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FINAL IMPLEMENTATION OF PILOT STUDY AT TRUMBO POINT FUEL FARM NAS KEY WEST FL

7/1/1991

IT CORPORATION

FINAL REPORT
IMPLEMENTATION OF PILOT STUDY
TRUMBO POINT FUEL FARM
NAVAL AIR STATION - KEY WEST
KEY WEST, FLORIDA

PREPARED FOR

SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON, SOUTH CAROLINA
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The Final Report of the Pilot Study summarizes the methods used to perform the study, the conclusions derived from the investigation and the recommendations for further investigations at the tank D-4 site, Trumbo Fuel Farm, Naval Air Station at Key West, Florida.

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1.0 Introduction

During the preliminary investigation conducted under the Naval Installation Restoration Program (IRP) at Trumbo Point Annex Fuel Farm at the Naval Air Station (NAS-Key West) in Key West, Florida, liquid phase and dissolved hydrocarbon contamination was detected in the vicinity of the D-4 marine diesel storage tank. A pilot study work plan for remediating the site was designed and submitted by Geraghty and Miller (G&M) in 1988. Implementation of the G&M pilot study work plan was awarded to IT Corporation (IT) by the Southern Division Naval Facilities Engineering Command (SouthDiv) on March 29, 1990. The pilot treatment study was performed by IT during the period from April 1990 to February 1991.

1.1 Scope of Work

As set forth in the statement of work, Contract No. N62467-88-C-0196, Modification P0003, the scope of the contract between IT and SouthDiv was to implement a pilot treatment study at NAS-Key West Trumbo Point Fuel Farm, tank D-4 site, for the recovery of free hydrocarbons and the treatment of contaminated groundwater. This report presents a description of the work performed, data collected, results obtained and provides conclusions and recommendations as to the feasibility of the treatment system to remediate the site.

1.2 Background

In 1981, a loss of diesel fuel reportedly occurred from a corroded pipe located between tank D-4 and the D-26 pumphouse at the fuel farm. G&M performed several hydrogeologic investigations of the site confirming subsurface contamination. A G&M report entitled "Subsurface Hydrocarbon Investigation at Trumbo Point Annex, NAS Key West, Florida, June 1985" confirmed diesel fuel contamination near storage tank D-4. The presence of liquid phase hydrocarbon in thicknesses varying between 0.03 and 1.39 feet were detected in monitoring well MW-4 which had been installed in this area.

In September 1988, G&M prepared and submitted a work plan for remediating liquid phase hydrocarbons at the tank D-4 site. The work plan includes evaluation of several remedial alternatives and final selection of a set of remedial steps to be implemented for obtaining design data for a full scale remedial system. There are four (4) proposed phases of the work

plan, of which the first phase, the pilot study work plan, was completed by G&M. The remaining three (3) phases are:

- Phase II - Implementation of pilot study work plan
- Phase III - Feasibility study and design
- Phase IV - Remedial action.

The work herein reported completes Phase II of the work plan. The actual pilot treatment study performance was completed in February 1991.

1.3 Objectives of the Work

The implementation of the pilot study work plan had the following objectives:

- Design, construct, and operate a pilot scale system to recover free product and remediate groundwater at the site.
- Provide "a means to evaluate the site."
- Determine the feasibility of any remediation actions to be taken at the site.
- Determine the effectiveness of the recovery and treatment system to:
  - Recover free product
  - Create a cone of depression
  - Remove dissolved constituents from the groundwater.
- Evaluate the pilot system as to its feasibility and effectiveness for cleanup at the site.
- Evaluate the efficiency of granular activated carbon to remove dissolved constituents from groundwater.
- Compile a pilot study report detailing the work performed and presenting the findings, collected data, and analytical results.

1.4 Report Format

The pilot study report contains the following sections:

- Section 2.0 Site Background
- Section 3.0 Design and Specifications
- Section 4.0 Installation

- Section 5.0 Data Acquisition and Operations
- Section 6.0 Findings and Results
- Section 7.0 Conclusions and Recommendations
- Appendices

Section 2.0 - "Site Background" includes a summary of the previous site studies which dealt with the contamination at the fuel farm. Administrative requirements for the pilot study are also presented.

Section 3.0 - "Design and Specifications" details the design logic and describes the equipment and the operations of the pilot treatment system.

Section 4.0 - "Installation" describes the installation of the various units, monitoring wells, infiltration galleries, and support structures for the pilot study extraction and treatment system. The reasoning behind the placement of those units on site is also discussed.

Section 5.0 - "Data Acquisition and Operations" presents a description of field activities, monitoring and sampling schedules, and duties performed by the site support personnel. The operation of the automatic teledialer is also discussed.

Section 6.0 - "Findings and Results" presents the results of the pilot study including a general discussion of the actual treatment system operation. Conclusions regarding the specific scope of work objectives are also presented.

Section 7.0 - "Conclusions and Recommendations" reports the conclusions and recommendations of IT regarding the effectiveness of the pilot study and the feasibility of alternative remediation processes at the site.

Supporting these sections are the following appendices:

- Appendix A - Design Calculations
- Appendix B - Field Documents and Transportation and Receiving Manifest
- Appendix C - Data Analyses
- Appendix D - Sampling and Analysis - Forms and Documents
- Appendix E - Analytical Results.

2.0 Site Background

2.1 Site Description

The Trumbo Point Annex Fuel Farm is located at the western end of the island of Key West east of the piers at the Trumbo Point Annex. The Annex was constructed in 1918 using dredged materials, for use as a seaplane base. Since 1972 the Annex has been used as a fuel storage and distribution point. Fuel is received at this facility from tankers and then stored or distributed by underground transmission lines to either Truman Annex or NAS Boca Chica. Fuels that have been stored at the fuel farm include No. 6 fuel oil, Bunker C oil, diesel fuel, aviation gasoline, JP-4 and JP-5.

Tank D-4 and the D-26 pumphouse are located at the Trumbo Point Annex Fuel Farm. The area between and immediately west of these structures is the site on which the pilot treatment study was conducted.

2.2 Regional Geology

The following information was compiled by Envirodyne Engineers, Inc., in "Initial Assessment Study, NAS Key West, Florida" (June 1985).

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 oolids or spherical calcareous grains. Key Largo limestone underlies the Miami Oolite on all the Lower Keys. It consists of cemented remains of ancient coral reefs, fossils and shells. The Miami Oolite is approximately 20 feet thick at Key West. It is a porous formation and is of little use as a groundwater aquifer because of the poor quality. The underlying Key Largo formation 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.

The Miami Oolite rests upon the Key Largo Limestone in what appears to be a transitional contact, covering all of the Lower Keys from Big Pine Key to Key West (Black, 1977). The formation is soft, white to yellow, stratified to massive and is constituted of pure calcium carbonate (limestone) which may contain shell fragments and minor quartz sand. Its major constituents are tiny oolids which are spherical calcareous grains with concentric structure, cemented to form Oolite rock (SOUTHNAVFACENGCOM, 1981a). The formation

thickens in a northward direction and its greatest known thickness is 35 feet in the northern part of Stock Island (Black, 1977).

The Pleistocene Key Largo limestone underlies Miami Oolite on all the Lower Keys. Its major constituents are the cemented remains of ancient coral reefs and a subsidiary amount of fossils or coral, shell, algae and echindids (SOUTHNAVFACENGCOM, 1981a). The formation varies from 75 feet in thickness at Key Largo to 180 feet under Key West (Department of Health Education and Welfare, 1975).

The Miami limestone, exposed at the surface in the Lower Keys, is a porous, solution riddled formation. It has been reported that much of the total volume of this formation is occupied by voids, producing a very high vertical permeability; however, since many of the solution pipes are not connected, a lower horizontal permeability is observed. In the Key West area, a freshwater lens has developed above a saltwater interface in this formation. There are no freshwater wells of consequence in this formation in the Key West area (SOUTHNAVFACENGCOM, 1980a).

The Key Largo limestone, a remnant reef structure, is extremely permeable. Solution holes and caverns are common throughout this formation. This permeability allows sea water, under tidal influence, to move freely in and out of the rock structure. Rain falling on the surface quickly permeates the rock and escapes to the sea. Although the Key Largo limestone will yield water freely to a well, the quality is poor, being close to that of sea water.

2.3 Site Soils and Topography

The original soils in the area are shallow marl over limerock. However, the tank area has been filled and is currently underlain by relatively low permeability silty sediments to a depth ranging between nine (9) to 13 feet. These sediments contain varying amounts of silt, sand, shell, and limestone fragments. The land surface is relatively flat with elevations ranging approximately three (3) to six (6) feet above mean sea level. The water table was encountered between 3.5 and five (5) feet below land surface and the shallow groundwater flow is radially away from a "high" near the center of the tank area ("Subsurface Hydrocarbon Investigation at Trumbo Point Annex, NAS Key West," G&M, June 1985).

2.4 Previous Site Studies

As part of the Naval IRP, G&M performed hydrogeologic investigations which identified and verified the presence of liquid phase hydrocarbons in the soils and groundwater at the fuel farm. As a result, G&M prepared and submitted a Pilot Study Work Plan for remediating the subsurface liquid phase hydrocarbons at the tank D-4 site. Subsequently, a remedial investigation of several sites at NAS Key West, including the Trumbo Point Fuel Farm (Site No. 9), was performed by IT. A summary of the pilot study work plan and the pertinent findings from the remedial investigation relevant to the fuel farm are presented below.

2.4.1 G&M Pilot Study Work Plan

This work plan describes the pilot study to evaluate recovery of dissolved and liquid phase hydrocarbon contamination at the tank D-4 site. The work plan also includes a discussion of the preliminary selection of the remedial alternatives to be evaluated during the pilot study.

The remedial alternatives evaluated in the report consisted of a collection system paired with a fluid handling system. The collection systems considered were recovery wells and infiltration galleries. The fluid handling systems evaluated were:

- Auto Skimmer™ for removing liquid phase hydrocarbons
- Scavenger® pump for removing liquid phase hydrocarbons
- Combination liquid phase hydrocarbon recovery pump with a water table depression pump
- Total fluid system for both liquid phase hydrocarbons and groundwater.

An infiltration gallery with a Scavenger® pump and water table depression pump installed at the collection point was the remedial alternative recommended for evaluation during the pilot study due to the assumed low hydraulic conductivity of the soils and tidal influence on the water table at the site. It was also recommended that an inert material be placed in the trench to serve as a filter and stabilizing material. Construction of monitoring wells near the gallery was also specified so that the recovery of liquid phase hydrocarbons could be monitored and the zone of influence of the gallery could be determined.

2.4.2 IT Remedial Investigation

This document presents the methodology and the results of the remedial investigation (RI) performed on eight (8) NAS sites at Key West. The Trumbo Point Fuel Farm, referred to as "Site No. 9," was included in the investigation. An excerpt of the findings and conclusions which pertain to the fuel farm is presented below.

> ***Soil Investigation*** - A soil boring program which was in accordance with the Florida Administrative Code (FAC) 17-770 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 four (4) to five (5) feet below land surface (BLS). Samples collected just above the water table were screened with an OVA using the headspace analysis method. Thirty (30) borings/samples were collected and analyzed in this manner inside the Trumbo Point Fuel Farm. OVA readings ranged from zero (0) (i.e., not detected) to approximately 5,000 parts per million (ppm). Areas of excessive soil contamination based on the headspace analysis results were identified.
>
> Four (4) additional borings/samples were collected along the underground pipelines and headspace analysis readings from three (3) to 12 ppm were recorded. These results based on our understanding and interpretation of the regulations do not constitute excessive soil contamination.
>
> ***Hydrogeologic Investigation*** - Information gathered from four (4) 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. Petroleum (free product) was encountered in the boring from monitoring well MW 9-10 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 soft.
>
> Geotechnical data was obtained from a composite soil sample collected from four (4) feet BLS, boring B-30. Geotechnical data 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 millimeter (mm). 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 x 10^{-6} units? which is representative of poorly sorted sand and gravel.

Groundwater levels were plotted and groundwater contour lines were derived using a three (3) point problem. Groundwater flow is determined to be to the northwest.

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 hydrographs of sea level fluctuations and water level elevations through the month of August were prepared and the correlation between these two hydrographs is apparent. The daily peaks and valley of both hydrographs clearly coincide. An approximately two (2) to three (3) 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 mean sea level (MSL) while groundwater elevations range from 0.4 to 3.0 feet MSL.

Analytical - Groundwater from the site was analyzed for polynuclear aromatic hydrocarbons (PAHs). PAHs were detected in some monitoring wells, but all concentrations were below established ARARs. Lead and xylene were also found in two (2) of the monitoring wells, but again at levels below the established ARAR. Volatile organic analysis was performed according to EPA Method 601/602 in the groundwater samples. Benzene was found in two (2) of the six (6) monitoring wells, with one (1) monitoring well showing particularly high levels. Toluene and ethylbenzene were found in one (1) of the four (4) wells. Dibromochloropropane was also detected at a level above its established ARAR in one (1) out of the six (6) sampled wells.

No definite group of potential chemicals of concern appears to exist. While it is recognized that benzene and toluene were detected at levels above their established ARARs, these detections appear to be isolated to one (1) or two (2) monitoring wells, while the remaining monitoring wells register no detections above the detection limit. Thus, these chemicals are not considered potential chemicals of concern.

2.5 Administrative Requirements

As part of the RI being conducted by IT at NAS-Key West, a document entitled "Administrative Requirements" (October 1989) was issued to SouthDiv. Included in the administrative documents were a Sampling and Analysis Plan and a Health and Safety Plan (HSP). The sampling and analysis plan is a two part document consisting of the Quality Assurance Project Plan and the Field Sampling Plan. The Quality Assurance Project Plan

requirements were directly applicable to work performed during the pilot treatment study. An abridged sampling and monitoring plan to be used by pilot plant operators was prepared specifically for the pilot treatment study and is presented in Section 5.0 of this report. The HSP describes the IT Health and Safety program, and identifies the factors of this program which are applicable to the performance of the remedial investigation of NAS-Key West.

2.5.1 Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) describes the methods and procedures that were used by IT at NAS-Key West sites to assure the quality, precision, accuracy, and completeness of the data generated during the field investigation and interim remedial action planning activities.

This QAPP was prepared by IT to insure that the work performed would be of the quality required to satisfy the project objectives and would be responsive to requirements of the Naval Energy and Environmental Support Activity (NEESA); Southern Division, Naval Facilities Engineering Command (SouthDiv); the Florida Department of Environmental Regulation (FDER); Analytical Chemistry Department, Martin Marietta Energy Systems, Inc.; and the United States Environmental Protection Agency (US EPA).

This QAPP is based on the NEESA Sampling and Chemical Analysis Quality Assurance (QA) Requirements for the Navy Installation Restoration Program (NEESA 20.2-0478B); FDER Guidelines for Preparing QA Plans (DER-QA-0D1/85); IT Analytical Services (ITAS) QA Manual, Laboratory Specific Attachment and IT's State of Florida Generic Plan No. 880566G approved by the FDER.

The QAPP focuses on the acquisition of environmental data of known and acceptable quality. Other aspects of the project, such as engineering analysis, report preparation and records, were controlled by the internal requirements of IT's QA Program. The IT QA Program is based on the IT Environmental Projects Group Southeast Region QA Procedures Manual, the IT Engineering Operations QA Manual and the ITAS QA Manual. The policies and procedures specified in these manuals define acceptable practices applicable to most environmental related projects, regardless of the specific aim of the project. These QA Manuals are controlled proprietary documents. Confidential copies can be supplied to regulatory agencies upon written request.

2.5.2 Health and Safety Plan

This document was prepared by IT for work on NAS-Key West, Florida. The purpose of the HSP was to:

- Assign health and safety responsibilities to IT site personnel
- Prescribe mandatory operating procedures
- Establish personal protective equipment requirements for work activities
- Establish emergency response procedures
- Provide information on the health hazards and nature of work safety at each work site to all employees, contractors, subcontractors, and visitors.

The HSP complies with all applicable Federal and Florida Occupational Safety and Health Administration (OSHA) regulations and IT's Health and Safety Policies and Procedures:

ITC	9000	Safety Policy
ITC	9001	Respiratory Protection Devices - Wearer Fit IT Policy
ITC	9020.1	Accident Prevention Program - Inspection and Analysis
ITC	9020.2	Accident Prevention Program - Safety Inspection
ITC	9021.1	Review of New Jobs, New Project, New Construction and Proposals
ITC	9030.1	Employee and Contractor Training Requirements
ITC	9300.1H	Procedures for Handling Insurance Claims
ITC	9410.1	Pre-employment Medical Examinations
ITC	9410.2	Periodic/Update Medical Examinations
ITC	9532.9	Excavation and Trenching
ITC	9532.10A	Hazardous Waste Operations and Emergency Response
ITC	9533.1	Working in Hot Environments
ITC	9552.	Hazards Communication Program
ITC	9561.	Respiratory Protective Devices
ITC	9571	Fire Safety
ITC	9572	Electrical Safety
ITC	9591.1	Health and Safety Rules for Contractors
ITC	9650	Hearing Conservation Program

These policies and their implementation are central to IT's accident prevention program.

Adherence to the HSP was mandatory for all IT personnel and subcontractors assigned to the project. All authorized visitors to the work site were also required to abide by the HSP. IT is pleased to report the pilot plant project was completed with no safety related incidents or injuries to IT personnel or subcontractors.

3.0 Design and Specifications

This phase of the project involved preparation of design and specifications of the pilot recovery and treatment system. The conceptual plan prepared by G&M was used as the basis for developing the detailed design of the pilot recovery and treatment system. Construction drawings were prepared for equipment fabrication and installation. The six (6) major components of the recovery and treatment system designed by IT were as follows:

- Infiltration gallery
- Recovered product tank
- Air sparger
- Groundwater and free product pumps
- Granulated activated carbon columns
- Leach bed

The following sections describe the design and specification for each of the above components.

3.1 Infiltration Gallery

The infiltration gallery specified by G&M was to have dimensions of 20 feet by 5 feet and to include a center sump constructed of 24 inch diameter by 12 feet long (minimum) perforated galvanized steel culvert pipe capped at the bottom. The trench portions of the gallery would provide a continuous hydraulic conduit for both free phase hydrocarbon and groundwater from the surrounding soils to flow into the sump. The trench would be eight (8) to ten (10) feet deep. The inner core of the infiltration gallery would be constructed of pea gravel and the annular space would be filled with washed medium to coarse grained sand. The sand would minimize the potential of clay particles to clog the path of fluid flow. Figure 3-1 shows the dimensions and construction of the infiltration gallery as actually installed.

3.2 Recovered Product Tank

A free phase product recovery storage tank was designed to store recovered product on site. The tank capacity was specified by G&M to be 5,000 gallons based on the estimated volume of product to be recovered. The material of construction was specified to be 1/4 inch carbon steel coated with Mobil 40-AW-13 epoxy, both inside and outside for corrosion protection. The tank dimensions were specified to be eight (8) feet diameter by 18 feet long. The tank

was designed to be mounted on a box skid for ease of transport and convenience of moving the tank around the site. The tank was also equipped with two (2) lifting lugs, a 24 inch manhole with cover for inspection access, and a conservation vent to allow the tank to breathe during pumping into and out of the storage tank. A pressure gauge at the bottom of the tank, measuring in inches of water column, was provided to indicate the level of free phase product in the tank. The tank was designed with four (4) nozzles at the top and two (2) nozzles at the bottom of the tank. Figure 3-2 shows design specifications of the 5,000 gallon skid mounted recovered product tank.

3.3 Air Sparger

Groundwater recovered from the site was specified in the contract to be treated by an air sparger. Air sparging is a process by which contaminated water is brought into intimate contact with a large volume of air inside a tank, such that volatile organic contaminants (VOCs) undergo a phase change (from liquid phase to vapor phase). The VOCs are discharged into the atmosphere while the organic free water is removed from the bottom of the tank. Air sparging is distinguished from air stripping by the mode of gas-liquid contact. Air stripping is the process which occurs in a packed column with large interfacial area while air sparging utilizes dispersed air volatilization which occurs at the gas-liquid interface. Air sparging was specified by SouthDiv over air stripping due to its more appropriate configuration and the ability to process water prone to fouling.

A concern with air sparging was the release of volatile compounds into the atmosphere. Due to lack of actual concentration data of the groundwater to be treated on site at the time of designing the air sparger, typical water quality data were used to estimate the air emissions. Diesel fuel contains approximately 25 to 30 percent aromatics, five (5) percent olefins, and the remainder being paraffins and naphthas. Naphthalene is one of the most soluble components of diesel fuel that was targeted for air emission analyses. A naphthalene concentration of 5,200 ppb in the sparger influent was used for air emission estimates from the air sparger and found to be within the specified acceptable ambient concentration (AAC) specified by the FDER (Calculations are included in Appendix A).

The air sparger was designed to process up to 50 gallons per minute of groundwater. This design was based on the anticipated groundwater recovery rate to be experienced at the site according to the G&M work plan. The air sparger consisted of an air blower, sparge tank,

air distribution sparge pipe, spray nozzle and demister. The air sparger design calculations are included in Appendix A.

3.4 Groundwater and Free Product Pumps

The pilot treatment system included a groundwater recovery pump and a free product recovery pump. The groundwater recovery pump would create and maintain a "cone of depression" to promote flow of free product and groundwater into the sump. The groundwater pump operation was designed to be controlled by a level probe which would maintain a specified level of water in the recovery sump below the surrounding water table. The pump was sized to pump up to 50 gpm. The free product pump featured a specially designed level probe to differentiate between hydrocarbon and water. The probe would turn on the free product pump when the free product level in the sump exceeded the preset level and then would shutdown the pump when the thickness of the free product layer dropped below 1/8 inch. The free product pump was sized to pump up to 35 gpm.

3.5 Granulated Activated Carbon Columns

Two (2) 1,600 pound activated carbon adsorption columns were designed to be used as polishing units to remove contaminants contained in the effluent from the air sparger. The column shells would be constructed of carbon steel lined inside with high density polyethylene. The shells would be equipped with dished heads with viton gaskets and separate fittings for adsorbent changeout. The columns would be piped to enable operation of carbon columns in series, parallel, or independent modes when "on line," and for backwashing. Fittings were provided to include pressure gauges, pressure relief valves, lifting lugs, and a metal skid.

Due to lack of groundwater quality data prior to construction of the pilot treatment plant, carbon usage rate was determined based on the maximum anticipated loading of the columns. A maximum of 20 milligrams per liter of total organic carbon was assumed for the concentration of the influent groundwater. Based on published isotherms, the carbon usage rate was estimated to be approximately 20 pounds per day. Actual usage rate would depend on the groundwater quality and throughput experienced at the site. Therefore, based on the above assumption, the carbon life for one column was projected to be approximately 80 days. Appendix A contains the carbon usage calculations.

3.6 Leach Bed

A leach bed was designed to be built on site for disposal of the treated groundwater. A falling head percolation test was performed by IT at the Trumbo Point fuel farm to determine the hydraulic conductivity. Appendix A contains the results of the test. Based on the hydraulic conductivity determined by the test (14.1 ft/day) a larger leach bed than called for in the statement of work was provided (26 feet by 56 feet x 4 feet). Figure 3-4 shows the leach bed as installed.

A mounding analyses was performed for a 1,500 square foot recharge gallery using a hydraulic conductivity of 14.1 ft/day, with a recharge rate of 50 gpm, which was equal to the projected yield from the infiltration gallery. Groundwater was assumed to be three (3) to four (4) feet below grade and the infiltration gallery located within 100 feet from the leach bed. The mounding under the leach bed was determined to be two (2) to three (3) feet after 100 days of operation, which was within acceptable limits. Appendix A contains the mounding calculations.

4.0 Installation of the Pilot Treatment System

4.1 Facility Location

On May 15, 1990 IT made a preliminary site visit to locate underground utilities, select the locations for constructing the infiltration gallery and leach bed and to locate the principal equipment units of the pilot treatment system. Considering the location of the plume as described in G&M's work plan, the location of roadways in the area and the prior excavation that had been performed in the vicinity of tank D-4, IT personnel in agreement with NAS-Key West personnel decided to locate and arrange the units as shown in Figure 4-1. A previous excavation performed by NAS-Key West was in close proximity to the indicated area of free product and was expanded by IT into the infiltration gallery. The leach bed was positioned to the north end of the work area to maintain separation between the marine diesel plume in vicinity of tank D-4 and the reported JP-5 plume located on the northern portion of the tank farm. The treatment unit was positioned at the western edge of the area near the access road.

4.2 Scheduling of the Installation

In accordance with the provisions of the contract between SouthDiv and IT, field work on the pilot system was required to start the same day as the initial project "kickoff" meeting which was scheduled to take place June 5, 1990. To meet this requirement the installation work was divided into two (2) phases. The initial effort included the construction of the four (4) monitoring wells, infiltration gallery, leach bed, and all foundations needed for the two (2) pilot treatment unit skids and the recovered product tank. This initial effort took place on June 5th through 8th, 1990.

