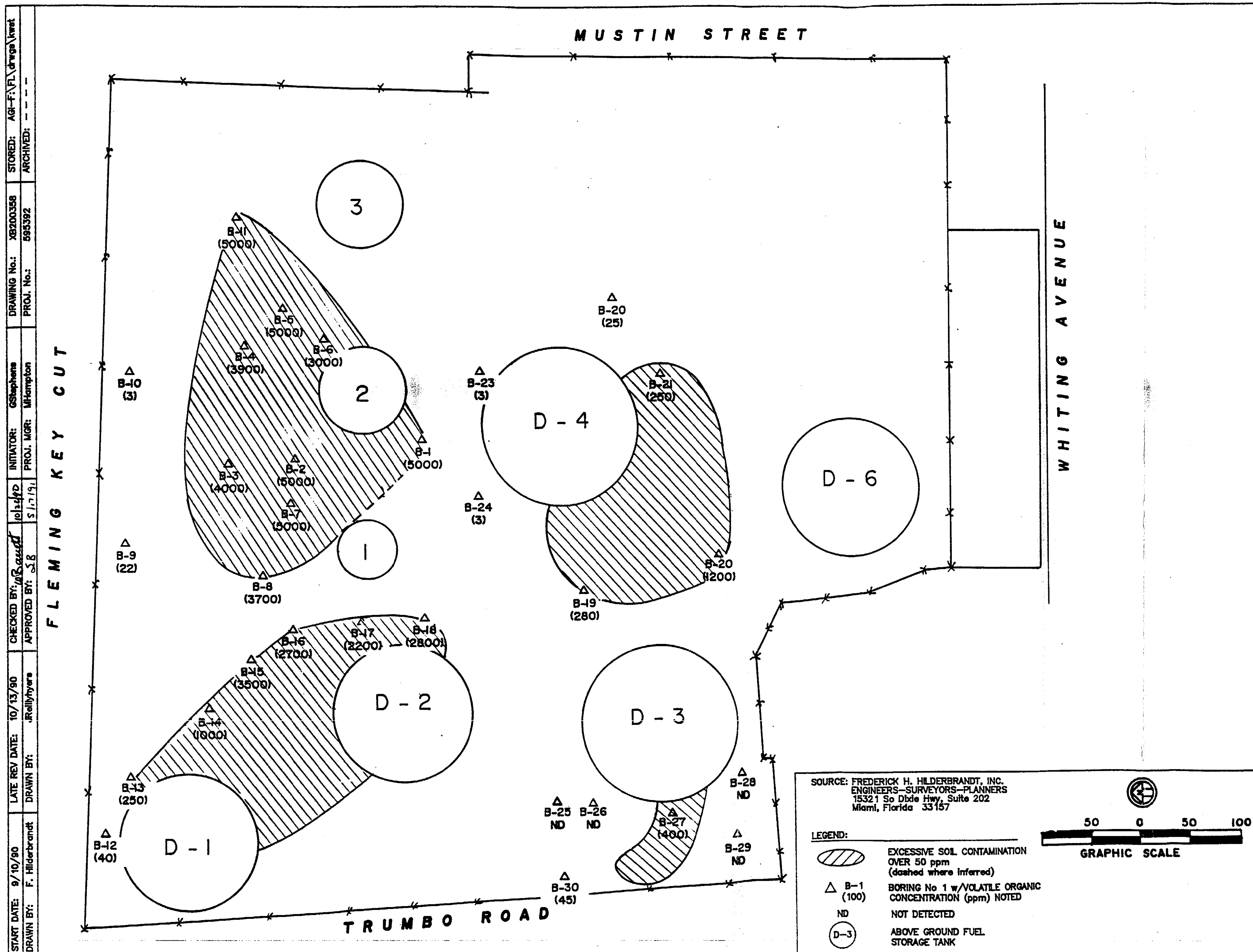


FIGURE 3–14

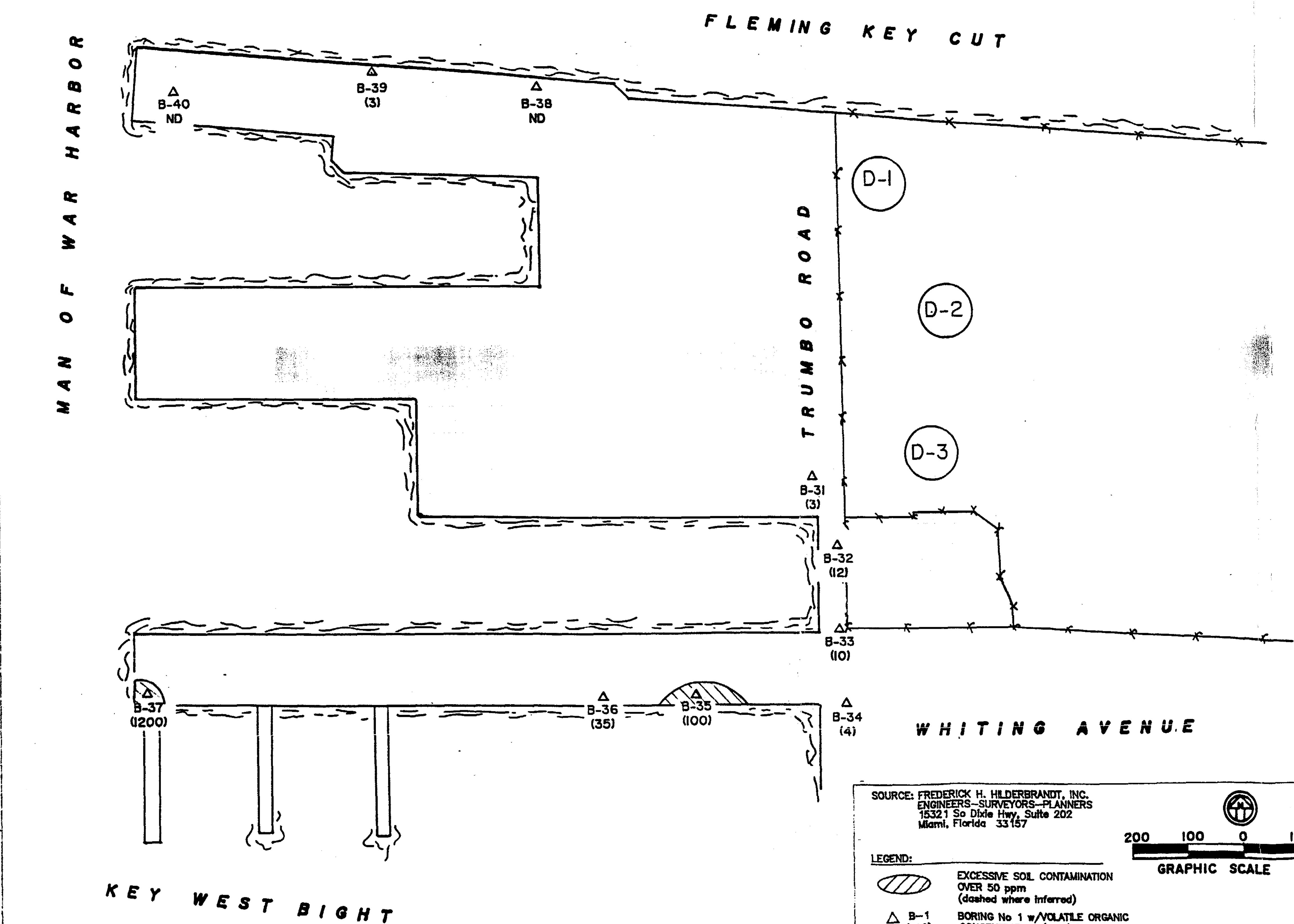
LOCATION OF EXCESSIVE CONTAMINATED SOIL
TRUMBO POINT ANNEX
FUEL FARM
SITE No 9

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 9/10/90 | LATE REV DATE: 10/13/90 | CHECKED BY: | INITIATOR: GStephens | DRAWING No.: XB200357 | STORED: AGI-F:\FL\drwgs\kwst

DRAWN BY: F. Hilderbrandt | DRAWN BY: JReilly/byers | APPROVED BY: | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
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Miami, Florida 33157

200 100 0 100 200
GRAPHIC SCALE

LEGEND:

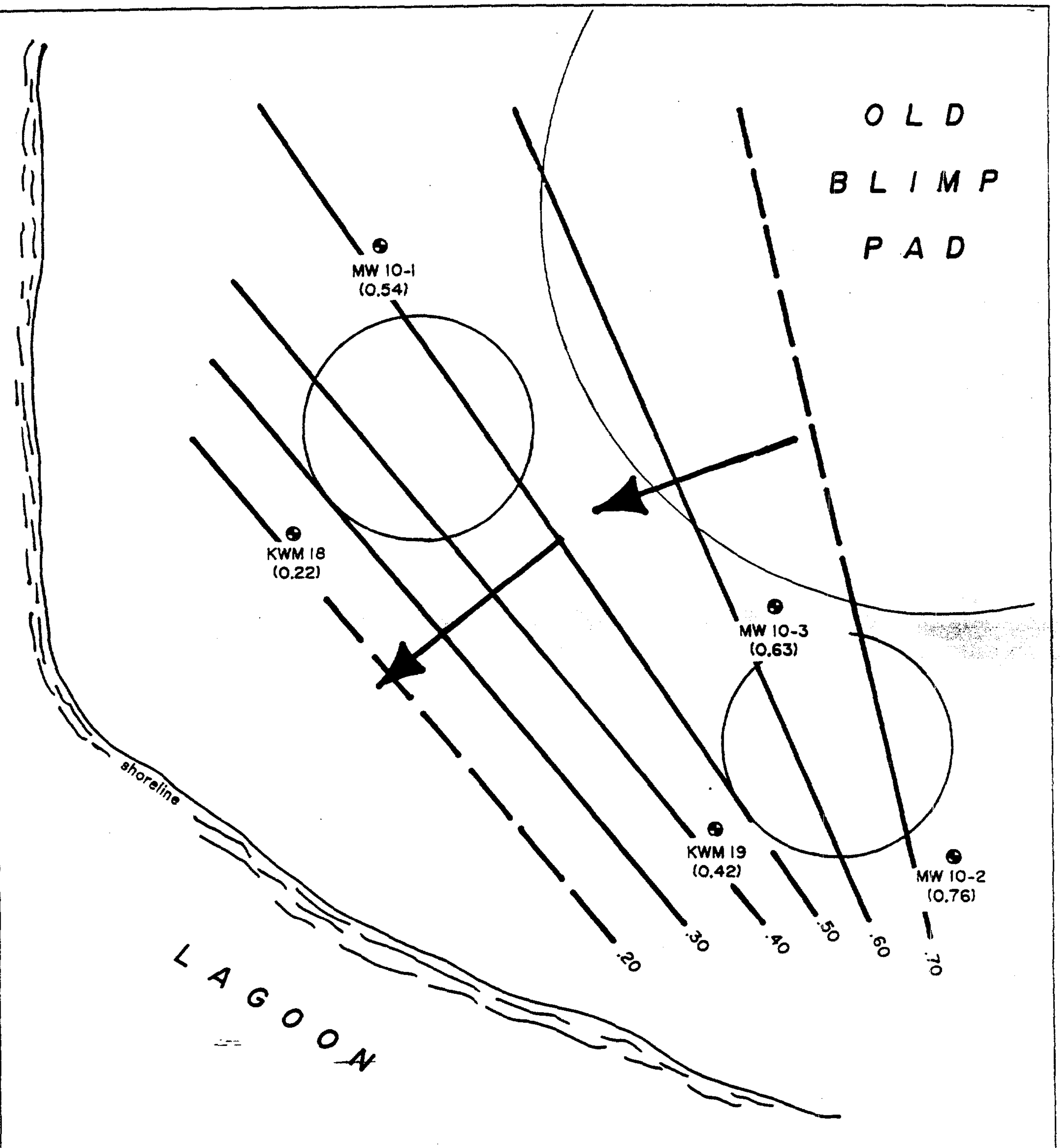
- EXCESSIVE SOIL CONTAMINATION OVER 50 ppm (dashed where inferred)
- △ B-1 (100) BORING No 1 w/VOLATILE ORGANIC CONCENTRATION (ppm) NOTED
- ND NOT DETECTED
- D-3 ABOVE GROUND FUEL STORAGE TANK