During this initial effort, arrangements were also made with NAS-Key West personnel and a civilian contractor qualified to perform electrical work on the base, to install an aerial power supply mounted on poles between building D-29, the fuel farm office, and the pilot treatment system site.

Later, upon completion of equipment manufacture and testing, a second installation effort took place starting August 14, 1990 at which time the major units were placed on their foundations. At this time the influent groundwater and free product removal pumps were installed, piping and electrical connections were made to the two pilot unit skids

(sparger/blower, carbon adsorbers/transfer pump) and the discharge line and control wiring between the system and the leach bed were installed.

The pilot treatment system was started at 11:00 a.m. August 16, 1990.

4.3 Site Safety

Prior to starting each day's work on the site during installation, IT conducted a "Tailgate Safety Meeting" with all IT and IT subcontractor personnel. Activities planned for the day were discussed along with management of safety hazards presented in performing the work. All personnel were checked for wearing of proper personal protective equipment. A record of these meetings which lists the topics presented and the names of the attendees is provided in Appendix B.

4.4 Construction of Infiltration Gallery

As discussed with NAS-Key West and SouthDiv personnel at the kickoff meeting, IT previously conducted a percolation test (Appendix A) at the site of the pilot test and determined that percolation rates were very low. Accordingly, the dimensions of both the infiltration gallery and leach bed were modified to make them larger than specified in the work plan.

The influent sump dimensions and construction are shown in Figure 3-1. A 24 inch diameter, perforated, corrugated metal pipe, 13 feet long forms the main sump in which the groundwater recovery pump (P-101) and free product pump (P-102) were installed. The sump was then provided with a secure cover by installation of a steel meter vault 36 inches square with cover. The excavation around the sump was backfilled with pea gravel and fine washed sand.

During the excavation of the influent sump, IT monitored both the ambient air and the excavated soil using an OVA to detect the presence of petroleum contamination. All excavated material was classified as lightly contaminated (OVA readings of 0 to 6 ppm) or contaminated (OVA readings of 6 ppm and greater). OVA readings ranged from nondetectable to 40 ppm as measured in the excavated material. All excavated soil was stockpiled on plastic sheeting and covered with additional sheeting as required under the provisions of IT's contract.

4.5 Construction of the Leach Bed

The leach bed was constructed on June 5th and 6th in an excavation approximately 56 feet long by 26 feet wide by two (2) feet deep. An approximate six (6) inch layer of one (1) inch bedding stone was placed over the bottom of the bed excavation. Four lateral drains constructed of perforated, four (4) inch diameter SDR 40 pipe were placed longitudinally on top of the bedding stone in the excavation. The lateral drains were aligned parallel to each other on about eight (8) foot centers and were connected with a four (4) inch diameter SDR 40 header to the treatment system.

Additional bedding stone was installed above the lateral drains to within four (4) inches of the ground surface. A layer of filter fabric was then placed over the surface of the stone and the bed backfilled to grade with clean material from the original excavation. The details of the construction are shown in Figure 3-4.

A two (2) inch diameter PVC monitoring well was constructed within the perimeter of the leach bed excavation on June 5th. This well functioned as a high groundwater level detector for the leach bed.

As in the case of the excavation for the infiltration gallery, the ambient air and excavated soil were monitored for presence of petroleum contaminants using an OVA. Readings taken from the excavated soil at the leach bed ranged from nondetectable to six (6) ppm. Excess soil from the excavation was placed in the lightly contaminated stockpile described in the previous section.

Upon completion of the installation of the leach bed and infiltration gallery, representatives of the activity and Avantra, the government contractor operating the Trumbo Point Fuel Farm, inspected the site and indicated their satisfaction with site conditions.

4.6 Monitoring Well Construction

Four (4) identical monitoring wells were constructed on site June 5th. These monitoring wells were designated MW-13, MW-15, MW-16, and MW-17. The locations of these wells are shown on Figure 4-1.

Borings for the monitoring wells were drilled using a truck mounted rotary rig, eight (8) inch outside diameter (OD) hollow stem augers, and a two (2) inch diameter inside diameter (ID) rock bit. All downhole drilling equipment was steam cleaned prior to the drilling of the first monitoring well boring and subsequently between each monitoring well site to minimize cross contamination.

The monitoring wells were constructed using ten (10) feet of two (2) inch diameter 0.010 inch slot Schedule 40 PVC screen and five (5) feet of solid Schedule 40 PVC riser. The annular space between each borehole wall and well screen was packed with 20/30 grade silica sand to minimize fine grained sand and silt from entering the well. After installing the sand pack, the remaining borehole and casing annulus was subsequently sealed with bentonite and grout materials. Water tight locking caps were fixed to the top of each casing to prevent accidental introduction of contaminating materials into the subsurface. On June 8th, the monitoring wells were sealed from surface runoff using flush mounted steel manholes set in four (4) inch thick concrete. Monitoring well construction specifications are presented in Figure 4-2.

Proper development of the monitoring wells was accomplished using a teflon bailer until the well water was clear and the sediment within the well was removed to the fullest extent practical. All water generated during well development was collected in 55 gallon drums for proper disposal by the Navy.

4.7 Construction of Equipment Foundations

Soil compaction and forming for the product recovery tank and skid mounted treatment unit foundations took place on June 5th and the concrete was poured June 6, 1990. Both foundations were constructed using six (6) inch by six (6) inch, No. 10 wire mesh reinforcement and 3,000 psi compressive strength concrete.

The size of the concrete pad built for the product recovery tank was ten (10) feet by 16 feet by one (1) foot thick. Three (3) concrete beams, each 16 feet long and spaced 11 feet center to center, were constructed for the treatment unit skid foundation.

4.8 Disposition of Excavated Materials

During the excavation of the infiltration gallery and the leach bed, IT monitored both the ambient air and the excavated soil using an OVA to detect the presence of petroleum contamination. All excavated material was classified as "lightly contaminated," (OVA readings of 0 to 6 ppm) or "contaminated," (OVA readings of 6 ppm and greater) and stored in segregated stockpiles on plastic sheeting and covered with additional sheeting. The treatment or disposal of this excess excavation is the responsibility of SouthDiv or the NAS-Key West under the provisions of the contract.

Transport of the excavated soils to the stockpiles was accomplished with a Mack 18 cubic yard dump truck. The dump truck body was cleaned of all residual soil and inspected prior to leaving the site. The 680 Case backhoe and 225 CAT excavator employed on site were also cleaned and inspected before leaving the site.

4.9 Dewatering of Excavations

IT arranged for a licensed waste hauler to stage a 6,000 gallon tanker on site to receive any contaminated water and free product encountered in the course of performing the excavations for the treatment system. A total of approximately 1,000 gallons of water/fuel mixture was pumped into the tanker from the excavations.

Saturated soils from the excavations were initially placed in a 20 feet by 20 feet staging area located near the excavation. Plastic sheeting covered the ground at the staging area and directed runoff from the excavated soils back into the excavation. A Honda pump removed the water from the excavation to the tanker. Flow rates and fluid levels in the tanker were monitored continuously during pumping to prevent overfill.

4.10 Demobilization of Pilot Treatment Equipment

Following completion of the test operation period, IT removed the pilot treatment equipment from the site on May 29, 1991. The free product recovered during the pilot plant operation was removed from the recovered product tank on April 30, 1991 and transported by an approved waste hauler to an approved recycling facility. A copy of the transportation and receiving manifest is included in Appendix B. In accordance with the modified contract, the 5,000 gallon recovered product tank was left on site and is now the property of the Navy. All aboveground piping associated with the treatment system was cut into approximately 20 foot

sections suitable for transport by truck and placed in a designated location for disposal by the activity in accordance with arrangements made with activity personnel.

The pilot unit was transported to IT's Ocala, Florida facility where the partially used carbon was removed from the unit and regenerated in an approved recycling facility.

5.0 Data Acquisition and Operations

The pilot treatment system was operated for 180 days as specified in the statement of work. The sampling and operation of the treatment system was performed by two (2) local operators stationed at Key West, Florida. The sampling and operation procedures followed during the performance of this project are described in the following sections.

5.1 Sampling and Groundwater Level Measurement

A prescribed sampling and monitoring protocol was followed for all sampling activities. The sampling protocol specified the procedures for sampling influent/effluent of the pilot treatment units, four (4) monitoring wells, and a single sampling of excavated soils removed during the installation of the pilot treatment unit.

5.1.1 Sampling Location and Frequency

Table 5-1 shows the schedule of all sampling activities. All of the sampling activities were performed except those for three (3) monitoring wells that were found to contain free phase product and therefore were not sampled following receipt of variance from SouthDiv.

5.1.2 Sampling Equipment and Procedures

The sampling activities included collection, preservation, packaging, handling, shipping and storage of samples performed in accordance with procedures described by any or all of: the US EPA, National Institute of Occupational Safety and Health (NIOSH), American Society of Testing and Materials (ASTM), Florida Department of Environmental Regulation Supplement A to Standard Operating Procedures and QA Manual dated June of 1981.

- **Soil Sampling** - Two (2) composite soil samples were collected from the excavated soil stockpiled at the site. Soil sampling was performed using a stainless steel trowel and a stainless steel bowl for compositing the samples. Five (5) soil samples were taken from five (5) discrete locations from the excavated soil pile and composited to one (1) sample. A similar set of five (5) soil samples were taken from another five (5) discrete locations for compositing to provide a second soil sample. Composite soil samples were transferred into two (2) 250 ml sample bottles for shipment to the laboratory for analyses as specified in Table 5-1. The results of these analysis were provided to the activity environmental department and are included in Appendix E.

- **Groundwater Sampling** - Standard activities involved with groundwater sampling included water level measurement, well purging, and sample collection. A minimum of three (3) casing volumes was removed prior to sample collection from the monitoring well. Removal of three (3) casing volumes permitted the collection of a representative groundwater sample not influenced by the water originally present in the monitoring well casing while not overpumping the monitoring well. If the monitoring well dried up during purging, it was allowed to recover until enough water was available to sample. Prior to purging as well, it was necessary to determine the volume of water present in the well casing. The calculation of well volume was conducted as follows:

  - Measured inside diameter of well casing

  - Measured the static water level (as described above)

  - Determined the total depth of the well from the measuring point

  - Calculated the number of linear feet of static water (total depth of the well minus the static water level)

  - Calculated the volume of water in a two (2) inch ID well casing using the equation:

    $$V = 0.1632h$$

    Where,

V	=	Volume of water (gallons)
0.1632	=	Conversion factor constant for well diameter of two (2) inches
h	=	Height of water in well (feet)

  After a monitoring well was properly purged, the monitoring well was sampled within three (3) hours with a teflon bailer. Dedicated teflon bailers were used to avoid cross contamination. An example of a sample collection log used by IT for recording well purging and sample collection data during groundwater sample collection is shown in Appendix D.

  Water sample collection for Volatile Organic Compounds (VOCs) EPA Method 601/602, Polynuclear Aromatic Compounds, EPA Method 610, and Acid and Base Neutral Compounds, EPA Method 625, was performed in accordance with the following procedures:

Volatile Organic Compounds

- Two (2) ml screw cap vials with teflon lined silicone rubber septa (US EPA approved vials) were filled to overflowing and sealed without any entrapped air bubbles.

- Each vial was placed in a cooler.

- The samples were not composited.

- A sample collection log, chain of custody record, a laboratory request for analysis form and a sample label was filled out in the field. These forms, except for the sample collection log, were sent with the samples to the laboratory.

- The sample bottles were placed in a cooler with sufficient packing to prevent breakage during shipment.

- The cooler was packed with ice to maintain the samples at four (4) degrees Celsius during shipment, sealed and transported to the laboratory.

Acid and Base Neutral Extractable Compounds and Polynuclear Aromatic Compounds

- One (1) liter amber glass sample bottle complete with teflon lined caps were filled to capacity and sealed.

- The sample bottles were placed in a cooler with sufficient packing to prevent breakage during shipment.

- A sample collection log, a chain of custody record, a request for analysis form and a sample label were filled out in the field. These forms, except for the sample collection log, were sent with the samples to the laboratory.

- The cooler was packed with ice to maintain the samples at four (4) degrees Celsius during shipment, sealed and transported to the laboratory.

Sample integrity was further enhanced through a few general sampling precautions as follows:

- Surgical style latex or Nitrile gloves were used during sample collection.

- Samples, preservations and sample containers were handled carefully to minimize exposure time and potential for evaporative loss and/or airborne contamination.

- Samples were delivered to the analyzing laboratory within 24 hours following sample collection.

- **Process Water Sampling** - Sampling ports were provided on both the inlet and outlet of the air sparger and the carbon adsorption column. Three (3) sample ports were sampled, two (2) at the inlet and outlet of the air sparger and one (1) at the outlet of the carbon adsorption column.

  Sampling for VOCs was performed as described in the previous section using 40 ml vials. Samples were obtained directly from the sampling ports without any other sampling equipment.

5.1.3 Procedure for Decontamination of Sampling Equipment

Sampling and monitoring equipment that came into contact with groundwater, except in cases where dedicated equipment was used, was decontaminated by the following steps:

Step 1 Cleaned with tap water and laboratory grade detergent, using a brush, if necessary, to remove particulate matter and surface films.

Step 2 Rinsed thoroughly with tap water.

Step 3 Rinsed with distilled water.

Step 4 Rinsed twice with solvent (pesticide grade or nano grade isopropanol).

Step 5 Rinsed with distilled water.

5.1.4 Sample Handling and Analysis

Following sample collection, the samples were sent to the laboratory for analysis. The following procedures for shipping and sample custody were followed to be able to track samples from the field to the laboratory. Chain of Custody and Request for Analyses forms (Appendix D) were filled out prior to shipment of samples.

- **Field Storage and Shipment of Samples** - As soon as samples were collected and preserved, they were stored in an ice chest packed with an adequate amount of ice. Field personnel checked that sample container lids were tight and secure before storing samples in an ice chest. Samples were shipped within

24 hours to the EPA approved IT Analytical Services (ITAS) laboratory in Knoxville, Tennessee, via overnight delivery to minimize sampling holding times.

- **Sample Analysis** - The analytical method for each sample bottle were identified on the sample label and the request for analysis forms. The analytical methods for each sample are identified in Table 5-1.

5.1.5 Water Level Measurements

Liquid level measurements in each monitoring well were made from a surveyed measuring point located at the top of well casing. Liquid level measurements were made using an electronic probe accurate to hundredth of a foot. The method used to measure liquid levels is described below:

- **Electronic Probe** - Using an electronic water level indicator, lower the probe down the center of the well casing. When the probe enters the liquid, an alarm will sound. Note the depth to liquid from the measuring point and record the depth to liquid in a field log. Repeat the measurement two (2) more times to ensure the reading is accurate. Subtract the average depth to water from measuring point elevation to find the elevation of the liquid level in the well to the nearest 0.01 foot.

5.2 Pilot Treatment System Performance Monitoring

Inspection of the treatment system was necessary to record performance information, maximize the uninterrupted operation, and to determine effectiveness of the specific components of the treatment system. The components inspected were the infiltration gallery, groundwater recovery well pump, free product pump, recovered product tank, air sparger, carbon adsorption system, and leach bed. The treatment system was attended locally by two (2) temporary employees. These two (2) IT operators inspected the treatment system at least once weekly. A log (Appendix B) was kept of each inspection in which deficiencies requiring repair were noted. The piping and instrumentation diagram (Drawing No. AD200058) was used to trouble shoot equipment malfunction during site inspections. Minor problems were corrected by the inspection crew and recorded in the log or else IT personnel at Tampa were notified for major breakdowns. The manufacturer's operation manual was used for obtaining detailed information on each component of the treatment system.

5.2.1 Performance Data

Following the prescribed operating schedule of inspections (Table 5-1), IT operators recorded the input/output of the pilot treatment system as measured by flow meters at the following points of the process:

- Flowmeter/totalizer FQ-101 - Sparger influent
- Flowmeter/totalizer FQ-102 - Sparger effluent
- Flowmeter/totalizer FQ-103 - Discharge to leach bed
- Flowmeter/totalizer FQ-104 - Influent to the recovered product tank

Readings were also made and recorded to document the level of liquid in the recovered product tank.

5.2.2 Equipment Checks

In addition to the inspections presented above, IT operators also performed the following equipment checks:

- **Groundwater Pump** - Turned the "ON" toggle switch, located at the front of the control panel, for the groundwater pump from "AUTO" to "MAN" for approximately two (2) seconds to confirm the operating status of the pump.

- **Free Product Pump** - Turned the "ON" toggle switch, located at the front of the control panel, for the product pump from "AUTO" to "MAN" for approximately two (2) seconds to confirm the operating status of the pump.

- **Flow Totalizer FQ-104** - Readings from this totalizer, which monitored the total volume of recovered product from the infiltration gallery, were recorded. The totalizer was inspected for variances.

- **Air Blower P-104 and Pressure Gauge PI-103** - The motor and fan of the air blower were inspected regularly for proper operation.

- **Pressure Gauges PI-104, PI-105, PI-106, PI-107, PI-108, and P-109** - These pressure gauges provided indication of increased resistance within the treatment pressure systems and were not permitted to go beyond a 10 psi pressure differential in order to prevent rupture of the filter bags. The gauges were inspected for variances.

- **Differential Pressure Switch DPSHH-101** - This fail/safe switch prevented excessive buildup of back pressure in the bag filters and the carbon adsorption

columns. The switch was an adjustable differential pressure switch that could be preset between 2.5 psi to 20 psi and was inspected regularly for variances.

- **Monitoring Wells** - The four (4) monitoring wells were inspected to check for presence of free phase product (if any). Presence of free phase product excluded those monitoring wells from further groundwater sampling and analyses.

5.2.3 Teledialer

The treatment system was equipped with a teledialer that monitored the operation of the treatment system and dialed specified telephone numbers in the event any of the four (4) fail/safe interlocks was energized. The four (4) fail/safe interlocks were (i) high level in recovered product tank, (ii) differential pressure switch was exceeded, (iii) high liquid level in the air sparger, and (iv) high water level in the leach bed. Power failure also triggered an alarm for the teledialer to call the specified phone numbers.

The teledialer was connected to a dedicated telephone line; (305) 294-2166. When an alarm was detected, the teledialer automatically dialed three (3) specified telephone numbers in sequence until one of the calls was received and acknowledged. The teledialer announced in English the exact nature and location of the alarm utilizing a preprogrammed message. The three (3) telephone numbers specified to be called were; (1) operator's work phone, (2) operator's home phone, (3) IT Corporation, Tampa, Florida office. The teledialer could also be called anytime from any telephone, and provide a complete report of the current alarm status. With a battery backup, the teledialer was invaluable in monitoring the operation of the pilot treatment system.

6.0 Findings and Results

The Pilot Study at the tank D-4 site, Trumbo Point Fuel Farm, was designed to apply a specified technology to recover free product and remediate contaminated groundwater. The study also incorporated the monitoring program required to evaluate the effect of treatment/recovery on the site. Monitoring wells were incorporated into the design so that groundwater levels could be measured, samples could be collected, and approximate contaminant concentrations could be established. Groundwater and free product elevations in the wells were measured to detect the presence of a cone of depression created by pumping from the infiltration gallery sump. The level of free product in the monitoring wells was also measured to monitor changes in the thickness of free product. Data which provided a means to evaluate the treatment system process performance was also generated and included the analyses of the influent and effluent stream samples for the air sparger and activated carbon units, and measurements of the recovered free product and volume of groundwater recovered.

6.1 Equipment Performance

The Pilot Treatment system operated successfully for the specified period of time (180 days). There were minor interruptions in the operation of the pilot treatment system due to power failure, fouling of filters, equipment breakdown and routine preventive maintenance. The longest continuous downtime period was one (1) week due to blower failure. All of the maintenance work was done by IT's temporary employees on site and none of the treatment equipment had to be replaced or shipped off site for repair during the performance of the project. Appendix B contains the inspection logs maintained by the operators.

The low horizontal hydraulic conductivity at the site prevented the infiltration gallery sump from recovering sufficient amounts of groundwater to evaluate the treatment system effectively. The anticipated yield of 50 gpm was not realized even though the infiltration gallery was constructed larger than originally designed. The actual groundwater yield was approximately one (1) gpm. The total amount of groundwater recovered during the pilot study was approximately 155,000 gallons (Figure C-1).

Although the air sparger and the activated carbon units performed well during the study period treating recovered groundwater, the infiltration gallery failed to deliver sufficient

throughput required to properly evaluate the effectiveness of these treatment system unit operations. In addition, the groundwater and free product recovery pumps' performance could only be marginally assessed.

The amount of free phase product recovered through the infiltration gallery sump was approximately 1,000 gallons during the study period (Figure C-2). This recovery is significantly lower than the anticipated volume specified in the contract statement of work. The low conductivity of the soils impeded the expected free product recovery and therefore monitoring wells adjacent to the infiltration gallery continue to indicate the presence of several feet of remaining free product.

A meaningful evaluation of the effectiveness of the air sparger to remove volatile hydrocarbons could not be performed. Groundwater samples were obtained from influent, air sparger effluent, first stage carbon effluent, and labeled "influent," "effluent - 1," and "effluent - 2," respectively. At a throughput of approximately one (1) gpm, concentrations of specific volatile organic compounds were effectively reduced to below method detection limits in all air sparger effluent samples (Table 6-1). However, samples obtained on November 16, 1990 had detectable volatile and polynuclear aromatic hydrocarbon compounds remaining in the effluent sample. This was attributed to the reported malfunction of the groundwater pump which had pumped some free phase hydrocarbon into the air sparger. This was later confirmed by the laboratory results which reported higher effluent concentrations of hydrocarbons than the influent concentrations.

Due to excessive retention period in the air sparger, hydrocarbon contaminant loading of the activated carbon was minimal. In accordance with the statement of work, IT was required to evaluate the performance of activated carbon alone in removal of both organic and inorganic constituents. Therefore, during the final month of the pilot test, the air sparger was bypassed and the recovered groundwater was routed directly into the activated carbon units to evaluate their performance independently. Samples were obtained from the influent, first stage effluent, and second stage effluent of the carbon units. These samples were labeled "influent," "effluent - 1," and "effluent - 2," respectively and analyzed for specified parameters (Table 6-2). Groundwater samples were also obtained from the influent and effluent of the carbon units for total dissolved solids (TDS) analyses. The TDS analyses were performed to determine the effectiveness of activated carbon to remove dissolved inorganic constituents

(Table 6-3). The TDS results do not offer any conclusive evidence of inorganic constituent removal in the activated carbon units.

6.2 Site Evaluation

Data was collected from the monitoring wells constructed during the installation phase of the pilot study. This data was collected to monitor the effect of the treatment process on groundwater quality and recovery of free product at the site. An analysis of this data provides a basis for a site evaluation.

6.2.1 Groundwater Quality

The analytical results for samples from monitoring well MW 9-13 during the pilot treatment study were examined to determine the effect of the treatment process on groundwater quality. As reported in Table 6-4, the concentrations of parameters as analyzed by EPA Methods 601, 602, and 625 ranged from non-detectable to the maximums listed as follows:

Parameter	Maximum Concentration	Date of Sampling
Trichlorofluoromethane	14 ug/L	December 13, 1990
Methylene Chloride	26 ug/L	September 20, 1990
Ethylbenzene	5 ug/L	December 13, 1990
Total Xylenes	17 ug/L	January 29, 1991
Naphthalene	33 ug/L	October 25, 1990

Although slight variations in contaminant concentrations in the groundwater at the site were observed, no perceptible trends which could be attributed to the operation of the pilot treatment system were noted in the samples from MW 9-13. The presence of free product in monitoring wells MW 9-15, MW 9-16, and MW 9-17 prevented the collection of additional groundwater samples from these wells for use in the groundwater quality analysis.

6.2.2 Free Product Recovery

In an effort to observe the hydrocarbon layer thickness in the subsurface and to evaluate the progress of hydrocarbon recovery, measurements of free product thickness and elevation in the monitoring wells and the infiltration gallery sump were recorded. An analysis of these measurements revealed that both the thickness and elevation of the free product layer in the monitoring wells varied from one measuring event to the next. Since no pattern of change

was apparent, IT consulted previous reports and other relevant literature in an attempt to explain this phenomenon.

The RI performed by IT (Section 2.4.2) including an assessment of the tidal influence on the groundwater at the site. An apparent correlation between fluctuating groundwater levels in nearby monitoring wells (elevations ranged from 0.4 to 3.0 feet MLS) and sea levels was noted during the assessment period (August 1990). Therefore, the variation in measured elevation in the monitoring wells may be attributed to the influence of the tide.