FIGURE 3–15

LOCATION OF EXCESSIVE CONTAMINATED SOIL
TRUMBO POINT ANNEX
PIERS
SITE No 9

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
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Miami, Florida 33157

60 40 20 0 20 40 60
GRAPHIC SCALE

LEGEND:

KWM 18 (0.22) GERAGHTY & MILLER MONITORING WELL w/GW ELEVATION NOTED

MW 10–1 (0.59) I T CORP MONITORING WELL w/GW ELEVATION NOTED

GROUND WATER ELEVATION CONTOUR (dashed where inferred)

DIRECTION OF GROUND WATER FLOW

NOTE:
CONTOUR INTERVAL 0.05 FEET

FIGURE 3–16

GROUND WATER ELEVATION
CONTOUR MAP
BOCA CHICA, FIRE
FIGHTING TRAINING AREA
SITE No 10

NAS-KEY WEST
KEY WEST, FLORIDA

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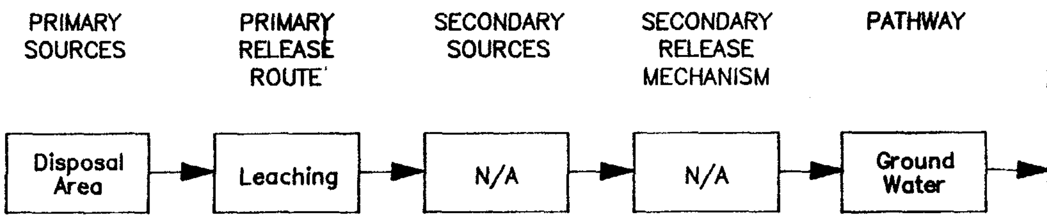
CORPORATION

START DATE: 9/10/90 | LATE REV DATE: 10/12/90 | CHECKED BY: W Barrett 10/22/90 | INITIATOR: GStephens | DRAWING No.: XA100321 | STORED: AGI–F:\FL\...\kwst

DRAWN BY: F. Hilderbrandt | DRAWN BY: JReilly/myers | APPROVED BY: 5/1/91 | PROJ. MGR: MHampton | PROJ. No.: 595392 | ARCHIVED: – – – –

START DATE: 10/9/90 LATE REV DATE: CHECKED BY: INITIATOR: DRAWING No.: FA200375 STORED: AGI-F:\FL\dwgs\kwst
DRAWN BY: DRAWN BY: APPROVED BY: PROJ. MGR: PROJ. No.: 595392 ARCHIVED: - - - -



EXPOSURE ROUTE	RECEPTOR HUMAN Area Residents	Site Visitors	BIOTA Terrestrial	Aquatic
Ingestion				●
Inhalation				
Dermal contact				

FIGURE 4-1

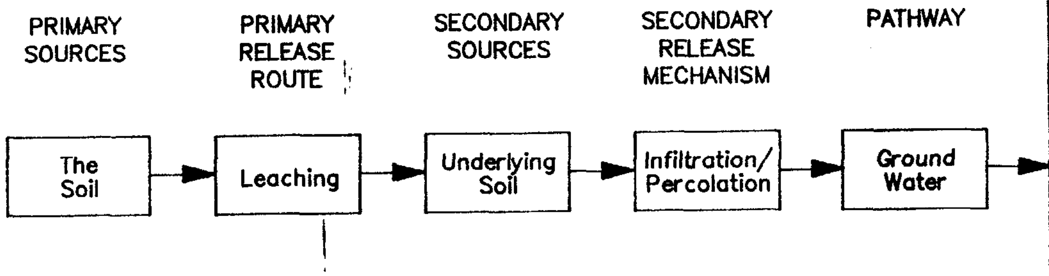
CONCEPTUAL SITE MODEL

TRUMAN ANNEX
REFUSE DISPOSAL AREA
SITE No 1

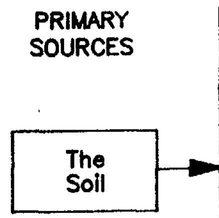
NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL
TECHNOLOGY
CORPORATION