Another document consulted was a paper by Kemblowski et al (GROUNDWATER, "Hydrocarbon Thickness Fluctuations in Monitoring Wells," March-April 1990). The authors describe this phenomenon as it was observed at two (2) locations with similar site characteristics (i.e., low hydraulic conductivity and fluctuating groundwater elevations) and evaluate its causes. They noted that during a period of rising groundwater, some of the subsurface hydrocarbon may be entrapped in the zone between the low and high groundwater/hydrocarbon interfaces. With falling groundwater, the trapped hydrocarbon is released. In monitoring wells, the result is observed as a hydrocarbon layer with a thickness which fluctuates inversely with the interface elevation. This effect is exaggerated by a low hydraulic conductivity of the soil on a site because higher vertical fluid velocities will be realized in the monitoring well during periods of changing water levels. The difference in elevation between the liquid in the wells and the liquid in the soil results in a net transfer of free product from one location to the other as illustrated in Figure C-3. The data presented in Figures C-4 through C-6 provide evidence that the phenomenon as described above may be occurring on site. The geological information presented in Section 2.2 of this report also supports this conclusion.

The authors of the paper conclude that conventional methods based on well measurements are inappropriate for estimating the hydrocarbon thickness on a site with the aforementioned subsurface characteristics. The conventional hydrocarbon bailing test would not be an appropriate alternative measurement technique since the test also assumes an equilibrium condition exists between the liquid levels in the well and the soil around the well. An evaluation of additional alternative measurement technologies was not considered by IT during the pilot treatment study.

The groundwater and free product elevations in the monitoring wells adjacent to the infiltration gallery (MW 9-15, MW 9-16, and MW 9-17) were also measured to estimate the zone of influence created in the subsurface around the infiltration gallery by the groundwater extraction process. Compensated groundwater elevations for the wells and the sump were calculated by assuming specific gravity values of 1.0 for the groundwater and 0.8 for the free product. The data indicate the creation of a zone of influence which extended from the infiltration gallery sump and encompassed monitoring wells MW 9-15, MW 9-16, and MW 9-17 (Figures C-7 through C-16).

7.0 Conclusions and Recommendations

7.1 Interim Project Review and Conclusion

In September of 1990 IT performed an internal project review of the pilot study project as part of IT's routine Quality Control program. The initial data was reviewed and the low groundwater throughput rates noted. It was decided to continue the program for another month to allow the groundwater and free product regime to stabilize further and hopefully improve before addressing the need to take some form of corrective action. In October the pilot unit's production had improved slightly but the groundwater throughput rate was still in the range of one (1) to two (2) gpm average flow as measured by the unit's flow meters.

IT contacted and advised SouthDiv of the unit performance. After some discussion it was decided to continue with the program since the unit was achieving some limited beneficial effect on conditions at the site. On December 4th of 1990, representative of IT visited SouthDiv's offices and presented an interim report on the unit's performance. Although loadings to the sparger and adsorption system were low, and therefore less meaningful, the treatment process was very effective in removing petroleum contamination from extracted groundwater. The amount of free product recovered was about ten (10) percent of the quantity projected in the contract statement of work.

Based on the discussion at the meeting, it was agreed that IT would investigate alternative methods to accelerate free product recovery and to remediate soil and groundwater at the tank D-4 site. On January 24, 1991, IT recommended that SouthDiv consider a possible modification to the scope of the contract that would consist of:

- Selective trenching in the D-4 tank area to locate and recover free product and excavation of excessively contaminated soils
- Performance of two (2) preliminary evaluations, one of the soil matrix, and a second of the naturally occurring organisms present at the tank D-4 site for determining the feasibility of bioremediation of the petroleum contamination.

IT prepared a proposed scope of work with a budget cost estimate for this effort and submitted the proposal to SouthDiv on March 1, 1991.

7.2 Conclusions of the Pilot Study

Based on the data obtained during this pilot treatment study, IT concludes that:

1. A groundwater/free product recovery system of the type designed does not appear to be a feasible technology to remediate the marine diesel plume at the tank D-4 area at Trumbo Point Fuel Farm. The low hydraulic conductivity of the subsurface soils on site limits the formation of a capture zone, groundwater recovery and transport of free product.

2. The treatment system consisting of an air sparger followed by activated carbon adsorption, to the extent the processes were loaded by the limited throughput, performed adequately.

3. The presence of free product to the extent indicated by surface and interface levels measured in monitoring wells in the vicinity of tank D-4 does not correspond with observed accumulations of fuel in excavations or below surface structures in the same area.

7.3 Recommendations for the Tank D-4 Site

Addressing the contaminated area in the immediate vicinity of tank D-4, extensive excavation by trenching or a multi-well recovery system would be necessary to obtain sufficient groundwater recovery rates to remediate the site in a reasonable time using a groundwater extraction and treatment system.

To expedite free product recovery and to perform remediation of the excessively contaminated soils and groundwater, IT recommends that SouthDiv consider a further effort to:

- Excavate and remove excessively contaminated soil as necessary to gain improved access to free phase product. The excavation would begin in the area in which the highest concentration most likely exists based on all information obtained to the present time. The resulting excavation would be backfilled using gravel to increase drainage and could include leaving in place a piping network distribution system to be used in the later remediation phase of the project to provide nutrients and oxygen for bioremediation activities.

- Perform a site bioassessment and biotreatability study to determine applicability of bioremediation for the subject site.

7.3.1 Free Product Recovery

IT recommends that further efforts be made to remove excessively contaminated soil and free phase product from the site by trenching and excavating areas where free phase product has been observed to be present. Based on prior work IT has performed, such excessively contaminated soil (>30,000 mg/kg Total Petroleum Hydrocarbons) cannot be effectively treated in-situ in reasonable timeframes, by bioremediation.

IT has made inquires of both NAS-Key West personnel and employees of Avantra, the government contractor responsible for the operation of the marine diesel storage facilities at Trumbo Point (Site 9). As reported, the fuel leak which caused the petroleum contamination in the vicinity of tank D-4 occurred in the early 1980's in an underground suction or return line between tank D-4 and the D-26 pumphouse (see Figure 4-1). Avantra personnel report that free product is still seeping into the valve pit located between tank D-4 and the D-26 pumphouse. With respect to the effort to recover free product, the area described above would appear to be where further work to recover free product should be focused. It is suggested that excavation be performed in this area to capture the free product contained in the soil and that any free product encountered be recovered through the infiltration gallery constructed under this project. Initially a trench from the present sump in the direction of KWM-04 could be excavated. An additional trench could be dug laterally starting at the existing infiltration gallery sump and proceed parallel to the line of monitoring wells MW 9-15, MW 9-16, and MW 9-17. These wells have also shown presence of several feet of free product.

It is anticipated that excavation of these two (2) trenches would provide the greatest opportunity to encounter free product based on available data. If free product is encountered, excavation could continue (subject to protection and preservation of facilities and structures) to recover as much excessively contaminated material as possible. OVA readings should be used to determine the extent of the contaminated soil. The soil removed from the excavation could be stored on site on plastic liners. As the excavation proceeds, it could be periodically backfilled with gravel and a piping network installed which may be useful for subsequent remediation activities. In the event bioremediation proves feasible, this initial distribution system could be further developed into a grid of piping laid in the gravel or in-situ soil for the injection of hydrogen peroxide and nutrients.

A selection of disposal/treatment methods could then be made which would be dependent upon the total volume of excavated material. On site incineration would be cost effective if the total volume of excavated material exceeded 2,000 cubic yards. Considering the previously excavated material is still on site, IT believes the total volume of material to be treated would be close to 2,000 cubic yards.

If on site thermal treatment of the excavated soil is selected, pre-burn analysis of the soil would have to be performed prior to executing this method. The FDER places restrictions on certain pollutant levels (such as certain metals) in soils to be incinerated. Based on data from the pilot study, it is not anticipated that these levels would be exceeded. The incineration would be performed after the excavation phase is complete to thermally treat all contaminated soils on site in one campaign. The soil currently on site from previous excavations would also be incinerated by this method. The incineration process should proceed rather quickly considering that mobile incinerators are typically permitted to process up to 25 tons per hour. The soil exiting the incinerator should be clean fill suitable for backfilling any excavations or for regrading of the site.

7.3.2 Remediation of Remaining Petroleum Contamination

Bioremediation has the potential to treat groundwater, facilitate contaminant desorption from the soil and, subsequently, treat that desorbed material. Bioremediation would utilize naturally existing bacteria that are present in the contaminated aquifer to biodegrade the petroleum contaminants. A preliminary effort consisting of a bioassessment followed by a biotreatability study is needed to evaluate certain site specific environmental conditions and to measure the change in the rate of biodegradation in response to variations in certain of these conditions which can be controlled. The specific content and objectives of the bioassessment and biotreatability were recently presented in the proposal submitted to SouthDiv on March 1, 1991.

The site bioassessment would be performed to determine whether or not the potential for bioremediation exists. Soil and water samples would be analyzed and tested to determine the principal factors that influence bioremediation performance:

- Microbial enumerations - this provides an estimation of the density of total heterotrophic bacteria and hydrocarbon degrading bacterial.

- pH - the pH should be within the range of six (6) to eight (8) for optimum biological activity. This will be used to determine if pH adjustment is needed at the startup of the bioremediation process.

- Microbial stimulation - this test demonstrates the bacterial response to nutrients and oxygen augmentation.

- Nutrient analysis - background nutrient levels are analyzed to determine the nutrient addition schedule.

- Nutrient adsorption - this test is performed to determine the affinity of the soil for nutrients.

- Oxygen delivery potential - this test is performed on a soil/water composite. It is designed to determine the rate of hydrogen peroxide decomposition, oxygen off gassing, and persistence of dissolved oxygen in the water.

- Mineral analysis - calcium, magnesium, and iron content in the groundwater are analyzed since these minerals are potential catalysts for accelerating the degradation of hydrogen peroxide in the precipitation.

- Nutrient compatibility analysis - this test is used to examine the interaction of groundwater with inorganic nutrients.

The bioassessment evaluation process and report preparation are estimated to take a total of four (4) to six (6) weeks to complete. The objectives and content for a treatability study will be determined following the review of the site bioassessment data.

The biotreatability study would assess the degradability of the hydrocarbon of interest by native bacteria and establish parameters for managing controllable environmental factors to optimize the bioremediation process. A computerized respirometer would be employed to measure the rate of oxygen utilization and hydrocarbon dissipation in soil/water microcosms. The study would continue over a period of 12 weeks or until oxygen utilization has subsided. Microcosms (sample subsets containing organisms, substrate and media) representing various treatment conditions along with a control would be utilized to compare the untreated microcosms with those of the biologically inhibited control. Measurements of oxygen utilization and hydrocarbon dissipation an be made and equated with biodegradation. Study treatment parameters would be designed to provide varying degrees of stimulation to the

indigenous bacteria. These microcosms would be prepared using soil collected from the most contaminated areas of the site.

7.4 Recommendations for the Trumbo Point Fuel Farm

On March 21, 1991 IT personnel met with personnel from SouthDiv's UST section to discuss the results of the pilot treatment study as they related to the project to assess and remediate petroleum contamination at the nearby US Coast Guard Dock at Trumbo Point Annex. At that meeting, the overall situation at the Trumbo Point Fuel Farm was discussed from the perspective of how best to proceed with remediation efforts within the context of Florida regulations for addressing petroleum contamination.

It was recognized that the current IT contract modification to perform the pilot plant study was in reality a response measure to hopefully reduce ongoing migration of petroleum into Fleming Channel on the north side of the Fuel Farm. Under the conditions that existed, the project was undertaken without the usual preliminary contamination assessment effort which would have included plume definition and aquifer characterization. Such an effort if conducted on the entire site would also have addressed the JP-5 plume as well.

The meeting concluded with the stated intention to treat the fuel farm as one (1) site and to proceed with the normal approach prescribed under FAC 17-770, namely to consider the present work as part of an Initial Remedial Action effort and proceed with the performance of a contamination assessment, followed by a Remedial Action Plan. IT concurs with this course of action.

8.0 References

Black, Crow, and Eidness, Inc., October 1977. Monroe County 201 Wastewater Facility Plan, Draft Copy No. 11.

Department of Health, Education and Welfare, June 1975. Draft Environmental Impact Statement for the Conveyance and Expansion of a Portion of the US Navy Aquaduct Serving the Florida Keys.

Naval Facilities Engineering Command, Southern Division (SOUTHNAVFACENGCOM), January 1980a. Environmental Engineering Survey, Naval Air Station Key West, Florida.

Naval Facilities Engineering Command, Southern Division (SOUTHNAVFACENGCOM), September 1981a. Master Plan, Naval Complex, Key West, Florida.

Tables

TABLE 5-1
SAMPLE TYPE AND ANALYSES PREFORMED
NAS-KEY WEST
KEY WEST, FLORIDA

TYPE OF ANALYSIS	PRE START-UP	DATE OF SAMPLING															TOTAL NO. SAMPLES
		8/16/90*	8/30/90	9/6/90	9/13/90	9/20/90	10/4/90	10/25/90	11/2/90	11/15/90	11/29/90	12/13/90	1/9/91	1/29/91	2/13/91	2/21/91	
EPA 601	1/WATER					1/ WATER		1/ WATER		1/ WATER		1/ WATER		1/ WATER		1/ WATER	7
EPA 602	1/WATER + 1 QA	21/ WATER + 7 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER +1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	85
EPA 610		21/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	63
EPA 625	1/WATER					1/ WATER		1/ WATER		1/ WATER		1/ WATER		1/ WATER		1/ WATER	7
EPA 1310 EXTRACTION	2/SOILS																2
EPA 1010 IGNITABILITY	2/SOILS																2
EPA 7060 ARSENIC	2/SOILS																2
EPA 7131 CADMIUM	2/SOILS																2
EPA 7191 CHROMIUM	2/SOILS																2
EPA 7420 LEAD	2/SOILS																2
EPA 9020 TOTAL HALOGENS	2/SOILS																2
TOTAL NO. OF SHIPMENTS	ONE +	SEVEN +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE -	176 22 SHIPMENTS

* Three water samples plus one QA sample shipped every day for seven days during startup.

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TABLE 5-1
SAMPLE TYPE AND ANALYSES PREFORMED
NAS-KEY WEST
KEY WEST, FLORIDA

TYPE OF ANALYSIS	PRE START-UP	DATE OF SAMPLING															TOTAL NO. SAMPLES
		8/16/90*	8/30/90	9/6/90	9/13/90	9/20/90	10/4/90	10/25/90	11/2/90	11/15/90	11/29/90	12/13/90	1/9/91	1/29/91	2/13/91	2/21/91	
EPA 601	1/WATER					1/ WATER		1/ WATER		1/ WATER		1/ WATER		1/ WATER		1/ WATER	7
EPA 602	1/WATER + 1 QA	21/ WATER + 7 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	3/ WATER +1 QA	3/ WATER + 1 QA	3/ WATER + 1 QA	85
EPA 610		21/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	3/ WATER	63
EPA 625	1/WATER					1/ WATER		1/ WATER		1/ WATER		1/ WATER		1/ WATER		1/ WATER	7
EPA 1310 EXTRACTION	2/SOILS																2
EPA 1010 IGNITABILITY	2/SOILS																2
EPA 7060 ARSENIC	2/SOILS																2
EPA 7131 CADMIUM	2/SOILS																2
EPA 7191 CHROMIUM	2/SOILS																2
EPA 7420 LEAD	2/SOILS																2
EPA 9020 TOTAL HALOGENS	2/SOILS																2
																	176
TOTAL NO. OF SHIPMENTS	ONE +	SEVEN +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE +	ONE =	22 SHIPMENTS

* Three water samples plus one QA sample shipped every day for seven days during startup.

TABLE 6-1

AIR SPARGER INFLUENT/EFFLUENT CONCENTRATIONS (ug/liter)
PILOT TREATMENT STUDY
TRUMBO POINT FUEL FARM
NAS - KEY WEST
KEY WEST, FLORIDA

sampling date and location	08/16/90 influent/effluent	08/17/90 influent/effluent	08/20/90 influent/effluent	08/21/90 influent/effluent	08/22/90 influent/effluent
EPA 602 Parameters					
BENZENE	nd/nd	16/nd	19/nd	27/nd	6/nd
ETHYL BENZENE	nd/nd	26/nd	18/nd	15/nd	11/nd
TOLUENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
XYLENES	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
EPA 610 Parameters					
ANTHRACENE	nd/nd	1/nd	nd/nd	nd/nd	nd/nd
NAPTHALENE	nd/nd	nd/nd	nd/nd	33/nd	nd/nd
FLUORANTHENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
FLUORENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
PYRENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
ACENAPTHENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
PHENANTHRENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
BENZO(a)ANTHRACENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
CHRYSENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd

NOTE: Only those parameters detected above their respective detection limits at least once during the pilot study are reported in this table.
nd - not detected above laboratory detection limit
NA - not available

TABLE 6-1
(continued)

AIR SPARGER INFLUENT/EFFLUENT CONCENTRATIONS (ug/liter)
PILOT TREATMENT STUDY
TRUMBO POINT FUEL FARM
NAS - KEY WEST
KEY WEST, FLORIDA

sampling date and location	08/23/90 influent/effluent	08/30/90 influent/effluent	09/06/90 influent/effluent	09/13/90 influent/effluent	09/20/90 influent/effluent
EPA 602 PARAMETERS					
BENZENE	14/nd	25/nd	34/nd	31/nd	17/nd
ETHYL BENZENE	8/nd	24/nd	26/nd	24/nd	17/nd
TOLUENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
XYLENES	nd/nd	nd/nd	nd/nd	30/nd	14/nd
EPA 610 PARAMETERS					
ANTHRACENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
NAPTHALENE	nd/nd	30/nd	nd/nd	nd/nd	nd/nd
FLUORANTHENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
FLUORENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
PYRENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
ACENAPTHENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
PHENANTHRENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
BENZO(a)ANTHRACENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
CHRYSENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd

NOTE: Only those parameters detected above their respective detection limits at least once during the pilot study are reported in this table.
nd - not detected above laboratory detection limit
NA - not available

TABLE 6-1
(continued)

AIR SPARGER INFLUENT/EFFLUENT CONCENTRATIONS (ug/liter)
PILOT TREATMENT STUDY
TRUMBO POINT FUEL FARM
NAS - KEY WEST
KEY WEST, FLORIDA

sampling date and location	10/04/90 influent/effluent	10/25/90 influent/effluent	11/02/90 influent/effluent	11/15/90* influent/effluent	11/29/90 influent/effluent
EPA 602 PARAMETERS					
BENZENE	26/nd	36/nd	37/nd	24/nd	35/nd
ETHYL BENZENE	25/nd	33/nd	35/nd	210/32	41/nd
TOLUENE	nd/nd	nd/nd	nd/nd	nd/nd	nd/nd
XYLENES	15/nd	16/nd	16/nd	91/13	19/nd
EPA 610 PARAMETERS					
ANTHRACENE	nd/nd	nd/nd	9/nd	NA/260	34/nd
NAPTHALENE	53/nd	67/nd	80/nd	NA/100	50/nd
FLUORANTHENE	nd/nd	nd/nd	9/nd	NA/nd	nd/nd
FLUORENE	nd/nd	nd/nd	11/nd	NA/220	33/nd
PYRENE	nd/nd	nd/nd	9/nd	NA/nd	nd/nd
ACENAPTHENE	nd/nd	nd/nd	nd/nd	NA/nd	21/nd
PHENANTHRENE	nd/nd	nd/nd	nd/nd	NA/390	49/nd
BENZO(a)ANTHRACENE	nd/nd	nd/nd	nd/nd	NA/nd	nd/nd
CHRYSENE	nd/nd	nd/nd	nd/nd	NA/nd	nd/nd

NOTE: Only those parameters detected above their respective detection limits at least once during the pilot study are reported in this table.
nd - not detected above laboratory detection limit
NA - not available
* - NA due to matrix interference as reported by Lab

TABLE 6-1
(continued)

AIR SPARGER INFLUENT/EFFLUENT CONCENTRATIONS (ug/liter)
PILOT TREATMENT STUDY
TRUMBO POINT FUEL FARM
NAS - KEY WEST
KEY WEST, FLORIDA

sampling date	12/13/90 influent/effluent	1/09/91* influent/effluent	1/29/91* influent/effluent	2/13/91 influent/effluent	2/21/91 influent/effluent
EPA 602 PARAMETERS					
BENZENE	32/nd	16/nd	nd/nd		
ETHYL BENZENE	37/nd	19/nd	nd/nd		
TOLUENE	nd/nd	nd/nd	nd/nd		
XYLENES	18/nd	17/nd	nd/nd		
EPA 610 PARAMETERS				Air sparger bypassed	
ANTHRACENE	nd/1	NA/17000	13/NA		
NAPTHALENE	100/nd	NA/nd	38/NA		
FLUORANTHENE	nd/nd	NA/21000	67/NA		
FLUORENE	nd/nd	NA/nd	26/NA		
PYRENE	nd/nd	NA/nd	nd/NA		
ACENAPTHENE	nd/nd	NA/nd	nd/NA		
PHENANTHRENE	nd/2	NA/32000	49/NA		
BENZO(a)ANTHRACENE	nd/nd	NA/nd	nd/NA		
CHRYSENE	nd/nd	NA/nd	nd/NA		

NOTE: Only those parameters detected above their respective detection limits at least once during the pilot study are reported in this table.
nd - not detected above laboratory detection limit
NA - not available
* - NA due to matrix interference as reported by lab

TABLE 6-2

ACTIVATED CARBON INFLUENT/EFFLUENT CONCENTRATIONS (ug/Liter)
PILOT TREATMENT STUDY
TRUMBO POINT FUEL FARM
NAS - KEY WEST
KEY WEST FLORIDA

sampling date and location	2/15/91 influent/effluent	2/22/91 influent/effluent
EPA 602 Parameters		
BENZENE	32/nd	28/nd
ETHYL BENZENE	37/nd	23/nd
TOLUENE	nd/nd	31/nd
XYLENES	18/nd	50/nd
	18/nd	50/nd
EPA 610 Parameters		
ANTHRACENE	nd/1	1/0.23
NAPTHALENE	100/nd	44/0.22
FLUORENE	nd/nd	13/0.56
ACENAPTHENE	nd/nd	18/0.17
PHENANTHRENE	nd/2	12/1.1

NOTE: Only those parameters detected above their respective detection limits are reported in this table.
nd - not detected above laboratory detection limit

TABLE 6-3

TOTAL DISSOLVED SOLIDS ANALYSIS (mg/liter)
PILOT TREATMENT STUDY
TRUMBO POINT FUEL FARM
NAS - KEY WEST
KEY WEST, FLORIDA

	CONCENTRATION (ppm)		
DATE OF SAMPLING	Influent	Effluent #1	Effluent #2
February 14, 1991	3540	2100	1990
February 21, 1991	1940	1810	1850