RECEPTOR



	HUMAN		BIOTA	
EXPOSURE ROUTE	Area Residents	Site Visitors	Terrestrial	Aquatic
Ingestion				
Inhalation				
Dermal contact				



	HUMAN		BIOTA	
EXPOSURE ROUTE	Area Residents	Site Visitors	Terrestrial	Aquatic
Ingestion	●	●		
Inhalation				
Dermal contact	●	●		

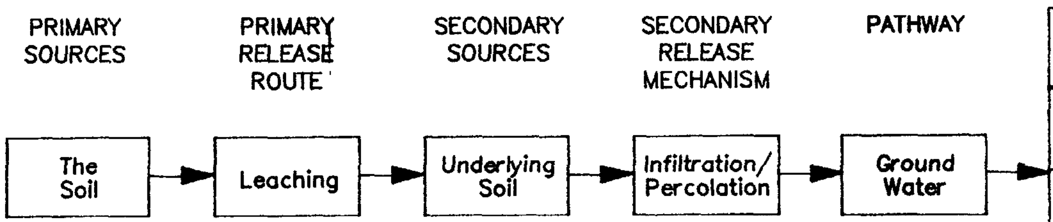
FIGURE 4-2
CONCEPTUAL SITE MODEL

TRUMAN ANNEX
DDT MIXING AREA
SITE No 3

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 10/9/90 LATE REV DATE: CHECKED BY: 10/2/91 INITIATOR: DRAWING No.: FA200376 STORED:
DRAWN BY: APPROVED BY: 8/7/91 PROJ. MGR: PROJ. No.: 585392 ARCHIVED:



RECEPTOR

EXPOSURE ROUTE	HUMAN: Area Residents	HUMAN: Site Visitors	BIOTA: Terrestrial	BIOTA: Aquatic
Ingestion	●	●		●
Inhalation				
Dermal contact	●	●		

FIGURE 4–3

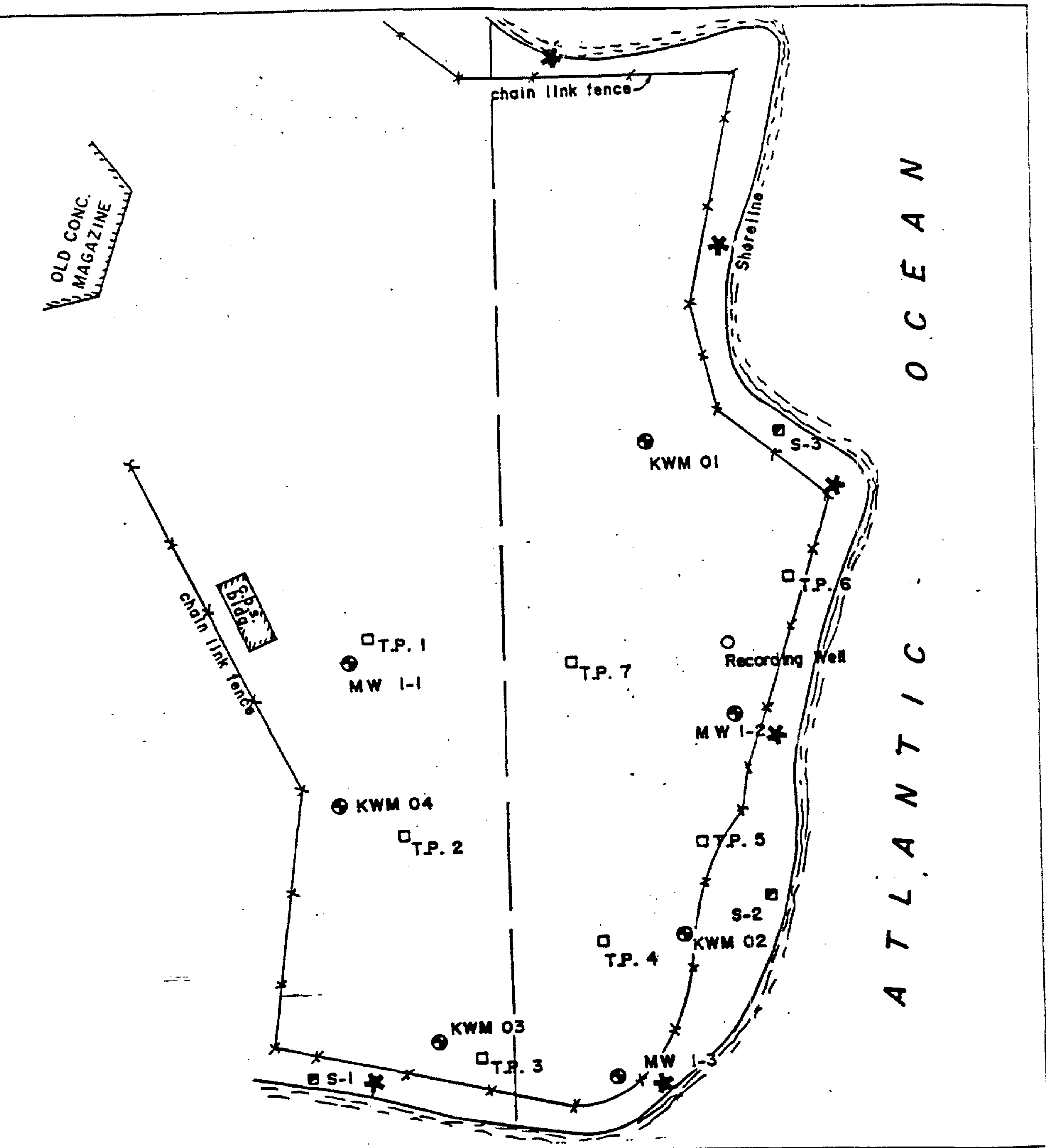
CONCEPTUAL SITE MODEL

BOCA CHICA
DDT MIXING AREA
SITE No 5

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

START DATE: 10/8/90 LATE REV DATE: CHECKED BY: INITIATOR: Slusick DRAWING No.: FA200377 STORED: AGI-F:\FL\drngs\kwst
DRAWN BY: JReillytyers DRAWN BY: APPROVED BY: PROJ. MGR: Mhampton PROJ. No.: 596392 ARCHIVED: - - - -



SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

LEGEND:

KWM 01	GERAGHTY & MILLER MONITORING WELL
MW 1–1	I T CORP MONITORING WELL
○	RECORDING WELL
— — —	AIR QUALITY SURVEY TRANSECT
□ T.P. 4	TEST PIT No 4
S–2	SEDIMENT SAMPLE No 2
•	SAND POINTS
*	PROPOSED SEDIMENT SAMPLING LOCATION

FIGURE 5–1
PREVIOUS INVESTIGATION & SAMPLING LOCATIONS AND PROPOSED SAMPLING LOCATIONS
TRUMAN ANNEX
REFUSE DISPOSAL AREA
SITE No 1
NAS–KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