NOTE: Influent is to sparger from infiltration gallery

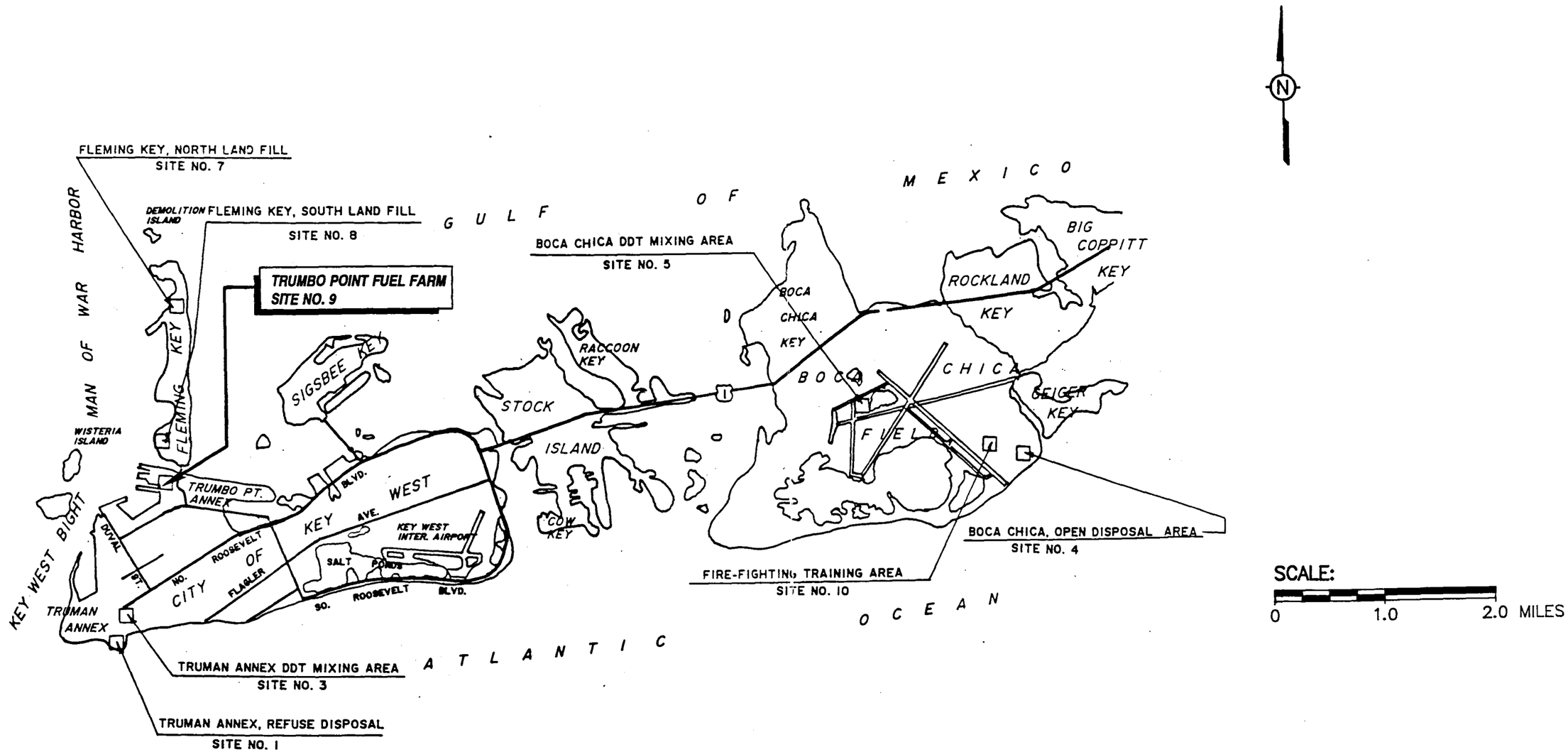
TABLE 6-4

MW 9-13 GROUND WATER ANALYTICAL RESULTS (ug/liter)
PILOT TREATMENT STUDY
TRUMBO POINT FUEL FARM
NAS - KEY WEST
KEY WEST, FLORIDA

sampling date	08/16/90	09/20/90	10/25/90	11/15/90	12/13/90	1/29/91	2/22/91
EPA 601/602 Parameters							
TRICHLOROFLUOROMETHANE	2.00	2.00	nd	nd	nd	nd	nd
METHYLENE CHLORIDE	nd	26.00	nd	nd	nd	nd	nd
ETHYL BENZENE	nd	nd	nd	nd	5.00	nd	nd
XYLENES	nd	nd	13.00	2.00	12.00	17.00	nd
EPA 625 Parameters							
NAPTHALENE	nd	12.00	22.00	18.00	17.00	nd	nd

NOTE: Only those parameters detected above their respective detection limits at least once during the pilot study are reported in this table.
nd - not detected above laboratory detection limit

Figures



SOURCE: FREDERICK H. HILDEBRANDT ENGINEER–SURVEYOR–PLANNER 15321 SO. DIXIE HWY., MIAMI, FOLRIDA 33157

FIGURE 1–1
SITE LOCATION MAP

PILOT STUDY REPORT
TRUMBO POINT FUEL FARM
KEY WEST, FLORIDA

Prepared for:
NAS–KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

STARTING DATE: 04\11\91	DATE LAST REV.:	DRAFT. CHCK. BY: J. HUBBARD	INITIATOR: D. GERARD
DRAWN BY: S. TOKAY	DRAWN BY:	ENGR. CHCK BY: D. GERARD	PROJ. MGR.: D. PHELPS
			DRAWING NO.: BB201041
			PROJ. NO.: 595391

(KNOXVILLE)

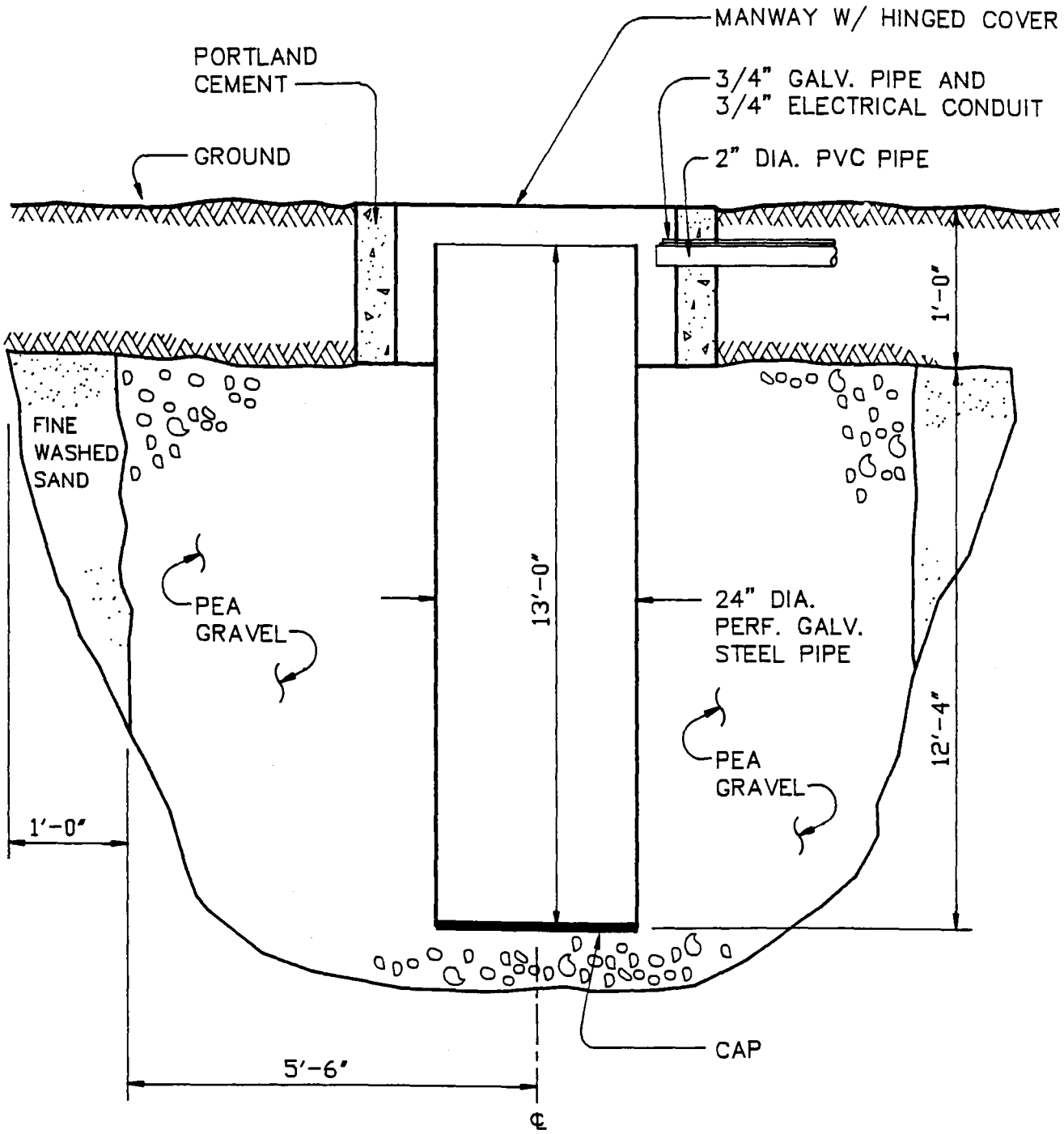


FIGURE 3-1

INFILTRATION GALLERY

PILOT TREATMENT STUDY REPORT
TRUMBO POINT FUEL FARM
KEY WEST, FLORIDA

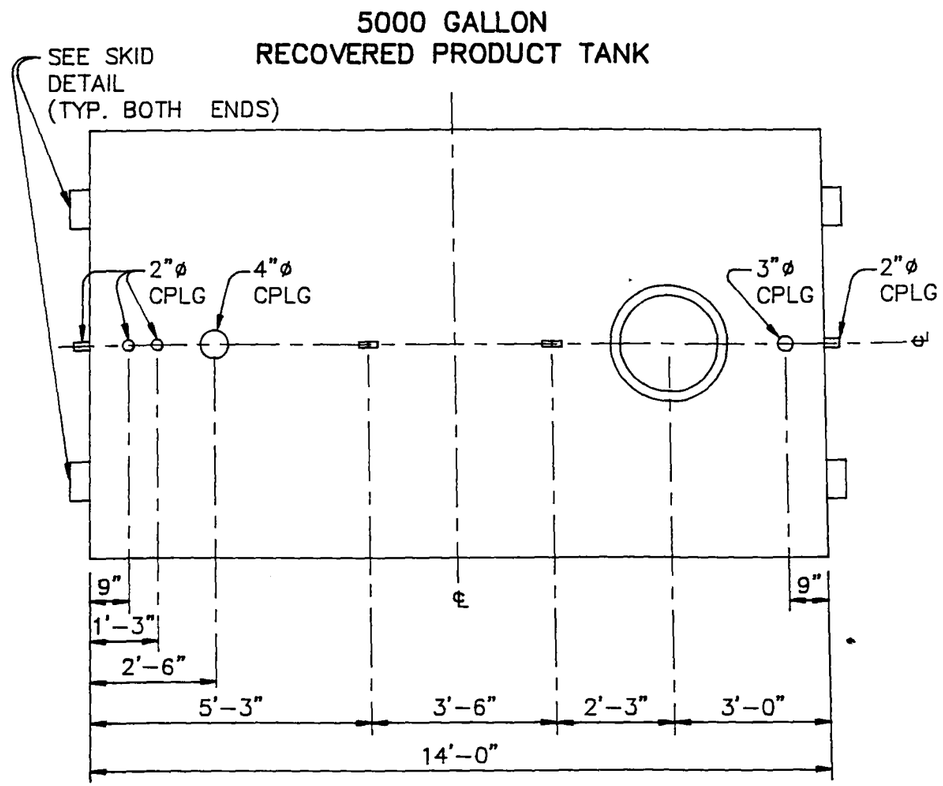
Prepared for:
NAS-KEY WEST
KEY WEST, FLORIDA

NOT TO SCALE

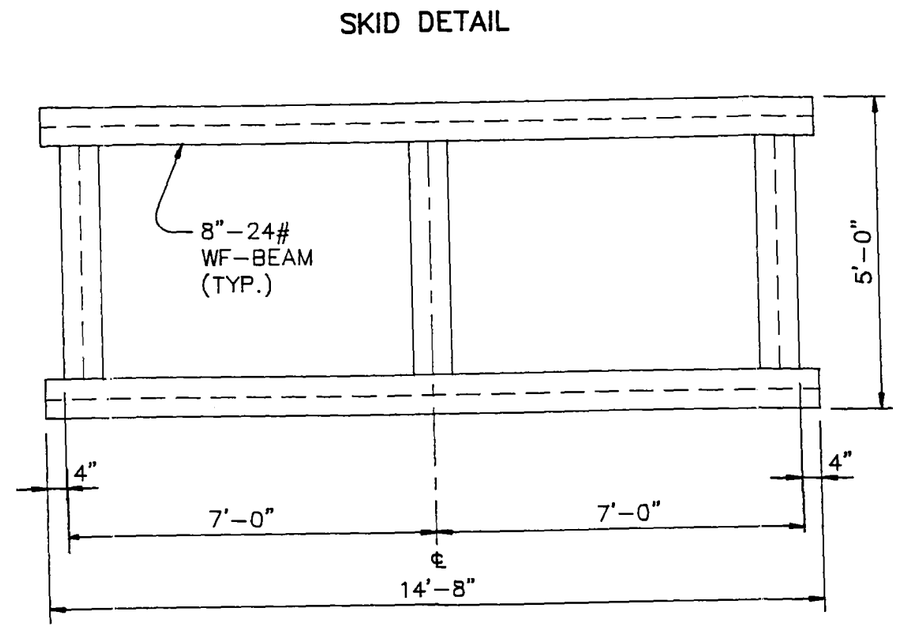
INTERNATIONAL TECHNOLOGY CORPORATION

KNOXVILLE

STARTING DATE: 03/29/91	LAST REV. DATE: 04/12/91	CHECKED BY: DG 7-11-91	INITIATOR: D. Gerard	DRAWING NO.: AA100883	STORED: JMR/AGI
DRAWN BY: JReillyhyers	DRAWN BY: G. ANDERSON	APPROVED BY: 7/11/91	PROJ. MGR.: W. D. Phelps	PROJ. NO.: 595391	ARCHIVED: N/A



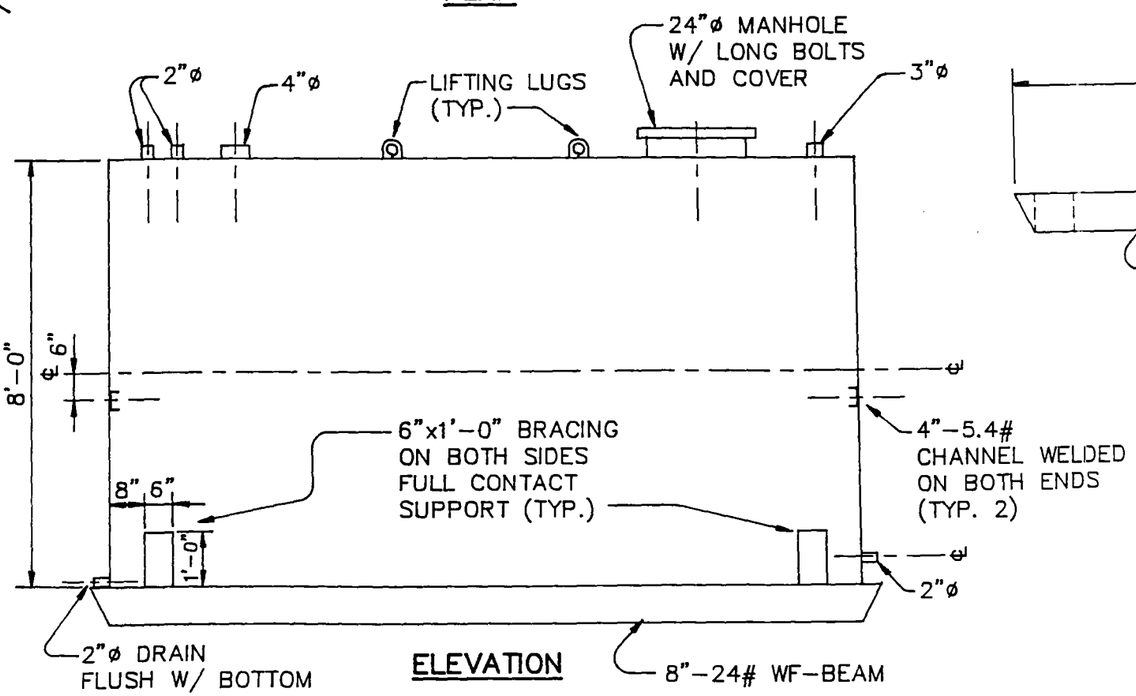
PLAN



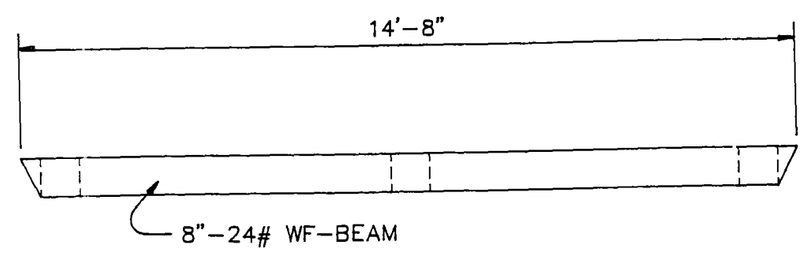
PLAN

NOTES:

1. MATERIAL TO BE 1/4" THICK A36 STEEL.
2. FINISH: INSIDE/OUTSIDE WITH MOBIL 40-AW-13 HIGH BUILD EPOXY.
3. ALL WELDED JOINTS.



ELEVATION



ELEVATION

NOT TO SCALE

FIGURE 3-2

RECOVERED PRODUCT TANK

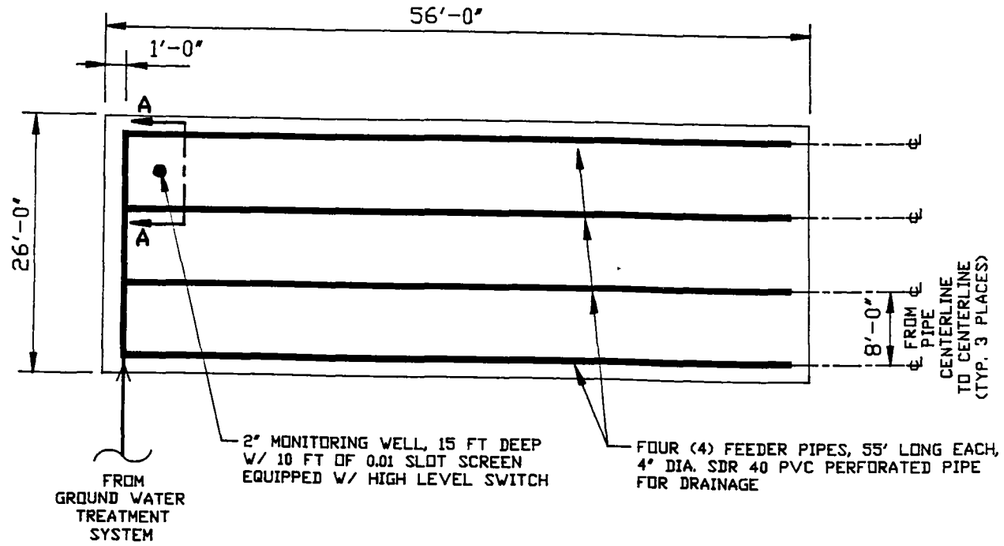
PILOT TREATMENT STUDY REPORT
TRUMBO POINT FUEL FARM
KEY WEST, FLORIDA

Prepared for
NAS-KEY WEST
KEY WEST, FLORIDA

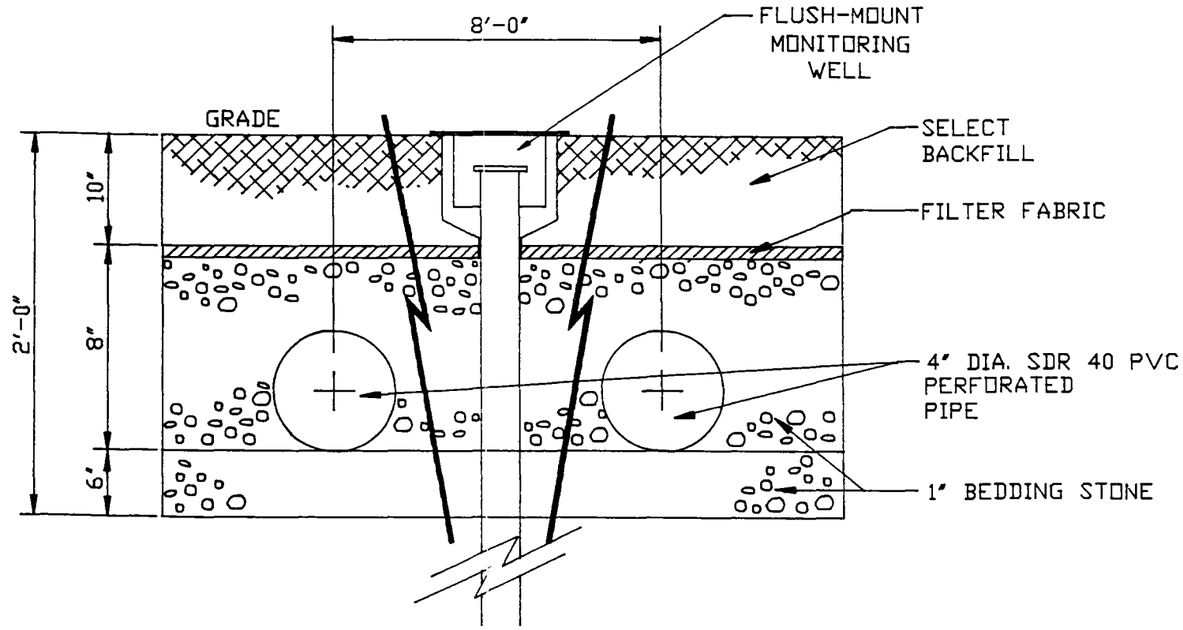
INTERNATIONAL TECHNOLOGY CORPORATION

KNOXVILLE

STARTING DATE: 04/23/90	LAST REV. DATE: 04/12/91	CHECKED BY: DG.	7/11/91	INITIATOR: KSenepad	DRAWING NO.: AB200068	STORED: C:\JMR\AB200068
DRAWN BY: JREILLYHYERS	DRAWN BY: G. ANDERSON	APPROVED BY:		PROJ. MGR.: RStephens	PROJ. NO.: 595391	ARCHIVED: N/A



PLAN VIEW



SECTION A–A VIEW

"NOT TO SCALE"

FIGURE 3–3

LEACH BED

PILOT TREATMENT STUDY REPORT
TRUMBO POINT FUEL FARM
KEY WEST, FLORIDA

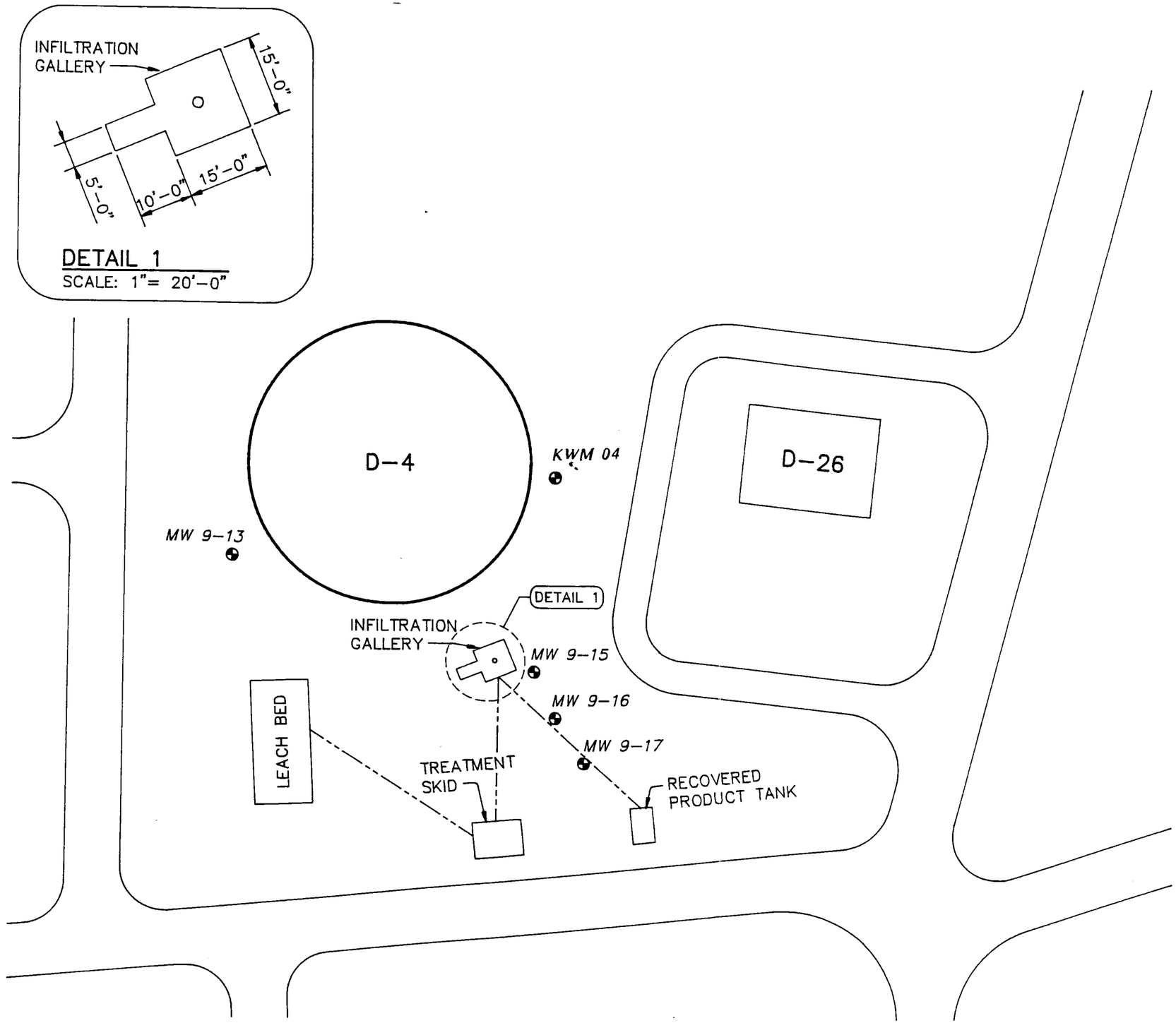
Prepared for:

NAS–KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

STARTING DATE: 12/18/90	LAST REV DATE: 04/12/91	DRAWING NO.: AB200469	STORED: JUR/AGI/ACAD\DWG
DRAWN BY: JREILLY/YYERS	DRAWN BY: G. ANDERSON	PROJ. NO.: 595391	ARCHIVED: N\A
INITIATOR: D.Gerard	CHECKED BY: D.G.	7-11-91	
PROJ. MGR.: DPhelps	APPROVED BY:	7-11-91	

KNOXVILLE



LEGEND:

- ◕ *MW 9-10* I.T. MONITORING WELL
- ---------- ABOVE GROUND PIPE

SCALE:

0 50 100 FT

FIGURE 4-1

PILOT TREATMENT SYSTEM LAYOUT

PILOT TREATMENT STUDY REPORT
TRUMBO POINT FUEL FARM
KEY WEST, FLORIDA

Prepared for:

NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

STARTING DATE: 04/12/91	LAST REV. DATE:	CHECKED BY: D.G.	7-11-91	INITIATOR: D. Gerard	DRAWING NO.: AB200886
DRAWN BY: G. ANDERSON	DRAWN BY:	APPROVED BY:	7-11-91	PROJ. MGR.: D. Phelps	PROJ. NO.: 595391

STORED: N/A
ARCHIVED: N/A

KNOXVILLE

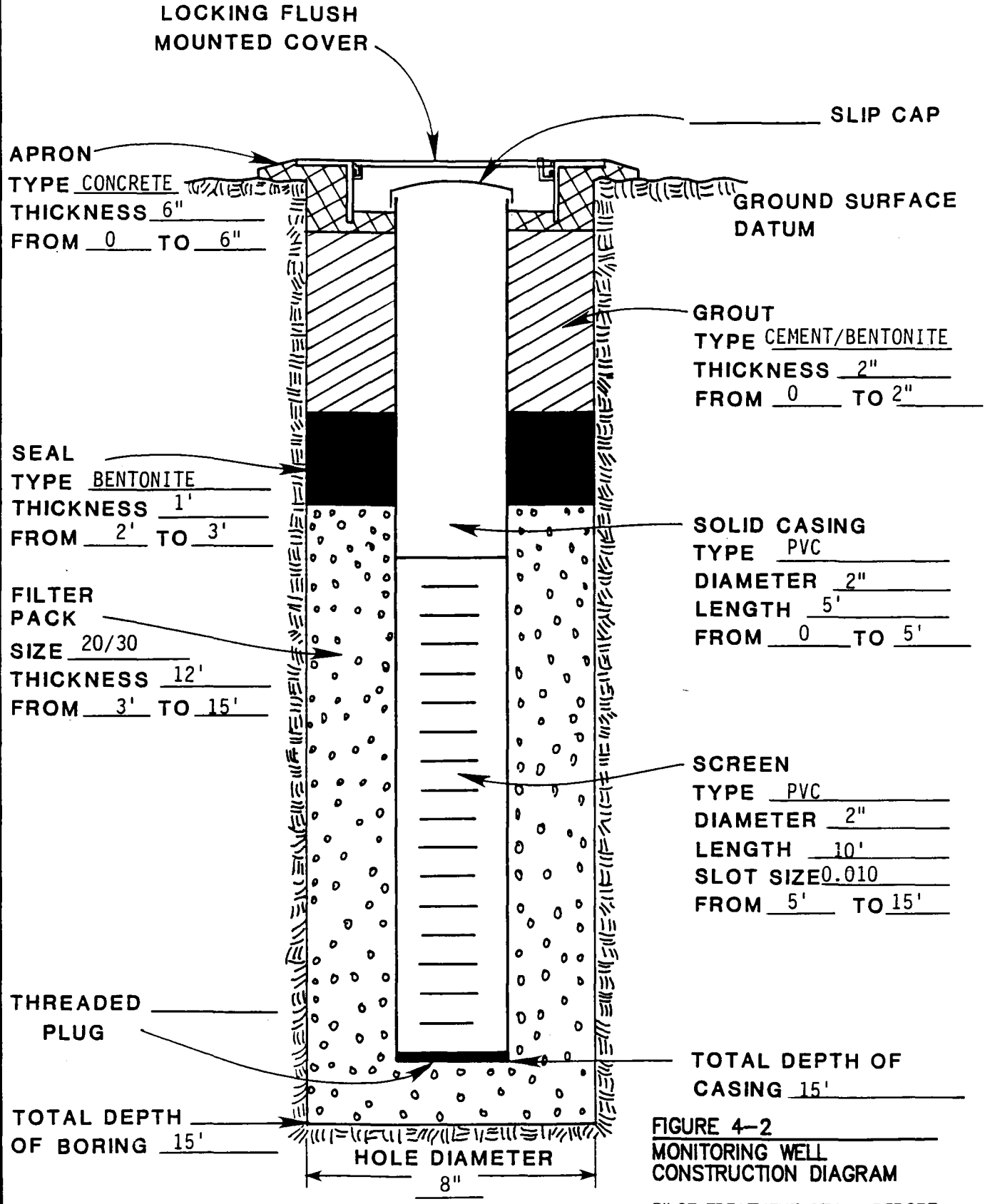


FIGURE 4-2
MONITORING WELL CONSTRUCTION DIAGRAM

PILOT TREATMENT STUDY REPORT
TRUMBO POINT FUEL FARM
KEY WEST, FLORIDA

Prepared for:
NAS-KEY WEST
KEY WEST, FLORIDA

INTERNATIONAL TECHNOLOGY CORPORATION

STARTING DATE: 4-12-91	DATE LAST REV.:
DRAWN BY: J NEAL	DRAWN BY:
INITIATOR: D. Gerard	DRAWING NO.: AA12001042
PROJ. ENGR.: D. Phelps	PROJECT NO.: 595391

Knc 11e

65360

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Do Not Scale This Drawing

Drawings

Appendix A
Design Calculations

INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 9/28/90 Subject AIR EMISSIONS Sheet No. 1 of 3

Chkd. By DP Date 9/28/90 AIR SPARGER UNIT Proj. No. 595391

NAS KEY WEST, FL

THE AIR SPARGER was designed to remove most of the volatile organic compounds (VOCs) present in the influent ground water to minimize the loading of the carbon adsorbers. The following air emission calculations are based on the assumption that 100% removal of VOCs takes place in the air sparger.

Basis: Water Flow rate = 50 gpm

Air Flow rate = 150 cfm

Emission ht = 11 ft

Max^m Hours of op^n = 168 hrs/wk

Influent concentration*

Benzene = 9.8 Mg/l

Toluene = 5 Mg/l

Ethyl Benzene = 5 Mg/l

* Source: Influent Sample taken on 8-16-90

Benzene Emission

$$\text{lbs/day} = Q\,\frac{\text{gal}}{\text{min}} \times 1440\,\frac{\text{min}}{\text{day}} \times 8.34\,\frac{\text{lbs}}{\text{gal}} \times \text{Conc}^n\,\frac{\text{lbs of Benzene}}{10^9\ \text{lbs of Water}}$$

$$= \frac{50 \times 1440 \times 8.34 \times 9.8}{10^9} = 0.006\ \frac{\text{lbs}}{\text{day}}$$

or 2.5×10^{-4} lb/hr

108-10-85

INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 9/28/90 Subject AIR EMISSIONS Sheet No. 2 of 3
Chkd. By BZ Date 9/28/90 AIR SPARGER UNIT Proj. No. 595391
NAS KEY WEST, FL

Similarly
Toluene emission lbs/day = 0.003 lbs/day
= OR 1.3×10^{-4} lbs/Hr

Ethyl Benzene emission lbs/day = 0.003 lbs/day
or 1.3×10^{-4} lbs/hr

For approval criteria Florida department of Environmental Regulation (FDER) has set the following standards.

(1) Acceptable Ambient Concentration (AAC) for a contaminant

$$AAC\ mg/m^3 = 0.238 \frac{TLV}{A}$$

where A = 100 for Acutely toxic compounds
A = 50 for Low toxic compounds
TLV = Threshold limit Values set by ACGIH

(2) Maximum Ambient Concentration (MAC)

$$MAC\ mg/m^3 = ACH^b$$

where A = 327.84
C = emission rate, lbs/Hr
H = stack height (ft)
b = -2.264

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INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 9/28/90 Subject AIR EMISSIONS Sheet No. 3 of 3

Chkd. By RB Date 9/28/90 AIR SPARGER UNIT. Proj. No. 595391

NAS KEY WEST, FL

A spread sheet summarizing the calculations (attached) confirms that the air emissions are within the acceptable FDER standards. Additionally, the actual operating water flow rate is set at 10 gallons per minute (1/5th the flow rate used in the calculations) which provides ensures a safety factor for remaining within the air emission standards.

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AIR STRIPPING EVALUATION WORK SHEET

SOURCE ID	= NAS KEY WEST	MAXm. INFLUENT FLOW RATE (GPM)=	50.00
LOCATION	= TRUMBO FUEL FARM	MAXm. AIR LOW RATE (CFM) =	150
MANUFACTURER	= NEPCCO	EMISSION POINT HEIGHT (FT) =	11
MODEL NO.	= SPARGER	MAXm. HOURS OF OPRN. (HRS./WK)=	168

CONTAMINANT NAME	MAXm. CONC. ppb	MAXm. EMISSION lb/hr	MAXm. AMBIENT IMPACT mg/cu. m.	TLV mg/cu. m.	CATEGORY A OR B A=100 B=50	AAC mg/cu. m.
BENZENE	10	2.5E-04	3.6E-04	3	100	7.1E-03
TOLUENE	5	1.3E-04	1.8E-04	375	50	1.8E+00
ETHYLBENZENE	5	1.3E-04	1.8E-04	435	100	1.0E+00

TLV = THRESHOLD LIMIT VALUE
AAC = ACCEPTABLE AMBIENT CONCENTRATION

INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 4-20-90 Subject KEY WEST. Sheet No. 1 of 6
Chkd. By BB Date 4-25-90 Sparger Design Proj. No. 595391

SPARGER DESIGN

Basis: Flow rate 50 gpm.
Assume Maximum concentration of Benzene in influent = 1,000 ppb.

Since sparging is a volatilization process that takes place at the surface between gas and liquid phases, a removal efficiency of 60% was assumed.

Ref: Removal of organic chemicals by sparging, K. Truong, Environmental Progress August 1984 (Vol. 3, No. 3)

$$\frac{C_{ae}}{C_{ai}} = \frac{1}{1 + K_a a \theta}$$ (P-17. Benefield & Randal)

where C_{ae} = effluent conc^n, ppb
C_{ai} = Influent conc^n ppb

$K_a a = 10\ hr^{-1}$ from pilot data. (for benzene P-149 - K. Truong)

$K_a a$ = stripping rate constant hr^{-1}
a = interfacial area, ft^2
θ = residence time
H = Henry's constant

$$\theta = \frac{1}{K_a a}\left(\frac{C_{ai}}{C_{ae}} - 1\right)$$

$$= \frac{1}{10} \times \frac{1000}{400}$$

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INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 4-20-90 Subject Key West Sheet No. 2 of 6
Chkd. By BB Date 4-25-90 Sparger Design Proj. No. 595311

$\theta = \underline{0.25}$ Hr

Volume of water

$V = 0.25 \times 60 \times 50 \frac{gal}{min} \frac{min}{Hr} Hr$

$= 750$ gals

$$K_a a \frac{V}{Q_{air}} = b(H)^m$$ — (P-147 K. Truong)

where
b & m are constants
H = Henry's constant (torr L/g.mole)
V = volume of liquid (gal)
Q = Air flow gal/min

Toluene data P-148 K. Truong was used instead of benzene
$b = 3.71 \times 10^{-3}$
$m = 1.045$

$H = 4{,}220 \frac{Torr\ L}{g\ mole}$ for Benzene — (P-149 K. Truong)

$$\frac{V}{Q_{Air}} = \frac{3.71 \times 10^{-3} \times (4220)^{1.045}}{10}$$

$$\frac{V}{Q_{Air}} = 2.28$$

$$Q_{Air} = \frac{750}{2.28} = 329 \text{ gals/min}$$
$$\simeq 43.99 \text{ cu ft/min}$$

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INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 4-20-90 Subject Key WEST Sheet No. 3 of 6
Chkd. By BB Date 4-25-90 Sparger Design Proj. No. 595391

Assume 3 ft of water level in tank

volume of water $= \frac{750}{7.4805} = 100.26$ cu ft

$\frac{\pi D^2}{4} \times H = 100.26$. $H = 3$

$D^2 = \frac{100.26 \times 4}{3 \times 3.142}$

$D = 6.52$

use 6' DIA and increase water level

$H = \frac{100.26}{36 \times 3.142} \times 4$

$= 3.55 \simeq \underline{3.5}$ ft

Vessel Dimension: 6' DIA x 9' TALL vessel. with 3.5 ft of water

108-10-85

INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 4-20-90 Subject Key West Sheet No. 4 of 6

Chkd. By BB Date 4-25-90 Sparger Design Proj. No. 595391

Air flow = 43.99 × 2 = 87.8 SCFM

With SF = 2 ≃ 90 SCFM

$$\Delta h = \frac{u^2}{2g_c}$$

Δh: Head loss

u = velocity in ft/sec

Rule of thumb for sparger:
total hole area = Area of cross section of pipe

2" SC 40 pipe ID = 2.067" Assuming 2" PVC Pipe

Area of 0.5 = $\pi \left(\frac{2.067}{12}\right)^2 \times \frac{1}{4}$

= 0.02 ft² ≃ 3.36 sq. in.

Total No. of holes required (assuming d = 0.25")

$$\pi \frac{(0.25)^2}{4} \times n = 3.36$$

n = 68.4

$n \simeq$ 68 holes.

Hole spacing required.

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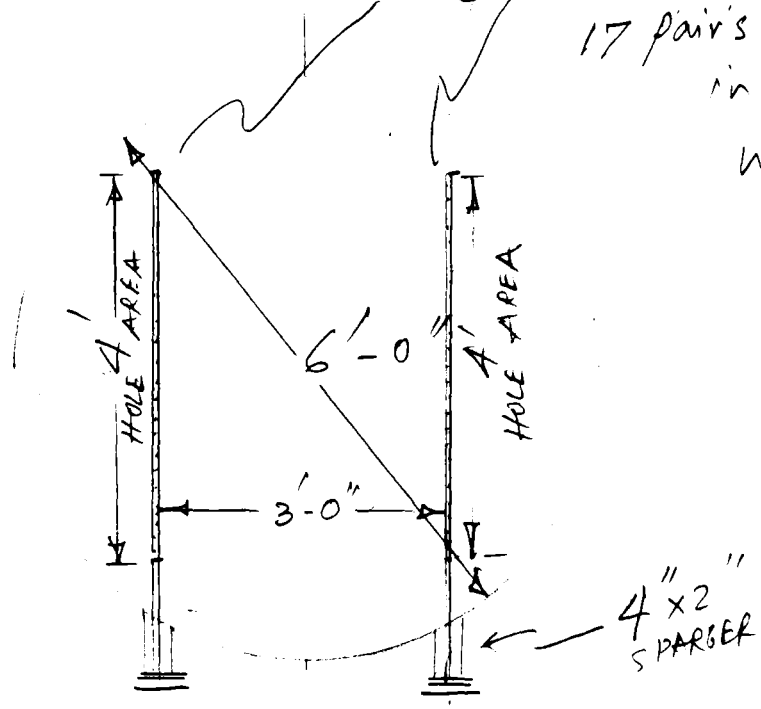
INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 4-20-90 Subject Key West Sheet No. 5 of 6

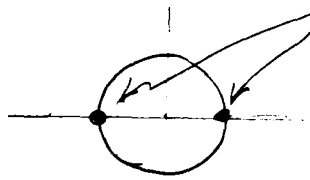
Chkd. By BB Date 0-25-90 Sparger Design Proj. No. 595391

68 - 0.25" holes ~~total~~ x
17 pairs of 5 holes
in 2 in sides
with 2 3/4" spacing



Total length = 8' of 2" pipe available for sparge holes.

$$\text{spacing} = \frac{8 \times 12}{34} = 2.82'' \simeq 2\tfrac{3}{4}''$$



2 holes on the side of the pipe (2" PVC)

Cross section of sparger ring

INTERNATIONAL TECHNOLOGY CORPORATION

By VCS Date 4-20-90 Subject Key West Sheet No. 6 of 6

Chkd. By BB Date 4-25-90 Spargar Design Proj. No. 595391

Flow per hole $\frac{90 \text{ cfm}}{68} \simeq 1.32$ cfm.

$= \frac{1.32}{60} = 0.02 \text{ ft}^3/\text{sec}$

$u = \frac{0.02 \text{ ft}^3}{\text{sec} \times 0.02 \text{ ft}^2}$ C.S = 0.02 ft

$= 1 \text{ ft/sec.}$

$\Delta h = \frac{1 \times 12}{2 \times 32.2} = 0.19$ inch/Hole.

for 68 holes = 12.67 inches of H_2O

Total head required

= 42" static head + 12.67" pressure loss

+ 10" (Losses-others)

= 64.67

$\simeq$ 65" H_2O. minimum.

BLOWER required = 80 CFM @ 65" H_2O

108-10-85

INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 5/25/90 Subject CARBON Usage Rate Sheet No. 1 of

Chkd. By AM Date 5-25-90 NAS - Key West. Proj. No. 595391-01-8

No. 2 Diesel fuel contains approximately 25-30% Aromatics, 5% olefins, and the remainder being Paraffins and naphthenes. Due to lack of actual concentration data in the groundwater to be treated on site, a maximum of 20 mg/l of Total Organic Carbon (TOC) was assumed.

Using attached isotherm for No. 2 Diesel fuel

influent concentration = 20 mg/l

$$\text{Carbon usage} = \frac{20 \times 8.34}{600}$$

$$= 0.28 \ \frac{\text{lbs of carbon}}{\text{1000 gals of influent}}$$

Maximum flow rate predicted by G&M in the pilot study report = 50 gpm OR 72,000 gals/day

Total Carbon per Column = 1600 lbs

$$\text{Total volume of groundwater that could be processed per column} = \frac{1600 \text{ lbs}}{0.28 \text{ lbs}} \times 1000 \text{ gals of influent}$$

$$= 5.75 \times 10^6 \text{ gals}$$

$$\text{Life of Carbon per column} = \frac{5.75 \times 10^6 \text{ gals}}{72{,}000 \text{ gals}} \times \text{day} \simeq 80 \text{ days}$$

108-10-85

INTERNATIONAL TECHNOLOGY CORPORATION

By KS Date 5/25/90 Subject CARBON Usage Rate Sheet No. 2 of 2
Chkd. By SAM Date 5-25-90 NAS Key West. Proj. No. 595391-01-80

For two Columns = 80x2 = 160 days
Using S.F of 1.20 and providing other misc. allowances, a maximum of one carbon load changeout will be necessary during the life of the project of 180 days.

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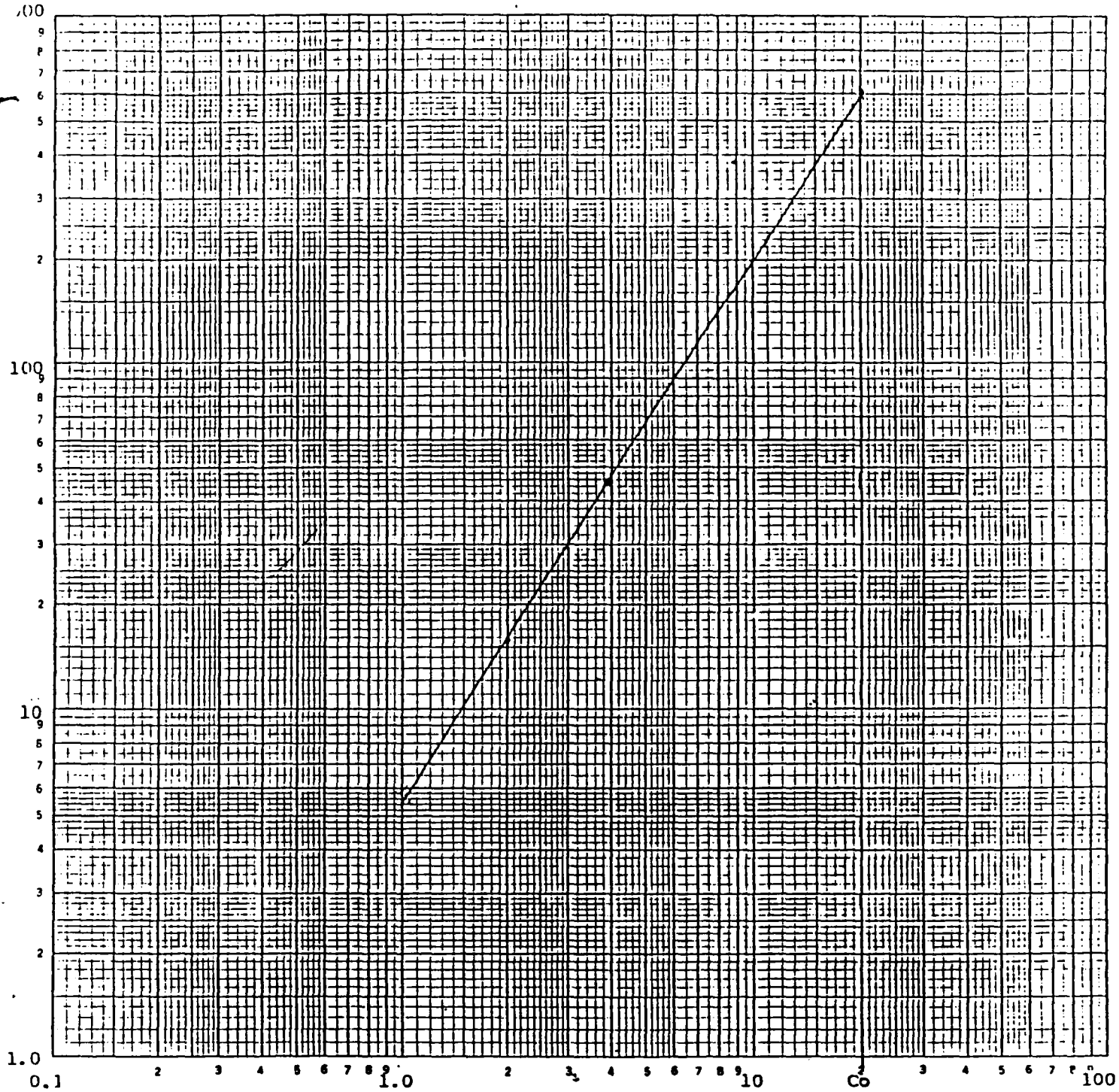
NO. 2 DIESEL FUEL ISOTHERM



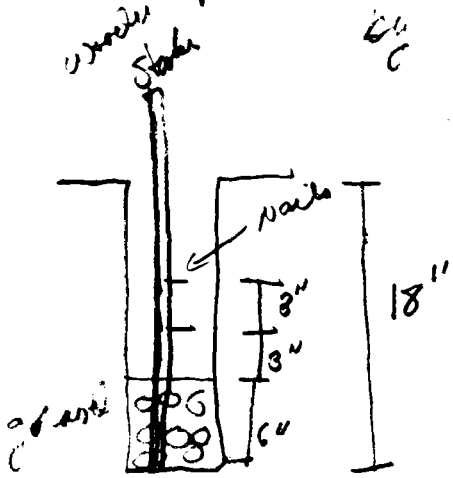
9/86

SOURCE : CARBTROL® CORPORATION • 39 Riverside Avenue, Westport, CT 06880 • 1-800-242-1150 • (203) 226-5642

INTERNATIONAL TECHNOLOGY CORPORATION

By MJJ Date 4/26/90 Subject Key West - Pilot Study Sheet No. 1 of 3
Chkd. By KG Date 5/9/90 Perc Test Proj. No. 595391
01 80

Purpose: Determine K value for soil by standard percolation test

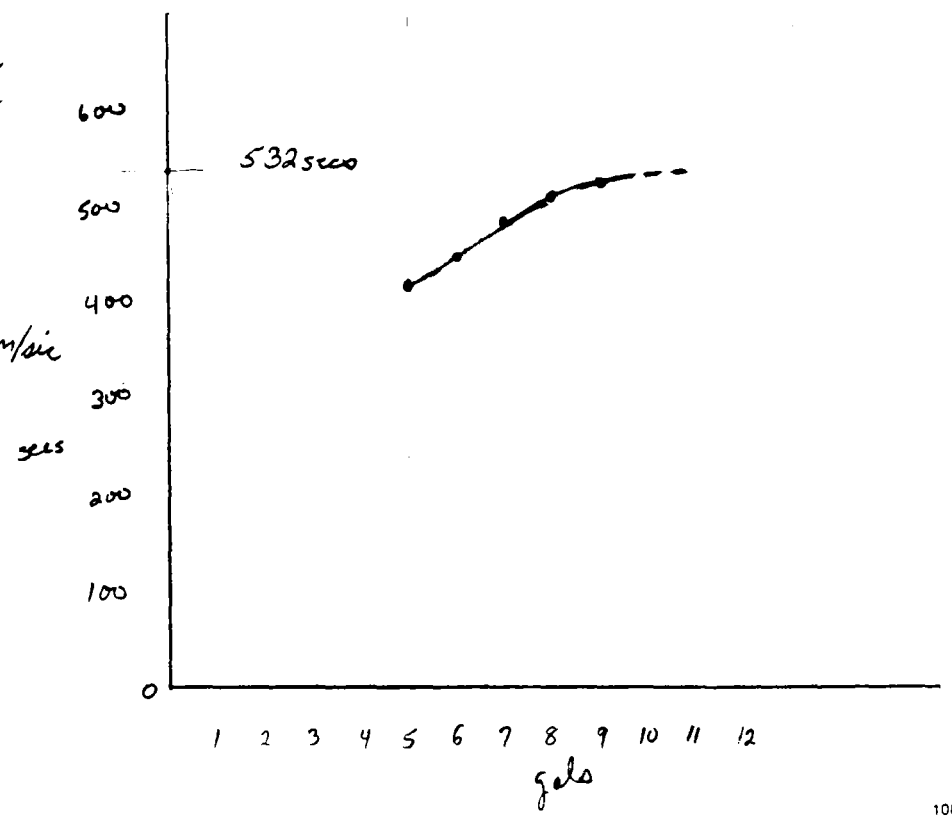


Fill hole with water and allow to saturate soils.
Measure rate of fall 3 [illegible] times to determine [illegible] rate of [illegible] [illegible].