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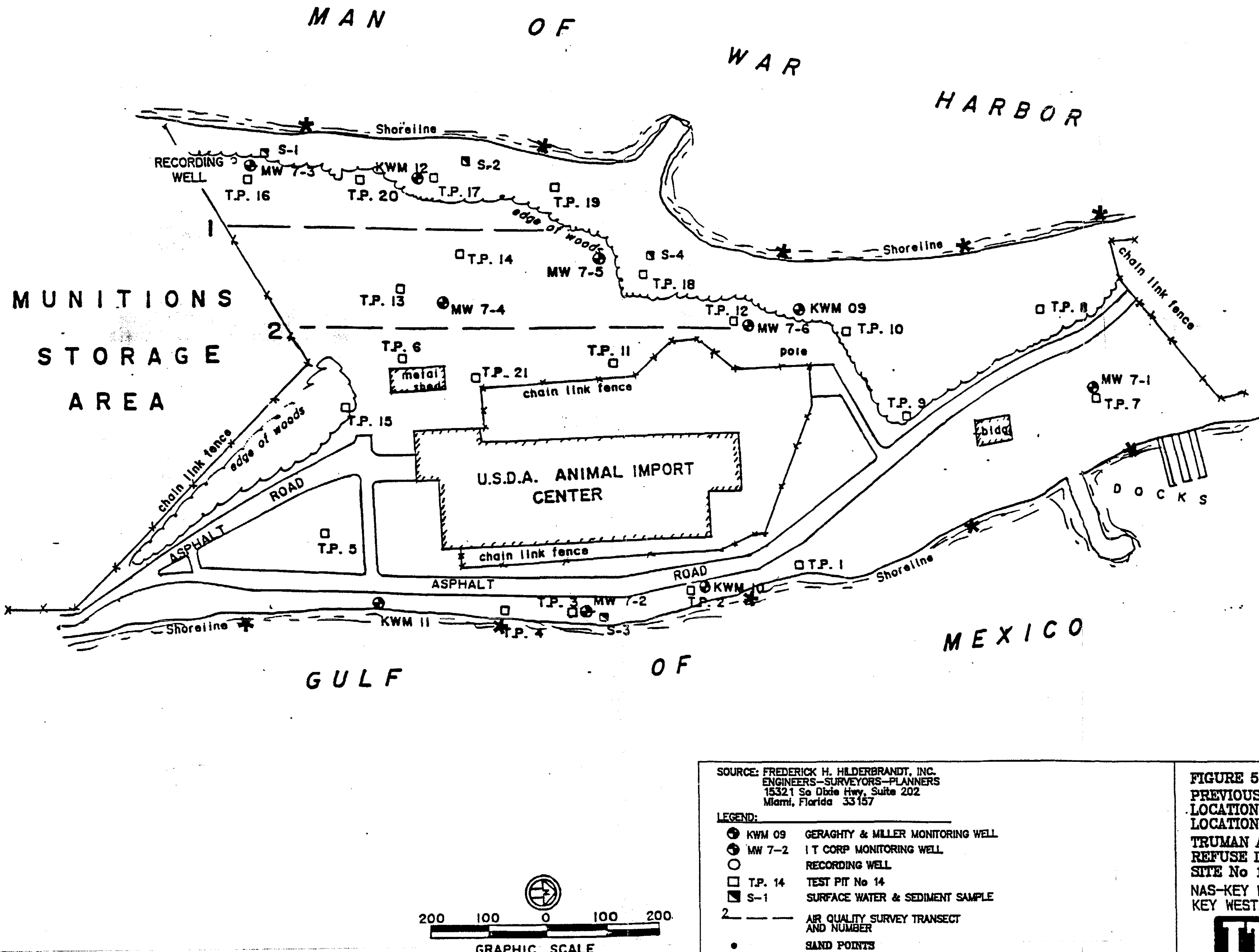

SOURCE: FREDERICK H. HILDERBRANDT, INC.
ENGINEERS–SURVEYORS–PLANNERS
15321 So Dixie Hwy, Suite 202
Miami, Florida 33157

LEGEND:

KWM 09	GERAGHTY & MILLER MONITORING WELL
MW 7-2	I T CORP MONITORING WELL
○	RECORDING WELL
□ T.P. 14	TEST PIT No 14
S-1	SURFACE WATER & SEDIMENT SAMPLE
2 — —	AIR QUALITY SURVEY TRANSECT AND NUMBER
•	SAND POINTS
*	PROPOSED SEDIMENT SAMPLING LOCATION