Test Site #1

	Time for 3" fall (sec)
Run 1	413 sec
Run 2	449 sec
Run 3	481 sec
Run 4	508 sec
Run 5	521 sec

$K_1 = 3cm / 532 sec = 5.64 \times 10^{-3} cm/sec$



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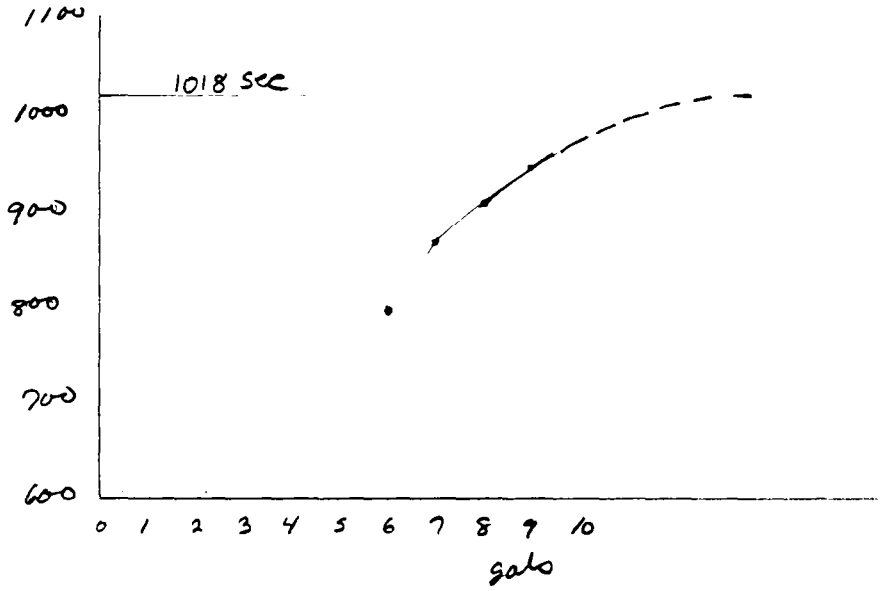
INTERNATIONAL TECHNOLOGY CORPORATION

By MJJ Date 4/26/90 Subject Key West Pilot Study Sheet No. 2 of 3
Chkd. By [illegible] Date 5/9/90 Rec Tests Proj. No. 595391

Site # 2 5 gal/min to saturate

	Time (sec)
Run 1	797
Run 2	865
Run 3	904
Run 4	942

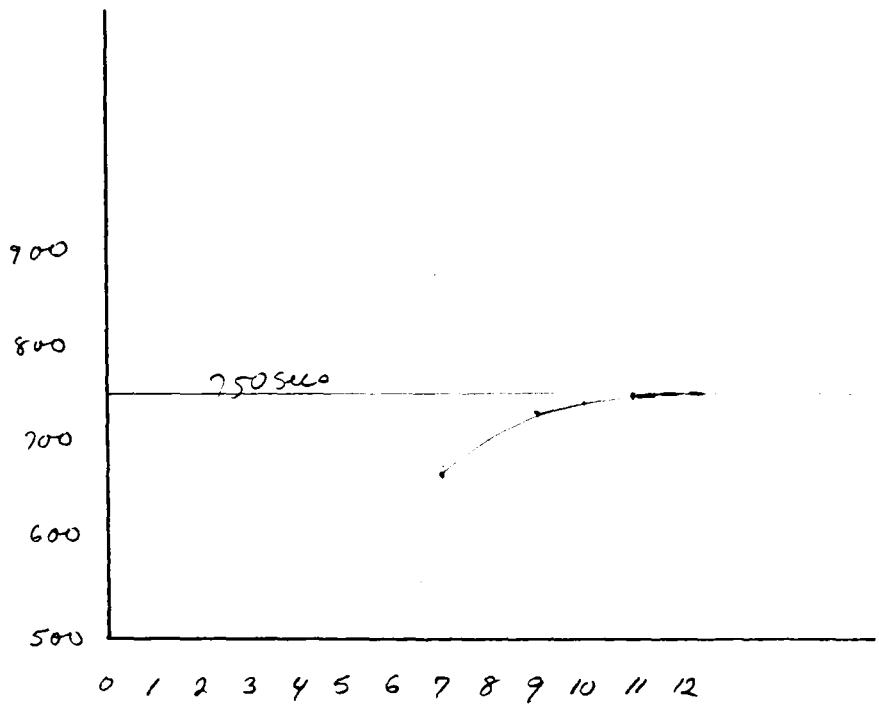
$K_2 = 3\text{in}/1018\text{sec} = 2.95 \times 10^{-3}$ in/sec



Site # 3

	Time (sec)
Run 1	668
Run 2	734
Run 3	742
Run 4	748

$K_3 = 3\text{in}/750\text{sec} = 4.00 \times 10^{-3}$ in/sec



INTERNATIONAL TECHNOLOGY CORPORATION

By MJ Date 5/8/90 Subject Key West Pilot Study Sheet No. 3 of 3

Chkd. By LS Date 5/9/90 Pump Tests Proj. No. 595391

K values

site 1 - K_1 = 5.64×10^{-3} in/sec $\bar{X}$ = 4.20×10^{-3} in/sec

site 2 - K_2 = 2.95×10^{-3} in/sec

site 3 - K_3 = 4.00×10^{-3} in/sec S = 1.36×10^{-3} in/sec

a 90% range $\mu \doteq \mu \pm 1.645\sigma$

approximated $\bar{X} \pm 1.645\,S$ we are concerned with smallest K

$$K = 4.20 \times 10^{-3} - (1.645)(1.36 \times 10^{-3}) =$$

$$1.96 \times 10^{-3} \text{ in/sec}$$

convert to ft/day

$(1.96 \times 10^{-3}$ in/sec$)(\frac{1 \text{ in}}{12 \text{ ft}})(60 \frac{\text{sec}}{\text{min}})(60 \frac{\text{min}}{\text{hr}})(24 \frac{\text{hr}}{\text{day}})$

$= 14.1$ ft/day

and cm/sec

$(1.96 \times 10^{-3}$ in/sec$)(2.540$ cm/in$) =$

4.99×10^{-3} cm/sec

108-10-85

```
                    U.S. GEOLOGICAL SURVEY MODULAR FINITE-DIFFERENCE GROUND-WATER MODEL
GROUND WATER MODELING FOR MOUNDING PROBLEMS                                INFLITRATION GALLERY - PILOT STUDY, KEY WEST
   1 LAYERS         9 ROWS         7 COLUMNS
  1 STRESS PERIOD(S) IN SIMULATION
MODEL TIME UNIT IS DAYS
I/O UNITS:
ELEMENT OF IUNIT:  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24
        I/O UNIT: 11 12  0  0  0  0 17 18 19  0  0 22  0  0  0  0  0  0  0  0  0  0  0  0
BAS1 -- BASIC MODEL PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM UNIT  1
ARRAYS RHS AND BUFF WILL SHARE MEMORY.
STATIC HEAD WILL BE SAVED
     587 ELEMENTS IN X ARRAY ARE USED BY BAS
     587 ELEMENTS OF X ARRAY USED OUT OF  100000
BCF -- BLOCK-CENTERED FLOW PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM UNIT 11
STEADY-STATE SIMULATION
     LAYER  AQUIFER TYPE
     ------------------
        1         1
     127 ELEMENTS IN X ARRAY ARE USED BY BCF
     714 ELEMENTS OF X ARRAY USED OUT OF  100000
WEL -- WELL PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM 12
MAXIMUM OF   11 WELLS
      44 ELEMENTS IN X ARRAY ARE USED FOR WELLS
     758 ELEMENTS OF X ARRAY USED OUT OF  100000
RCH -- RECHARGE PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM UNIT 18
OPTION 1 -- RECHARGE TO TOP LAYER
      63 ELEMENTS OF X ARRAY USED FOR RECHARGE
     821 ELEMENTS OF X ARRAY USED OUT OF  100000
GHB1 -- GHB PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM UNIT 17
MAXIMUM OF   21 HEAD-DEPENDENT BOUNDARY NODES
     105 ELEMENTS IN X ARRAY ARE USED FOR HEAD-DEPENDENT BOUNDARIES
     926 ELEMENTS OF X ARRAY USED OUT OF  100000
SIP1 -- STRONGLY IMPLICIT PROCEDURE SOLUTION PACKAGE, VERSION 1, 9/1/87 INPUT READ FROM UNIT 19
MAXIMUM OF  50 ITERATIONS ALLOWED FOR CLOSURE
  5 ITERATION PARAMETERS
     457 ELEMENTS IN X ARRAY ARE USED BY SIP
    1383 ELEMENTS OF X ARRAY USED OUT OF  100000
1GROUND WATER MODELING FOR MOUNDING PROBLEMS                               INFLITRATION GALLERY - PILOT STUDY, KEY WEST
```

Model on test of map
Infiltration gallery
with infiltration @ 100 gpm
and a recovery well.

FILE COPY

BOUNDARY ARRAY FOR LAYER 1 WILL BE READ ON UNIT 1 USING FORMAT: (40I2)

```
      1  2  3  4  5  6  7
..............................
     -1 -1 -1 -1 -1 -1 -1
      1  1  1  1  1  1  1
  3   1  1  1  1  1  1  1
  4   1  1  1  1  1  1  1
      1  1  1  1  1  1  1
  6   1  1  1  1  1  1  1
  7   1  1  1  1  1  1  1
      1  1  1  1  1  1  1
      1  1  1  1  1  1  1
AQUIFER HEAD WILL BE SET TO  .00000     AT ALL NO-FLOW NODES (IBOUND=0).
```

INITIAL HEAD, LAYER 1 WILL BE READ UNFORMATTED ON UNIT 29

```
          1           2           3           4           5           6           7
```

1	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2	.3372	1.400	1.383	1.378	1.370	1.316	.8912
	.3616	1.463	1.448	1.443	1.436	1.383	.9641
	.3659	1.474	1.459	1.454	1.447	1.394	.9771
5	.3699	1.483	1.468	1.463	1.456	1.403	.9899
	.3739	1.491	1.477	1.472	1.465	1.412	1.002
	.3776	1.497	1.484	1.479	1.472	1.420	1.015
8	.3973	1.527	1.516	1.512	1.505	1.457	1.081
	.5019	1.143	1.195	1.204	1.213	1.260	1.619

H D PRINT FORMAT IS FORMAT NUMBER 4 DRAWDOWN PRINT FORMAT IS FORMAT NUMBER 4
HEADS WILL BE SAVED ON UNIT 0 DRAWDOWNS WILL BE SAVED ON UNIT 0
OUTPUT CONTROL IS SPECIFIED EVERY TIME STEP

COLUMN TO ROW ANISOTROPY = 1.000000

DELR WILL BE READ ON UNIT 11 USING FORMAT: (7G11.4)

1000.0 100.00 10.000 10.000 10.000 100.00 1000.0

DELC WILL BE READ ON UNIT 11 USING FORMAT: (7G11.4)

1000.0 100.00 10.000 10.000 10.000 10.000 10.000 100.00 1000.0

HYD. COND. ALONG ROWS = 14.10000 FOR LAYER 1
BOTTOM = -20.00000 FOR LAYER 1

SOLUTION BY THE STRONGLY IMPLICIT PROCEDURE

MAXIMUM ITERATIONS ALLOWED FOR CLOSURE = 50
ACCELERATION PARAMETER = 1.0000
HEAD CHANGE CRITERION FOR CLOSURE = .10000E-01
SIP HEAD CHANGE PRINTOUT INTERVAL = 1
CALCULATE ITERATION PARAMETERS FROM MODEL CALCULATED WSEED
STRESS PERIOD NO. 1, LENGTH = 180.0000

NUMBER OF TIME STEPS = 12

MULTIPLIER FOR DELT = 1.000

INITIAL TIME STEP SIZE = 15.00000

11 WELLS

LAYER	ROW	COL	STRESS RATE	WELL NO.
1	3	3	192.40	1
1	3	4	192.40	2
1	4	3	192.40	3
1	4	4	192.40	4
1	5	3	192.40	5
1	5	4	192.40	6
1	6	3	192.40	7
1	6	4	192.40	8
1	7	3	192.40	9
1	7	4	192.40	10
1	4	2	-1924.0	11

RECHARGE WILL BE READ ON UNIT 13 USING FORMAT: (7G11.4)

	1	2	3	4	5	6	7
1	.0000	.0000	.0000	.0000	.0000	.0000	.0000
2	.0000	1.0270E-02	1.0270E-02	1.0270E-02	1.0270E-02	2.5000E-03	.0000
	.0000	1.0270E-02	1.0270E-02	1.0270E-02	1.0270E-02	2.5000E-03	.0000
	.0000	1.0270E-02	1.0270E-02	1.0270E-02	1.0270E-02	2.5000E-03	.0000
5	.0000	1.0270E-02	1.0270E-02	1.0270E-02	1.0270E-02	2.5000E-03	.0000
	.0000	1.0270E-02	1.0270E-02	1.0270E-02	1.0270E-02	2.5000E-03	.0000
	.0000	1.0270E-02	1.0270E-02	1.0270E-02	1.0270E-02	2.5000E-03	.0000
8	.0000	1.0270E-02	1.0270E-02	1.0270E-02	1.0270E-02	2.5000E-03	.0000
9	.0000	.0000	.0000	.0000	.0000	.0000	.0000

21 HEAD-DEPENDENT BOUNDARY NODES

LAYER	ROW	COL	ELEVATION	CONDUCTANCE	BOUND NO.
1	2	1	.0000	28.20	1
1	3	1	.0000	2.820	2
1	4	1	.0000	2.820	3
1	5	1	.0000	2.820	4
1	6	1	.0000	2.820	5
1	7	1	.0000	2.820	6
1	9	2	2.500	28.20	7
1	9	3	3.000	2.820	8
1	9	4	3.000	2.820	9
1	9	5	3.000	2.820	10
1	9	6	3.000	28.20	11
1	9	7	2.500	564.0	12
1	8	7	2.500	28.20	13
1	7	7	2.500	2.820	14
1	6	7	2.500	2.820	15
1	5	7	2.500	2.820	16
1	4	7	2.500	2.820	17
1	3	7	2.500	2.820	18
1	2	7	2.500	28.20	19
1	8	1	.0000	28.20	20
1	9	1	.0000	564.0	21

RAGE SEED = .00590343
IMUM SEED = .00001109

5 ITERATION PARAMETERS CALCULATED FROM AVERAGE SEED:

.0000000E+00 .7228110E+00 .9231662E+00 .9787025E+00 .9940966E+00

10 ITERATIONS FOR TIME STEP 1 IN STRESS PERIOD 1
IMUM HEAD CHANGE FOR EACH ITERATION:

HEAD CHANGE	LAYER,ROW,COL	HEAD CHANGE	LAYER,ROW,COL	HEAD CHANGE	LAYER,ROW,COL	HEAD CHANGE	LAYER,ROW,COL	HEAD CHANGE	LAYER,ROW,COL
-2.730	(1, 4, 2)	-.8256	(1, 2, 3)	.5265	(1, 6, 5)	.4697	(1, 7, 3)	.2423	(1, 4, 2)
.2697E-01	(1, 4, 2)	-.1007E-01	(1, 6, 4)	-.1111E-01	(1, 4, 5)	-.1259E-01	(1, 4, 3)	-.4935E-02	(1, 4, 2)

AD/DRAWDOWN PRINTOUT FLAG = 1 TOTAL BUDGET PRINTOUT FLAG = 0 CELL-BY-CELL FLOW TERM FLAG = 0
UTPUT FLAGS FOR ALL LAYERS ARE THE SAME:

HEAD INTOUT	DRAWDOWN PRINTOUT	HEAD SAVE	DRAWDOWN SAVE
1	1	0	0

1 HEAD IN LAYER 1 AT END OF TIME STEP 1 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
2	.25	.68	1.45	1.59	1.66	1.83	.97

4	[illegible]	-.46	3.71	3.86	3.54	[illegible]	1.06
5	.28	-.10	3.81	3.95	3.62	2.29	1.08
	.28	.19	3.80	3.92	3.59	2.30	1.09
	.29	.40	3.66	3.77	3.46	2.28	1.10
8	.31	1.18	1.85	1.93	1.97	2.07	1.17
	.48	1.16	1.22	1.23	1.24	1.29	1.66

DRAWDOWN IN LAYER 1 AT END OF TIME STEP 1 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
	.09	.72	-.10	-.21	-.28	-.52	-.08
	.09	1.68	-2.07	-2.21	-1.92	-.84	-.09
4	.09	1.94	-2.25	-2.40	-2.09	-.87	-.09
	.09	1.58	-2.34	-2.48	-2.16	-.89	-.09
	.09	1.30	-2.33	-2.45	-2.13	-.89	-.09
7	.09	1.10	-2.18	-2.29	-1.98	-.86	-.09
	.09	.35	-.33	-.42	-.47	-.61	-.09
	.02	-.02	-.02	-.02	-.03	-.03	-.04

TIME SUMMARY AT END OF TIME STEP 1 IN STRESS PERIOD 1

	SECONDS	MINUTES	HOURS	DAYS	YEARS
TIME STEP LENGTH	.129600E+07	21600.0	360.000	15.0000	.410678E-01
STRESS PERIOD TIME	.129600E+07	21600.0	360.000	15.0000	.410678E-01
TOTAL SIMULATION TIME	.129600E+07	21600.0	360.000	15.0000	.410678E-01

1 ITERATIONS FOR TIME STEP 2 IN STRESS PERIOD 1

MAXIMUM HEAD CHANGE FOR EACH ITERATION:

HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL

-.8649E-03 (1, 4, 2)

HEAD/DRAWDOWN PRINTOUT FLAG = 1 TOTAL BUDGET PRINTOUT FLAG = 0 CELL-BY-CELL FLOW TERM FLAG = 0

OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:

HEAD PRINTOUT	DRAWDOWN PRINTOUT	HEAD SAVE	DRAWDOWN SAVE
1	1	0	0

HEAD IN LAYER 1 AT END OF TIME STEP 2 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
2	.25	.68	1.49	1.59	1.66	1.83	.97
3	.27	-.22	3.52	3.66	3.36	2.22	1.05
4	.27	-.46	3.71	3.86	3.54	2.27	1.06
5	.28	-.10	3.81	3.95	3.62	2.29	1.08
6	.28	.19	3.80	3.92	3.59	2.30	1.09
7	.29	.40	3.66	3.77	3.46	2.28	1.10
8	.31	1.18	1.84	1.93	1.97	2.07	1.17
9	.48	1.16	1.22	1.23	1.24	1.29	1.66

DRAWDOWN IN LAYER 1 AT END OF TIME STEP 2 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
2	.09	.72	-.10	-.21	-.28	-.52	-.08
3	.09	1.68	-2.07	-2.21	-1.92	-.84	-.09
4	.09	1.94	-2.25	-2.40	-2.09	-.87	-.09

.09	1.30	-2.33	-2.45	-2.13	-.89	-.09
.09	1.10	-2.18	-2.29	-1.98	-.86	-.09
.09	.35	-.33	-.42	-.47	-.61	-.09
.02	-.02	-.02	-.03	-.03	-.03	-.04

TIME SUMMARY AT END OF TIME STEP 2 IN STRESS PERIOD 1

	SECONDS	MINUTES	HOURS	DAYS	YEARS
TIME STEP LENGTH	.129600E+07	21600.0	360.000	15.0000	.410678E-01
STRESS PERIOD TIME	.259200E+07	43200.0	720.000	30.0000	.821355E-01
TOTAL SIMULATION TIME	.259200E+07	43200.0	720.000	30.0000	.821355E-01

1 ITERATIONS FOR TIME STEP 3 IN STRESS PERIOD 1

MAXIMUM HEAD CHANGE FOR EACH ITERATION:

HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL

-.2084E-03 (1, 2, 3)

HEAD/DRAWDOWN PRINTOUT FLAG = 1 TOTAL BUDGET PRINTOUT FLAG = 0 CELL-BY-CELL FLOW TERM FLAG = 0

OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:

HEAD PRINTOUT	DRAWDOWN PRINTOUT	HEAD SAVE	DRAWDOWN SAVE
1	1	0	0

HEAD IN LAYER 1 AT END OF TIME STEP 3 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
2	.25	.68	1.49	1.59	1.66	1.83	.97
3	.27	-.22	3.52	3.66	3.36	2.22	1.05
4	.27	-.46	3.71	3.86	3.54	2.27	1.06
5	.28	-.10	3.81	3.95	3.62	2.29	1.08
6	.28	.19	3.80	3.92	3.59	2.30	1.09
7	.29	.40	3.66	3.77	3.46	2.28	1.10
8	.31	1.18	1.84	1.93	1.97	2.07	1.17
9	.48	1.16	1.22	1.23	1.24	1.29	1.66

DRAWDOWN IN LAYER 1 AT END OF TIME STEP 3 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
2	.09	.72	-.10	-.21	-.28	-.52	-.08
3	.09	1.68	-2.07	-2.21	-1.92	-.84	-.09
4	.09	1.94	-2.25	-2.40	-2.09	-.87	-.09
5	.09	1.58	-2.34	-2.48	-2.16	-.89	-.09
6	.09	1.30	-2.33	-2.45	-2.13	-.89	-.09
7	.09	1.10	-2.18	-2.29	-1.98	-.86	-.09
8	.09	.35	-.33	-.42	-.47	-.61	-.09
9	.02	-.02	-.02	-.03	-.03	-.03	-.04

TIME SUMMARY AT END OF TIME STEP 3 IN STRESS PERIOD 1

	SECONDS	MINUTES	HOURS	DAYS	YEARS
TIME STEP LENGTH	.129600E+07	21600.0	360.000	15.0000	.410678E-01
STRESS PERIOD TIME	.388800E+07	64800.0	1080.00	45.0000	.123203
TOTAL SIMULATION TIME	.388800E+07	64800.0	1080.00	45.0000	.123203

1 ITERATIONS FOR TIME STEP 4 IN STRESS PERIOD 1

```
HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL
-----------------------------------------------------------------------------------------------------------------------------------
    7969E-04 (  1,  3,  2)
0
0HEAD/DRAWDOWN PRINTOUT FLAG = 1     TOTAL BUDGET PRINTOUT FLAG = 0     CELL-BY-CELL FLOW TERM FLAG = 0
0OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
    HEAD    DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE    SAVE
 -------------------------------
     1         1       0       0
1                     HEAD IN LAYER  1 AT END OF TIME STEP  4 IN STRESS PERIOD  1
          ---------------------------------------------------------------------

           1       2       3       4       5       6       7
 ..............................................................
0         .00     .00     .00     .00     .00     .00     .00
0         .25     .68    1.49    1.59    1.66    1.83     .97
0  3      .27    -.22    3.52    3.66    3.36    2.22    1.05
0         .27    -.46    3.71    3.86    3.54    2.27    1.06
0         .28    -.10    3.81    3.95    3.62    2.29    1.08
0  6      .28     .19    3.80    3.92    3.59    2.30    1.09
0  7      .29     .40    3.66    3.77    3.46    2.28    1.10
0         .31    1.18    1.84    1.93    1.97    2.07    1.17
0         .48    1.16    1.22    1.23    1.24    1.29    1.66
1                  DRAWDOWN IN LAYER  1 AT END OF TIME STEP  4 IN STRESS PERIOD  1
          ---------------------------------------------------------------------

           1       2       3       4       5       6       7
 ..............................................................
0         .00     .00     .00     .00     .00     .00     .00
0  2      .09     .72    -.10    -.21    -.28    -.52    -.08
0  3      .09    1.68   -2.07   -2.21   -1.92    -.84    -.09
0         .09    1.94   -2.25   -2.40   -2.09    -.87    -.09
0         .09    1.58   -2.34   -2.48   -2.16    -.89    -.09
0  6      .09    1.30   -2.33   -2.45   -2.13    -.89    -.09
0         .09    1.10   -2.18   -2.29   -1.98    -.86    -.09
0         .09     .35    -.33    -.42    -.47    -.61    -.09
0  9      .02    -.02    -.02    -.03    -.03    -.03    -.04
0


         TIME SUMMARY AT END OF TIME STEP  4 IN STRESS PERIOD  1
                              SECONDS        MINUTES         HOURS          DAYS           YEARS
                         ---------------------------------------------------------------------------
      TIME STEP LENGTH        .129600E+07    21600.0        360.000        15.0000        .410678E-01
    STRESS PERIOD TIME        .518400E+07    86400.0        1440.00        60.0000        .164271
   TOTAL SIMULATION TIME      .518400E+07    86400.0        1440.00        60.0000        .164271
1
     1 ITERATIONS FOR TIME STEP   5 IN STRESS PERIOD  1
0  MAXIMUM HEAD CHANGE FOR EACH ITERATION:
0 HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL
-----------------------------------------------------------------------------------------------------------------------------------
   -.2880E-04 (  1,  2,  3)
0
0HEAD/DRAWDOWN PRINTOUT FLAG = 1     TOTAL BUDGET PRINTOUT FLAG = 0     CELL-BY-CELL FLOW TERM FLAG = 0
0  OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
    HEAD    DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE    SAVE
   -------------------------------
     1         1       0       0
1                     HEAD IN LAYER  1 AT END OF TIME STEP  5 IN STRESS PERIOD  1
          ---------------------------------------------------------------------

           1       2       3       4       5       6       7
 ..............................................................
```

```
  2      .25     .68    1.49    1.59    1.66    1.83     .97
  3      .27    -.22    3.52    3.66    3.36    2.22    1.05
  4      .27    -.46    3.71    3.86    3.54    2.27    1.06
  5      .28    -.10    3.81    3.95    3.62    2.29    1.08
  6      .28     .19    3.80    3.92    3.59    2.30    1.09
  7      .29     .40    3.66    3.77    3.46    2.28    1.10
  8      .31    1.18    1.84    1.93    1.97    2.07    1.17
  9      .48    1.16    1.22    1.23    1.24    1.29    1.66
                 DRAWDOWN IN LAYER  1 AT END OF TIME STEP  5 IN STRESS PERIOD  1
          ------------------------------------------------------------------

          1       2       3       4       5       6       7
 ..........................................................
  1      .00     .00     .00     .00     .00     .00     .00
  2      .09     .72    -.10    -.21    -.28    -.52    -.08
  3      .09    1.68   -2.07   -2.21   -1.92    -.84    -.09
  4      .09    1.94   -2.25   -2.40   -2.09    -.87    -.09
  5      .09    1.58   -2.34   -2.48   -2.16    -.89    -.09
  6      .09    1.30   -2.33   -2.45   -2.13    -.89    -.09
  7      .09    1.10   -2.18   -2.29   -1.98    -.86    -.09
  8      .09     .35    -.33    -.42    -.47    -.61    -.09
  9      .02    -.02    -.02    -.03    -.03    -.03    -.04


       TIME SUMMARY AT END OF TIME STEP  5 IN STRESS PERIOD  1
                              SECONDS        MINUTES         HOURS          DAYS           YEARS
                         ---------------------------------------------------------------------------
    TIME STEP LENGTH         .129600E+07    21600.0        360.000        15.0000        .410678E-01
  STRESS PERIOD TIME         .648000E+07    108000.        1800.00        75.0000        .205339
TOTAL SIMULATION TIME        .648000E+07    108000.        1800.00        75.0000        .205339

   1 ITERATIONS FOR TIME STEP   6 IN STRESS PERIOD  1
MAXIMUM HEAD CHANGE FOR EACH ITERATION:
 HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL
  ---------------------------------------------------------------------------------------------------------------------------------
  -.1018E-04 (  1,  3,  2)

 AD/DRAWDOWN PRINTOUT FLAG = 1     TOTAL BUDGET PRINTOUT FLAG = 0     CELL-BY-CELL FLOW TERM FLAG = 0
 TPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD    DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE    SAVE
  -------------------------------
    1         1       0       0
                     HEAD IN LAYER  1 AT END OF TIME STEP  6 IN STRESS PERIOD  1
          ------------------------------------------------------------------

          1       2       3       4       5       6       7
 ..........................................................
  1      .00     .00     .00     .00     .00     .00     .00
  2      .25     .68    1.49    1.59    1.66    1.83     .97
  3      .27    -.22    3.52    3.66    3.36    2.22    1.05
  4      .27    -.46    3.71    3.86    3.54    2.27    1.06
  5      .28    -.10    3.81    3.95    3.62    2.29    1.08
  6      .28     .19    3.80    3.92    3.59    2.30    1.09
  7      .29     .40    3.66    3.77    3.46    2.28    1.10
  8      .31    1.18    1.84    1.93    1.97    2.07    1.17
  9      .48    1.16    1.22    1.23    1.24    1.29    1.66
                 DRAWDOWN IN LAYER  1 AT END OF TIME STEP  6 IN STRESS PERIOD  1
          ------------------------------------------------------------------

          1       2       3       4       5       6       7
 ..........................................................
  1      .00     .00     .00     .00     .00     .00     .00
  2      .09     .72    -.10    -.21    -.28    -.52    -.08
```

4	.09	1.91	-2.22	-2.46	-2.09	-.8[illegible]	-.0[illegible]
5	.09	1.58	-2.34	-2.48	-2.16	-.89	-.09
6	.09	1.30	-2.33	-2.45	-2.13	-.89	-.09
7	.09	1.10	-2.18	-2.29	-1.98	-.86	-.09
8	.09	.35	-.33	-.42	-.47	-.61	-.09
9	.02	-.02	-.02	-.03	-.03	-.03	-.04

TIME SUMMARY AT END OF TIME STEP 6 IN STRESS PERIOD 1

	SECONDS	MINUTES	HOURS	DAYS	YEARS
TIME STEP LENGTH	.129600E+07	21600.0	360.000	15.0000	.410678E-01
STRESS PERIOD TIME	.777600E+07	129600.	2160.00	90.0000	.246407
TOTAL SIMULATION TIME	.777600E+07	129600.	2160.00	90.0000	.246407

1 ITERATIONS FOR TIME STEP 7 IN STRESS PERIOD 1

MAXIMUM HEAD CHANGE FOR EACH ITERATION:

HEAD CHANGE	LAYER,ROW,COL	HEAD CHANGE	LAYER,ROW,COL	HEAD CHANGE	LAYER,ROW,COL	HEAD CHANGE	LAYER,ROW,COL	HEAD CHANGE	LAYER,ROW,COL
-.3376E-05	(1, 2, 3)								

HEAD/DRAWDOWN PRINTOUT FLAG = 1 TOTAL BUDGET PRINTOUT FLAG = 0 CELL-BY-CELL FLOW TERM FLAG = 0

OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:

HEAD PRINTOUT	DRAWDOWN PRINTOUT	HEAD SAVE	DRAWDOWN SAVE
1	1	0	0

HEAD IN LAYER 1 AT END OF TIME STEP 7 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
2	.25	.68	1.49	1.59	1.66	1.83	.97
3	.27	-.22	3.52	3.66	3.36	2.22	1.05
4	.27	-.46	3.71	3.86	3.54	2.27	1.06
5	.28	-.10	3.81	3.95	3.62	2.29	1.08
6	.28	.19	3.80	3.92	3.59	2.30	1.09
7	.29	.40	3.66	3.77	3.46	2.28	1.10
8	.31	1.18	1.84	1.93	1.97	2.07	1.17
9	.48	1.16	1.22	1.23	1.24	1.29	1.66

DRAWDOWN IN LAYER 1 AT END OF TIME STEP 7 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
2	.09	.72	-.10	-.21	-.28	-.52	-.08
3	.09	1.68	-2.07	-2.21	-1.92	-.84	-.09
4	.09	1.94	-2.25	-2.40	-2.09	-.87	-.09
5	.09	1.58	-2.34	-2.48	-2.16	-.89	-.09
6	.09	1.30	-2.33	-2.45	-2.13	-.89	-.09
7	.09	1.10	-2.18	-2.29	-1.98	-.86	-.09
8	.09	.35	-.33	-.42	-.47	-.61	-.09
9	.02	-.02	-.02	-.03	-.03	-.03	-.04

TIME SUMMARY AT END OF TIME STEP 7 IN STRESS PERIOD 1

	SECONDS	MINUTES	HOURS	DAYS	YEARS
TIME STEP LENGTH	.129600E+07	21600.0	360.000	15.0000	.410678E-01
STRESS PERIOD TIME	.907200E+07	151200.	2520.00	105.000	.287474
TOTAL SIMULATION TIME	.907200E+07	151200.	2520.00	105.000	.287474

1 ITERATIONS FOR TIME STEP 8 IN STRESS PERIOD 1
MAXIMUM HEAD CHANGE FOR EACH ITERATION:
HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL

.1683E-05 (1, 6, 4)

HEAD/DRAWDOWN PRINTOUT FLAG = 1 TOTAL BUDGET PRINTOUT FLAG = 0 CELL-BY-CELL FLOW TERM FLAG = 0
OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:

HEAD PRINT	DRAWDOWN PRINTOUT	HEAD SAVE	DRAWDOWN SAVE
1	0	0	

HEAD IN LAYER 1 AT END OF TIME STEP 8 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
2	.25	.68	1.49	1.59	1.66	1.83	.97
3	.27	-.22	3.52	3.66	3.36	2.22	1.05
4	.27	-.46	3.71	3.86	3.54	2.27	1.06
5	.28	-.10	3.81	3.95	3.62	2.29	1.08
6	.28	.19	3.80	3.92	3.59	2.30	1.09
7	.29	.40	3.66	3.77	3.46	2.28	1.10
8	.31	1.18	1.84	1.93	1.97	2.07	1.17
9	.48	1.16	1.22	1.23	1.24	1.29	1.66

DRAWDOWN IN LAYER 1 AT END OF TIME STEP 8 IN STRESS PERIOD 1

	1	2	3	4	5	6	7
1	.00	.00	.00	.00	.00	.00	.00
2	.09	.72	-.10	-.21	-.28	-.52	-.08
3	.09	1.68	-2.07	-2.21	-1.92	-.84	-.09
4	.09	1.94	-2.25	-2.40	-2.09	-.87	-.09
5	.09	1.58	-2.34	-2.48	-2.16	-.89	-.09
6	.09	1.30	-2.33	-2.45	-2.13	-.89	-.09
7	.09	1.10	-2.18	-2.29	-1.98	-.86	-.09
8	.09	.35	-.33	-.42	-.47	-.61	-.09
9	.02	-.02	-.02	-.03	-.03	-.03	-.04

TIME SUMMARY AT END OF TIME STEP 8 IN STRESS PERIOD 1

	SECONDS	MINUTES	HOURS	DAYS	YEARS
TIME STEP LENGTH	.129600E+07	21600.0	360.000	15.0000	.410678E-01
STRESS PERIOD TIME	.103680E+08	172800.	2880.00	120.000	.328542
TOTAL SIMULATION TIME	.103680E+08	172800.	2880.00	120.000	.328542

1 ITERATIONS FOR TIME STEP 9 IN STRESS PERIOD 1
MAXIMUM HEAD CHANGE FOR EACH ITERATION:
HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL

.1203E-05 (1, 6, 4)

HEAD/DRAWDOWN PRINTOUT FLAG = 1 TOTAL BUDGET PRINTOUT FLAG = 0 CELL-BY-CELL FLOW TERM FLAG = 0
OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:

HEAD PRINTOUT	DRAWDOWN PRINTOUT	HEAD SAVE	DRAWDOWN SAVE
1	1	0	0

HEAD IN LAYER 1 AT END OF TIME STEP 9 IN STRESS PERIOD 1

```
 1      .00     .00     .00     .00     .00     .00     .00
        .25     .68    1.49    1.59    1.66    1.83     .97
 3      .27    -.22    3.52    3.66    3.36    2.22    1.05
 4      .27    -.46    3.71    3.86    3.54    2.27    1.06
        .28    -.10    3.81    3.95    3.62    2.29    1.08
        .28     .19    3.80    3.92    3.59    2.30    1.09
 7      .29     .40    3.66    3.77    3.46    2.28    1.10
        .31    1.18    1.84    1.93    1.97    2.07    1.17
        .48    1.16    1.22    1.23    1.24    1.29    1.66
                 DRAWDOWN IN LAYER  1 AT END OF TIME STEP  9 IN STRESS PERIOD  1
        ----------------------------------------------------------------------

         1       2       3       4       5       6       7
 ..............................................................
        .00     .00     .00     .00     .00     .00     .00
        .09     .72    -.10    -.21    -.28    -.52    -.08
 3      .09    1.68   -2.07   -2.21   -1.92    -.84    -.09
        .09    1.94   -2.25   -2.40   -2.09    -.87    -.09
        .09    1.58   -2.34   -2.48   -2.16    -.89    -.09
 6      .09    1.30   -2.33   -2.45   -2.13    -.89    -.09
 7      .09    1.10   -2.18   -2.29   -1.98    -.86    -.09
        .09     .35    -.33    -.42    -.47    -.61    -.09
 9      .02    -.02    -.02    -.03    -.03    -.03    -.04


        TIME SUMMARY AT END OF TIME STEP  9 IN STRESS PERIOD  1
                                SECONDS        MINUTES         HOURS          DAYS           YEARS
                            ---------------------------------------------------------------------------
     TIME STEP LENGTH         .129600E+07    21600.0        360.000        15.0000        .410678E-01
   STRESS PERIOD TIME         .116640E+08    194400.        3240.00        135.000        .369610
 TOTAL SIMULATION TIME        .116640E+08    194400.        3240.00        135.000        .369610

    1 ITERATIONS FOR TIME STEP  10 IN STRESS PERIOD  1
MAXIMUM HEAD CHANGE FOR EACH ITERATION:
HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL
-------------------------------------------------------------------------------------------------------------------------------
  .9845E-06 (  1,  6,  4)

HEAD/DRAWDOWN PRINTOUT FLAG = 1     TOTAL BUDGET PRINTOUT FLAG = 0     CELL-BY-CELL FLOW TERM FLAG = 0
OUTPUT FLAGS FOR ALL LAYERS ARE THE SAME:
  HEAD    DRAWDOWN  HEAD  DRAWDOWN
PRINTOUT  PRINTOUT  SAVE    SAVE
 ----------------------------------
    1        1       0       0
                     HEAD IN LAYER  1 AT END OF TIME STEP 10 IN STRESS PERIOD  1
        ----------------------------------------------------------------------

         1       2       3       4       5       6       7
 ..............................................................
 1      .00     .00     .00     .00     .00     .00     .00
 2      .25     .68    1.49    1.59    1.66    1.83     .97
 3      .27    -.22    3.52    3.66    3.36    2.22    1.05
 4      .27    -.46    3.71    3.86    3.54    2.27    1.06
 5      .28    -.10    3.81    3.95    3.62    2.29    1.08
 6      .28     .19    3.80    3.92    3.59    2.30    1.09
 7      .29     .40    3.66    3.77    3.46    2.28    1.10
 8      .31    1.18    1.84    1.93    1.97    2.07    1.17
 9      .48    1.16    1.22    1.23    1.24    1.29    1.66
                 DRAWDOWN IN LAYER  1 AT END OF TIME STEP 10 IN STRESS PERIOD  1
        ----------------------------------------------------------------------

         1       2       3       4       5       6       7
 ..............................................................
```

```
0  3      .09    1.68   -2.07   -2.21   -1.92    -.84    -.09
0         .09    1.94   -2.25   -2.40   -2.09    -.87    -.09
0  5      .09    1.58   -2.34   -2.48   -2.16    -.89    -.09
0  6      .09    1.30   -2.33   -2.45   -2.13    -.89    -.09
0         .09    1.10   -2.18   -2.29   -1.98    -.86    -.09
0         .09     .35    -.33    -.42    -.47    -.61    -.09
0  9      .02    -.02    -.02    -.03    -.03    -.03    -.04
0


        TIME SUMMARY AT END OF TIME STEP 10 IN STRESS PERIOD  1
                                SECONDS        MINUTES         HOURS          DAYS           YEARS
                            ----------------------------------------------------------------------
     TIME STEP LENGTH         .129600E+07    21600.0        360.000        15.0000        .410678E-01
   STRESS PERIOD TIME         .129600E+08    216000.        3600.00        150.000        .410678
 T  AL SIMULATION TIME        .129600E+08    216000.        3600.00        150.000        .410678
1
    1 ITERATIONS FOR TIME STEP  11 IN STRESS PERIOD  1
0M  IMUM HEAD CHANGE FOR EACH ITERATION:
0 HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL
 ---------------------------------------------------------------------------------------------------------------------------------
   .8216E-06 (  1,  6,  4)
0
0HEAD/DRAWDOWN PRINTOUT FLAG = 1     TOTAL BUDGET PRINTOUT FLAG = 0     CELL-BY-CELL FLOW TERM FLAG = 0
0( PUT FLAGS FOR ALL LAYERS ARE THE SAME:
   HEAD    DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE    SAVE
 ------------------------------
    1         1       0       0
1                    HEAD IN LAYER  1 AT END OF TIME STEP 11 IN STRESS PERIOD  1
          ----------------------------------------------------------------------

          1       2       3       4       5       6       7
 ..............................................................
0  1      .00     .00     .00     .00     .00     .00     .00
0  2      .25     .68    1.49    1.59    1.66    1.83     .97
0  3      .27    -.22    3.52    3.66    3.36    2.22    1.05
0  4      .27    -.46    3.71    3.86    3.54    2.27    1.06
0  5      .28    -.10    3.81    3.95    3.62    2.29    1.08
0  6      .28     .19    3.80    3.92    3.59    2.30    1.09
0  7      .29     .40    3.66    3.77    3.46    2.28    1.10
0  8      .31    1.18    1.84    1.93    1.97    2.07    1.17
0  9      .48    1.16    1.22    1.23    1.24    1.29    1.66
1                  DRAWDOWN IN LAYER  1 AT END OF TIME STEP 11 IN STRESS PERIOD  1
          ----------------------------------------------------------------------

          1       2       3       4       5       6       7
 ..............................................................
0  1      .00     .00     .00     .00     .00     .00     .00
0  2      .09     .72    -.10    -.21    -.28    -.52    -.08
0  3      .09    1.68   -2.07   -2.21   -1.92    -.84    -.09
0  4      .09    1.94   -2.25   -2.40   -2.09    -.87    -.09
0  5      .09    1.58   -2.34   -2.48   -2.16    -.89    -.09
0  6      .09    1.30   -2.33   -2.45   -2.13    -.89    -.09
0  7      .09    1.10   -2.18   -2.29   -1.98    -.86    -.09
0  8      .09     .35    -.33    -.42    -.47    -.61    -.09
0  9      .02    -.02    -.02    -.03    -.03    -.03    -.04
0


        TIME SUMMARY AT END OF TIME STEP 11 IN STRESS PERIOD  1
                                SECONDS        MINUTES         HOURS          DAYS           YEARS
                            ----------------------------------------------------------------------
     TIME STEP LENGTH         .129600E+07    21600.0        360.000        15.0000        .410678E-01
```

```
TOTAL SIMULATION TIME          .142560E+08    237600.        2960.00        1[illegible].000        .451749
0
     1 ITERATIONS FOR TIME STEP  12 IN STRESS PERIOD  1
0MAXIMUM HEAD CHANGE FOR EACH ITERATION:
0 HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL HEAD CHANGE LAYER,ROW,COL
 -- ---------------------------------------------------------------------------------------------------------------------------------
    .7575E-06 (  1,  5,  3)
0
0HE  /DRAWDOWN PRINTOUT FLAG = 1     TOTAL BUDGET PRINTOUT FLAG = 0     CELL-BY-CELL FLOW TERM FLAG = 0
0OU  UT FLAGS FOR ALL LAYERS ARE THE SAME:
   HEAD    DRAWDOWN  HEAD  DRAWDOWN
 PRINTOUT  PRINTOUT  SAVE    SAVE
 -- ------------------------------
     1         1       0       0
1                     HEAD IN LAYER  1 AT END OF TIME STEP 12 IN STRESS PERIOD  1
         ------------------------------------------------------------------

          1       2       3       4       5       6       7
 .........................................................
0        .00     .00     .00     .00     .00     .00     .00
0  2     .25     .68    1.49    1.59    1.66    1.83     .97
0        .27    -.22    3.52    3.66    3.36    2.22    1.05
0        .27    -.46    3.71    3.86    3.54    2.27    1.06
0  5     .28    -.10    3.81    3.95    3.62    2.29    1.08
0  6     .28     .19    3.80    3.92    3.59    2.30    1.09
0        .29     .40    3.66    3.77    3.46    2.28    1.10
0        .31    1.18    1.84    1.93    1.97    2.07    1.17
0  9     .48    1.16    1.22    1.23    1.24    1.29    1.66
1                 DRAWDOWN IN LAYER  1 AT END OF TIME STEP 12 IN STRESS PERIOD  1
         ------------------------------------------------------------------

          1       2       3       4       5       6       7
 .........................................................
0  1     .00     .00     .00     .00     .00     .00     .00
0  2     .09     .72    -.10    -.21    -.28    -.52    -.08
0        .09    1.68   -2.07   -2.21   -1.92    -.84    -.09
0        .09    1.94   -2.25   -2.40   -2.09    -.87    -.09
0  5     .09    1.58   -2.34   -2.48   -2.16    -.89    -.09
0        .09    1.30   -2.33   -2.45   -2.13    -.89    -.09
0        .09    1.10   -2.18   -2.29   -1.98    -.86    -.09
0  8     .09     .35    -.33    -.42    -.47    -.61    -.09
0        .02    -.02    -.02    -.03    -.03    -.03    -.04
0


                    VOLUMETRIC BUDGET FOR ENTIRE MODEL AT END OF TIME STEP 12 IN STRESS PERIOD  1
                    ---------------------------------------------------------------------------
0                CUMULATIVE VOLUMES      L**3                                  RATES FOR THIS TIME STEP      L**3/T
                 ------------------                                            ------------------------

                      IN:                                                            IN:
                      ---                                                            ---
                         STORAGE =    .00000                                         STORAGE =    .00000
                  CONSTANT HEAD =    .00000                                      CONSTANT HEAD =    .00000
                          WELLS =    .34632E+06                                          WELLS =    1924.0
                       RECHARGE =    71329.                                           RECHARGE =    396.27
                 HEAD DEP BOUNDS =    .12176E+06                                  HEAD DEP BOUNDS =    676.44
0                       TOTAL IN =    .53941E+06                                        TOTAL IN =    2996.7
0                     OUT:                                                           OUT:
                      ----                                                           ----
                         STORAGE =    .00000                                         STORAGE =    .00000
                  CONSTANT HEAD =    .14090E+06                                  CONSTANT HEAD =    782.76
                          WELLS =    .34632E+06                                          WELLS =    1924.0
                       RECHARGE =    .00000                                           RECHARGE =    .00000
                 HEAD DEP BOUNDS =    52189.                                      HEAD DEP BOUNDS =    289.95
```

IN - OUT = [illegible]

0 PERCENT DISCREPANCY = .00

IN - OUT = [illegible]

PERCENT DISCREPANCY = .00

0

TIME SUMMARY AT END OF TIME STEP 12 IN STRESS PERIOD 1

	SECONDS	MINUTES	HOURS	DAYS	YEARS
TIME STEP LENGTH	.129600E+07	21600.0	360.000	15.0000	.410678E-01
STRESS PERIOD TIME	.155520E+08	259200.	4320.00	180.000	.492813
TOTAL SIMULATION TIME	.155520E+08	259200.	4320.00	180.000	.492813

1

Appendix B
Field Documents and Transportation and Receiving Manifest

WALKER

TAILGATE SAFETY MEETING

1-305-292-4335

Division/Subsidiary TAMPA Facility I T CORP.