FIGURE 5-2
PREVIOUS INVESTIGATION & SAMPLING LOCATIONS AND PROPOSED SAMPLING LOCATIONS

TRUMAN ANNEX
REFUSE DISPOSAL AREA
SITE No 1

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

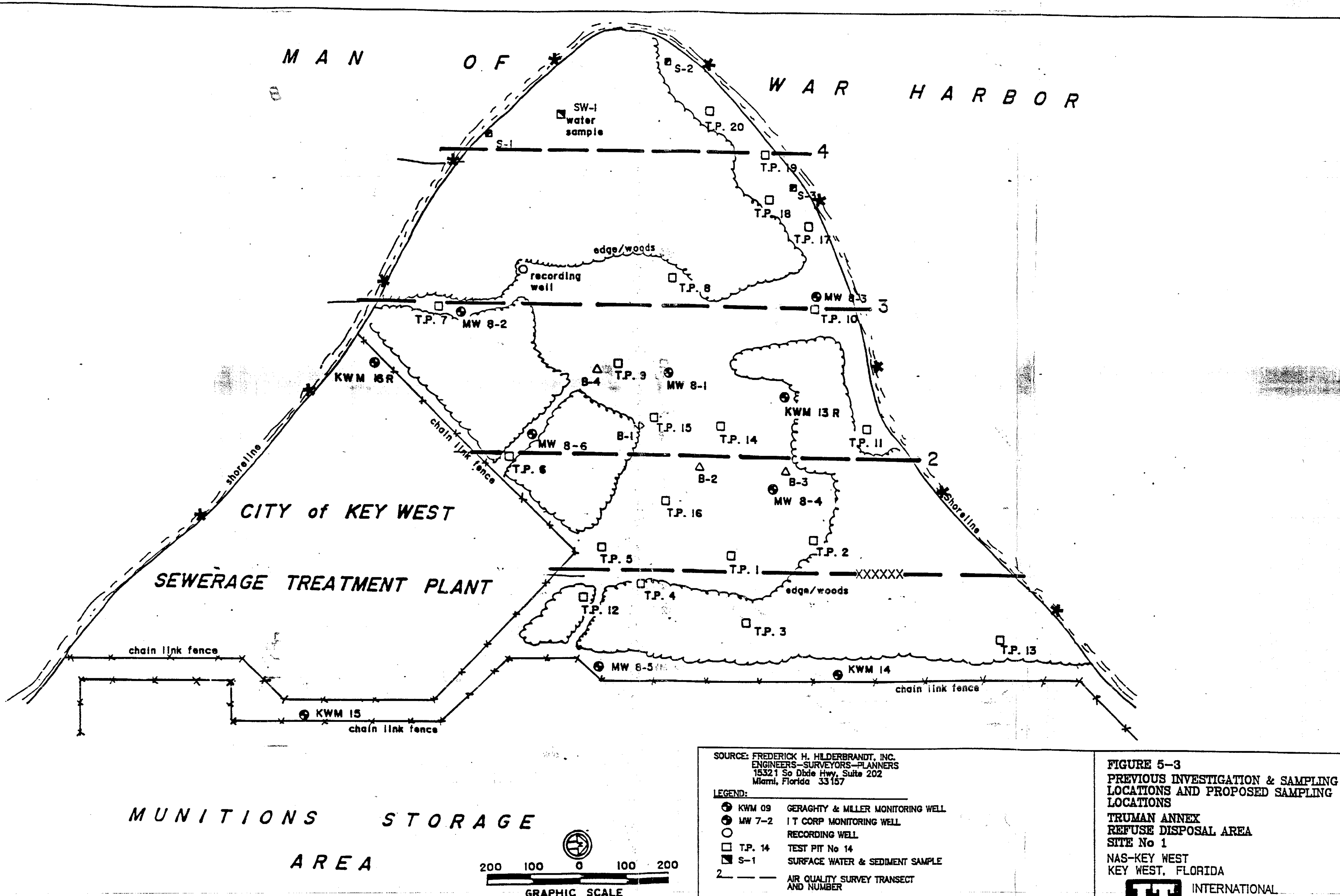

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FIGURE 5-3
PREVIOUS INVESTIGATION & SAMPLING LOCATIONS AND PROPOSED SAMPLING LOCATIONS
TRUMAN ANNEX
REFUSE DISPOSAL AREA
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