Date 6/5/90 Time 11:00 AM Job Number 595391

Customer TRUMBO POINT FUEL FARM Address:

Specific Location KEY WEST 33040

Type of Work RECOVERY SYSTEM INSTALLATION

Chemicals Used NONE

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment - NONE - CLASS D SITE - VERY LOW LEVELS OF CONTAMINATION PRESENT UTILIZING A HNU METER + POR FID UNIT.

Chemical Hazards NONE

Physical Hazards - PIPELINES FROM FUEL TANKS - SLIP, FALLS - USE STAGING AREAS FOR ALL EQUIPMENT.

Emergency Procedures PROCEDURES TO BE FOLLOWED IN FUEL FARM GUARD LOCATION BUILDING D-19 - FIRST AID KIT IN WHITE GMC CDI VEHICLE

Hospital / Clinic KEY WEST Phone (9-911 Paramedic Phone (9-911

Hospital Address FIRE 3333 EMERG ONLY

Special Equipment UTILIZE BARRICADES + CAUTION TAPE AROUND ALL EXCAVATED AREAS

Other NO SMOKING ON SITE - (CAUTION) FUEL TANK FARM ALL SMOKING TO BE DONE WITHIN D-19 BUILDING AND OUTSIDE MAIN GATE TO FUEL FARM.

ATTENDEES

NAME PRINTED			SIGNATURE
BRAD	TANZER	IT	
ED	UEHLING	CDI	
JEFF	PLANTE	CDI	
GEORGE	REED	CDI	
JERRY	THOMAS	CDI	
GREG	STEVENS	IT	X
JULIEN	CAMACHO	DRILL SOL	
MIKE	LOUGE	" "	X
EDWARD	BAXTER	" "	X

Meeting conducted by:

BRAD TANZER

NAME PRINTED SIGNATURE

Supervisor BRAD TANZER Manager

36-8-85

TAILGATE SAFETY MEETING

Division/Subsidiary TAMPA Facility IT CORP

Date 6-6-90 Time 7:00 AM Job Number 595391

Customer Trumbo Point Address:

Specific Location Fuel Farm - Key West

Type of Work The Installation of one Recovery System

Chemicals Used None

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment None required at this time - Very low levels of contamination present, utilizing a HNU + a Porta FID

Chemical Hazards Above Ground fuel oil + Gasoline Tanks

Physical Hazards None except Slip, Trips Keep all equipment in staging areas determined by IT Corp.

Emergency Procedures See Safety meeting # 1

Hospital / Clinic Dial 9-911 for emerg Phone ( ) Paramedic Phone (9) 911

Hospital Address Fire 3333

Special Equipment To reach outside line dial #9. First Aid kit located behind white GMC CDI Truck

Other "No Smoke at Project location" - Use designated areas inside D-19 Building + outside main fuel farm gate "Smoke in designated areas only"

ATTENDEES

NAME PRINTED			SIGNATURE
Brad	Tanner	IT Corp.	
Edward	Uehlinger	CDI	
Jerry	Thomas	CDI	
Jeff	Plante	CDI	
George	Reed	CDI	George Reed

Meeting conducted by:

Brad Tanner — NAME PRINTED — SIGNATURE

Supervisor — Manager

TAILGATE SAFETY MEETING

Division/Subsidiary TAMPA Facility IT CORP

Date 6/7/90 Time 7:00 AM. Job Number 595 391

Customer Trumbo Point Fuel Farm Address:

Specific Location Key West Florida

Type of Work The Installation of a Groundwater Remediation System

Chemicals Used None

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment As of 6/5/90 The Site Has Been Determined That There Are low Areas of Contamination Present.

Chemical Hazards The only Product Stored on Site is #2 fuel oil, JPS Jet fuel and 2 Above Ground Gasoline Tanks located to the Rear of Building #D-19

Physical Hazards Embankments, Small Stone. Becaneful Slip + falls All Vehicles Backing up must have Person watching Rear of Vehicles

Emergency Procedures Fire Dial 3333, Hospital Dial 9-911 Outside Line Dial 9 Then Number

Hospital / Clinic Phone ( ) Paramedic Phone (9) 911

Hospital Address

Special Equipment Fire Exting on all Vehicles, First Aid Kid located in CDI GMC Truck Behind Seat.

Other The Entire Project Area is a no Smoking Area. All Smoking must be within D-19 Building and outside the main Gate to Fuel Farm. Keep Area Clean + Comunicate

ATTENDEES

NAME PRINTED			SIGNATURE
Brad	Tanzer	IT	
Jeff	Plante	CDI	
Jerry	Thomas	CDI	
George	Reed	CDI	

Meeting conducted by: Brad Tanzer

NAME PRINTED

SIGNATURE

Supervisor Brad Tanzer

Manager

06-8-85

TAILGATE SAFETY MEETING

Division/Subsidiary TAMPA Facility IT CORP

Date 6-8-90 Time 7:00 AM Job Number 595391

Customer TRUMBO POINT FUEL FARM Address: KEY WEST

Specific Location

Type of Work RECOVERY SYSTEM INSTALLATION

Chemicals Used NONE

SAFETY TOPICS PRESENTED

Protective Clothing/Equipment SEE 6/7/90 SAFETY MEETING FOR INFO LOW LEVELS OF CONTAMINATED 8'-12' FEET BELOW GRADE

Chemical Hazards ABOVE GROUND STORAGE TANKS- CONTAIN #2 FUEL OIL, JPS JET FUEL, GASOLINE- SEE NO SMOKING SECTION

Physical Hazards WATCH ENBANKMENTS SLIP, TRIPS

Emergency Procedures

FIRE 3333

Hospital / Clinic Phone ( ) Paramedic Phone ( ) 911

Hospital Address DIAL #9 FOR OUTSIDE PHONE LINE

Special Equipment FIRE EXTING & FIRST AID LOCATED INSIDE GAS WHITE CONSTRUCTION DYNAMICS VEHICLE BEHIND SEAT

Other NO SMOKING ON SITE- ALL SMOKING WITHIN D-19 BUILDING AND THE EXTENSION OF TANK FIELD MAIN GATE

ATTENDEES

NAME PRINTED	IT	SIGNATURE
BRAD TANZER	[redacted]	
JEFF PLANTE	CDI	
GEORGE REED	CDI	
TERRY THOMAS	CDI	

Meeting conducted by: BRAD TANZER

NAME PRINTED SIGNATURE

Supervisor Manager

IT CORPORATION

MONITOR WELL INSTALLATION SHEET

PROJECT NAME Key West ~~RI~~ Pilot FIELD ENG./GEO. G. Stephens DATE 6/5/90
PROJECT NO. ~~595399~~ 595391 CHECKED BY BB DATE 9/24/90
BORING NO. ~~Pilot Study Trunk~~ ~~Fuel Farm, MW13~~ KWM-13 DATE OF INSTALLATION 6/5/90

BOREHOLE DRILLING

DRILLING METHOD Hollow stem Auger	TYPE OF BIT Rock Bit
DRILLING FLUID (S) USED: N.A.	CASING SIZE (S) USED:
FLUID ____ FROM ____ TO ____	SIZE 2" I.D. FROM ____ TO ____
FLUID ____ FROM ____ TO ____	SIZE ____ FROM ____ TO ____

DESCRIPTION

TYPE Sch 40 PVC	RISER PIPE MATERIAL Sch 40 PVC
DIAMETER OF PERFORATED SECTION ____	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. ____ I.D. 2"
SLOTS ☑ HOLES ☐ SCREEN ☑	LENGTH OF PIPE SECTIONS ____
AVERAGE SIZE OF PERFORATIONS .010	JOINING METHOD Flush Threaded
TOTAL PERFORATED AREA ____	

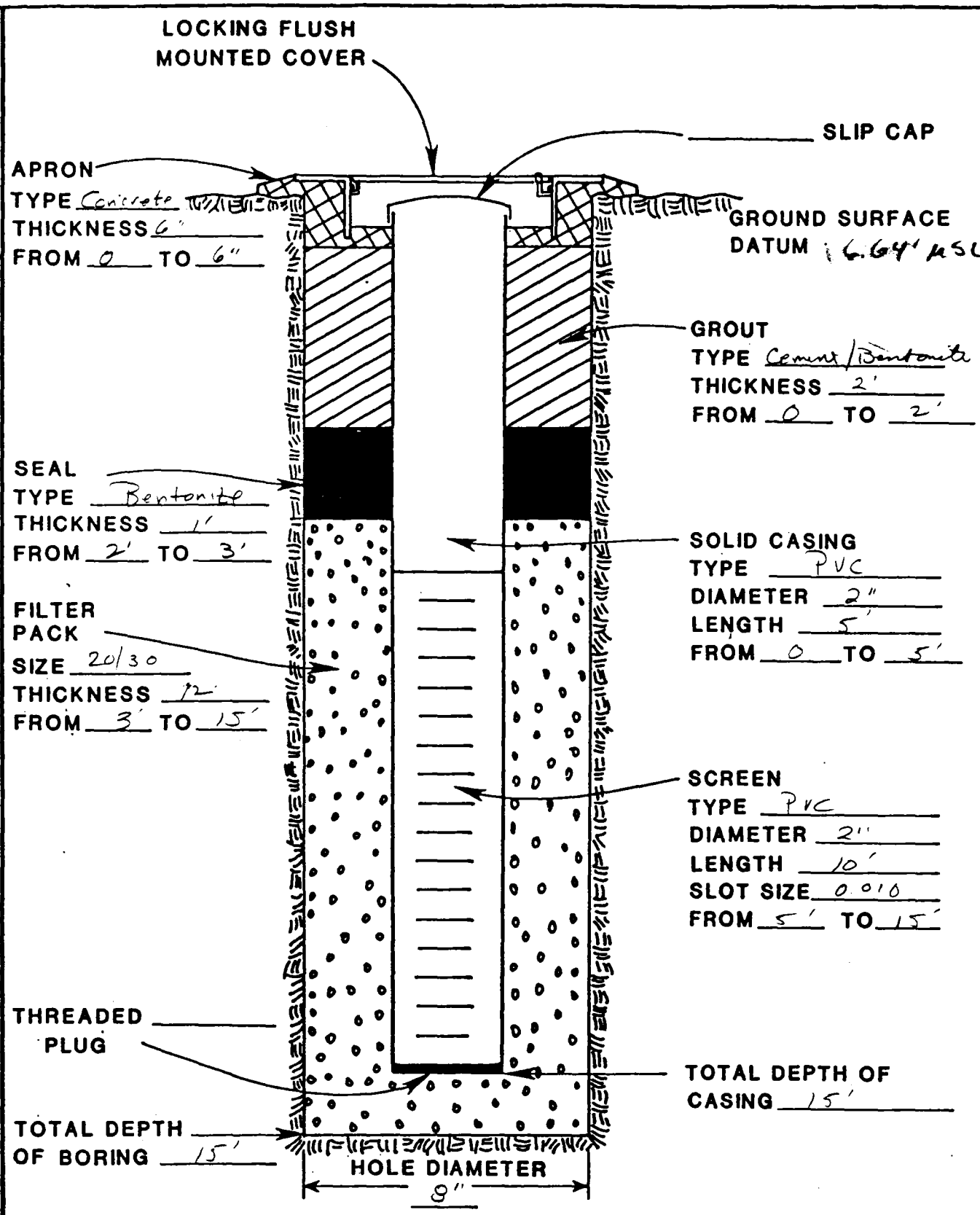
PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'	OTHER PROTECTION Locking Riser
PROTECTIVE PIPE O.D. 3 3/4	Cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	Flush Mount 0'		~~6.64~~	
GROUND SURFACE	0.0		6.64	
BOTTOM OF PROTECTIVE PIPE	5' BGS ~~2' BGS, 3' AGS~~		1.64	
BOREHOLE FILL MATERIALS:				
GROUT	TOP 0	BOTTOM 2'	TOP 6.64	BOTTOM 4.64
BENTONITE	TOP 2'	BOTTOM 3'	TOP 4.64	BOTTOM 3.64
SAND	TOP ~~1'~~ 3'	BOTTOM 15'	TOP 3.64	BOTTOM -8.36
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 5'	BOTTOM 15'	TOP -3.36	BOTTOM -8.36
BOTTOM OF BOREHOLE	15'		-8.36	
GWL AFTER INSTALLATION	5.5'		-3.86	

FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED YES ☐ NO ☑
REMARKS Wells were not developed as of 6/5/90
AWA Manhole Covers

BRUNING 44-132 67120



INSTALLED BY B Reg Stephens Date 6/5/90

Checked By BB Date 9/21/90

KWM-13

SITE 4

NAS - Key West

STARTING DATE: 7/8/87 | DATE LAST REV.: | INITIATOR: M. Sturdevant | DRAWING NO.: Bid Package

DRAWN BY: J. Neal | DRAWN BY: | PROJ. ENGR.: | PROJECT NO.:

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IT ...Creating a Safer Tomorrow

65360

"Do Not Scale This Drawing"

IT CORPORATION

MONITOR WELL INSTALLATION SHEET

PROJECT NAME Key West Pilot FIELD ENG./GEO. G. Stephens DATE 6/5/90
PROJECT NO. 595392 CHECKED BY B.B. DATE 9/26/90
BORING NO. MW 14 Pilot Study
Trumbo Tank Farm DATE OF INSTALLATION 6/5/90

BOREHOLE DRILLING

DRILLING METHOD Hollow stem Auger	TYPE OF BIT Rock Bit
DRILLING FLUID (S) USED: N.A.	CASING SIZE (S) USED:
FLUID ____ FROM ____ TO ____	SIZE 2" I.D. FROM ____ TO ____
FLUID ____ FROM ____ TO ____	SIZE ____ FROM ____ TO ____

DESCRIPTION

TYPE Sch 40 PVC	RISER PIPE MATERIAL Sch 40 PVC
DIAMETER OF PERFORATED SECTION ____	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. ____ I.D. 2"
SLOTS ☑ HOLES ☐ SCREEN ☑	LENGTH OF PIPE SECTIONS ____
AVERAGE SIZE OF PERFORATIONS .010	JOINING METHOD Flush Threaded
TOTAL PERFORATED AREA ____	

PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'	OTHER PROTECTION Locking Riser
PROTECTIVE PIPE O.D. 3 3/4	Cap

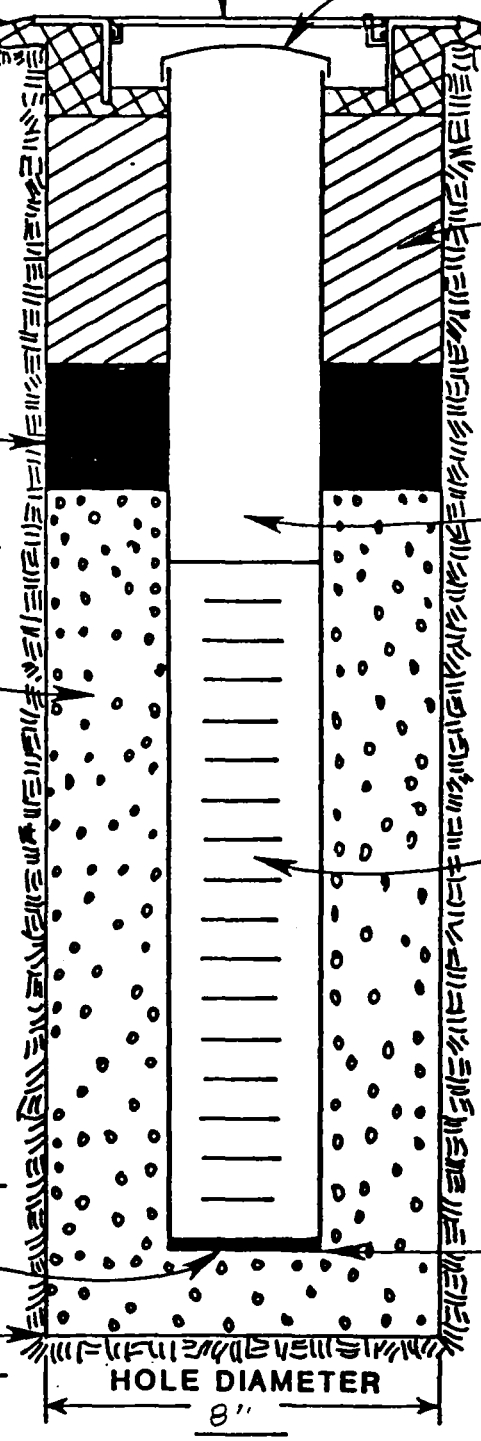
ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	flush Mount 0'		[redacted]	
GROUND SURFACE	0.0		6.13	
BOTTOM OF PROTECTIVE PIPE	5'		1.13	
BOREHOLE FILL MATERIALS:				
GROUT	TOP 0'	BOTTOM 2'	TOP 6.13	BOTTOM 4.13
BENTONITE	TOP 2'	BOTTOM 3'	TOP 4.13	BOTTOM 3.13
SAND	TOP 3'	BOTTOM 15'	TOP 3.13	BOTTOM -8.87
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 5'	BOTTOM 15'	TOP 1.13	BOTTOM -8.87
BOTTOM OF BOREHOLE	15'		-8.87	
GWL AFTER INSTALLATION	3'		3'	

FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED YES ☐ NO ☑
REMARKS Wells were not developed as of 6/5/90
AWA manhole covers

BRUNING 44-132 67120

STARTING DATE: 7/8/87	DATE LAST REV.:
DRAWN BY: J.Neal	DRAWN BY:
INITIATOR: M.Sturdevant	DRAWING NO.: Bid Package
PROJ. ENGR.:	PROJECT NO.:

MS 7/15/87



INSTALLED BY GS DATE 6/5/90

Checked By BB Date 9/21/90

KWM-14
SITE
NAS- Key West

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IT CORPORATION

MONITOR WELL INSTALLATION SHEET

PROJECT NAME Key West ~~RI~~ Pilot FIELD ENG./GEO. G. Stephens DATE 6/5/90
PROJECT NO. ~~596392~~ 595391 CHECKED BY _____ DATE _____
BORING NO. MW 15 Pilot Study Trumbo Tank Farm DATE OF INSTALLATION 6/5/90

BOREHOLE DRILLING

DRILLING METHOD Hollow stem Auger	TYPE OF BIT Rock Bit
DRILLING FLUID (S) USED: N.A.	CASING SIZE (S) USED:
FLUID _____ FROM _____ TO _____	SIZE 2" I.D. FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE Sch 40 PVC	RISER PIPE MATERIAL Sch 40 PVC
DIAMETER OF PERFORATED SECTION _____	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. _____ I.D. 2"
SLOTS ☑ HOLES ☐ SCREEN ☑	LENGTH OF PIPE SECTIONS _____
AVERAGE SIZE OF PERFORATIONS .010	JOINING METHOD Flush Threaded
TOTAL PERFORATED AREA _____	

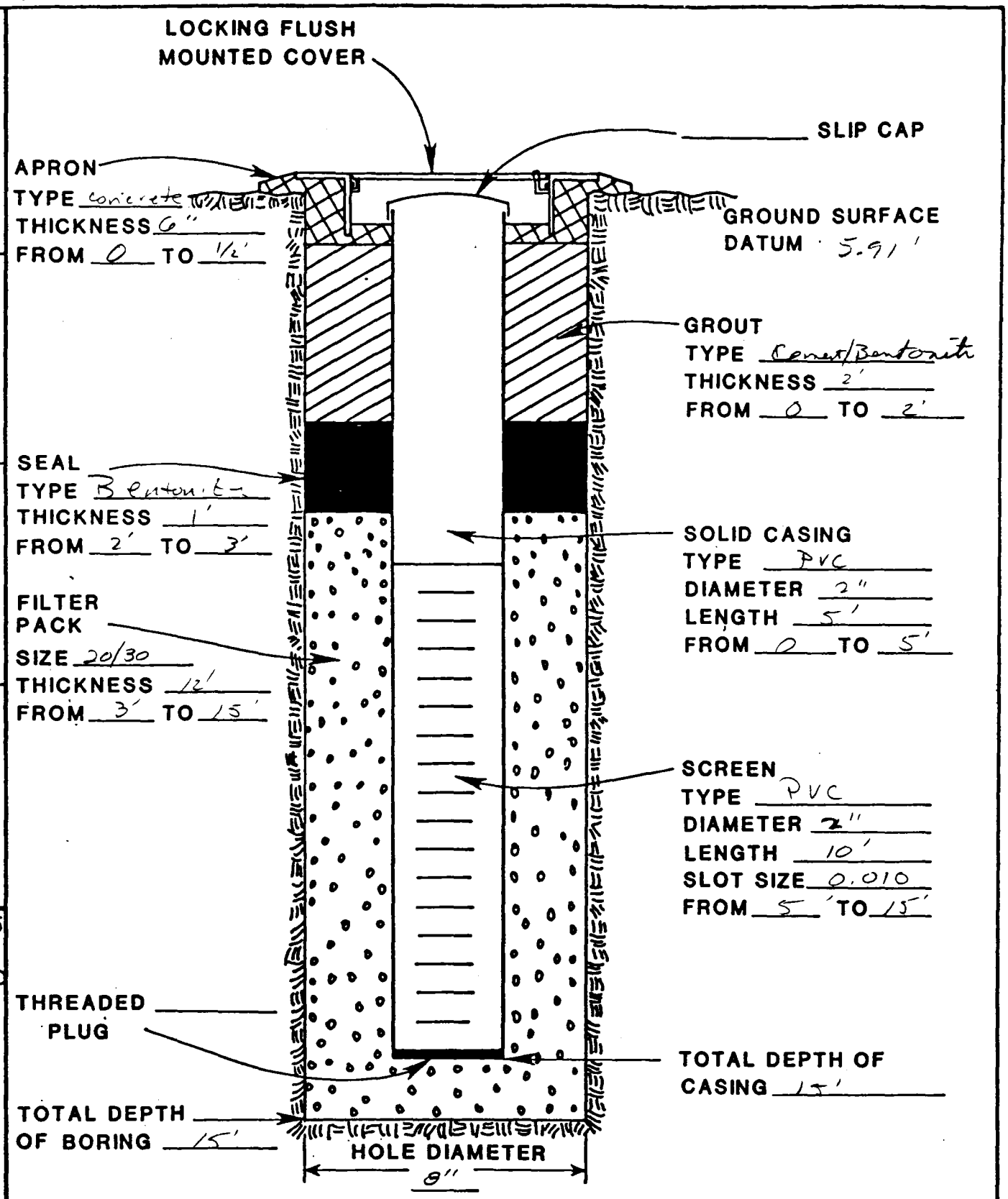
PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'	OTHER PROTECTION Locking Riser
PROTECTIVE PIPE O.D. 3 3/4	Cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	Flush Mount 0'		[redacted]	
GROUND SURFACE	0.0		5.91	
BOTTOM OF PROTECTIVE PIPE	5'		0.91	
BOREHOLE FILL MATERIALS:				
GROUT	TOP 0'	BOTTOM 2'	TOP 5.91	BOTTOM 3.91
BENTONITE	TOP 2'	BOTTOM 3'	TOP 3.91	BOTTOM 2.91
SAND	TOP 3'	BOTTOM 15'	TOP 2.91	BOTTOM -9.09
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 5'	BOTTOM 15'	TOP 0.91	BOTTOM -9.09
BOTTOM OF BOREHOLE	15'		-9.09	
GWL AFTER INSTALLATION	5'		0.91	

FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED YES ☐ NO ☑
REMARKS Wells were not developed as of 6/5/90 AWA Manhole Covers

BRUNING 44-132 67120



STARTING DATE: 7/8/87 | DATE LAST REV.: | INITIATOR: M.Sturdevant | DRAWING NO.: Bid Package
DRAWN BY: J.Nosi | DRAWN BY: | PROJ. ENGR.: | PROJECT NO.:

MWS 7/15/87

KWM-15
SITE 9
NAS-Key West

INSTALLED By GS Date 6/5/90
Checked By BB Date 9/21/90

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MONITOR WELL INSTALLATION SHEET

PROJECT NAME Key West Pilot FIELD ENG./GEO. G. Stephens DATE 6/5/90
PROJECT NO. ~~[illegible]~~ 595391 CHECKED BY _____ DATE _____
BORING NO. Pilot Study, Trunbo Fock Farm, MW16 DATE OF INSTALLATION 6/5/90

BOREHOLE DRILLING

DRILLING METHOD Hollow stem Auger	TYPE OF BIT Rock Bit
DRILLING FLUID (S) USED: N.A.	CASING SIZE (S) USED:
FLUID _____ FROM _____ TO _____	SIZE 2" I.D. FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE Sch 40 PVC	RISER PIPE MATERIAL Sch 40 PVC
DIAMETER OF PERFORATED SECTION _____	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. _____ I.D. 2"
SLOTS ☑ HOLES ☐ SCREEN ☑	LENGTH OF PIPE SECTIONS _____
AVERAGE SIZE OF PERFORATIONS .010	JOINING METHOD Flush Threaded
TOTAL PERFORATED AREA _____	

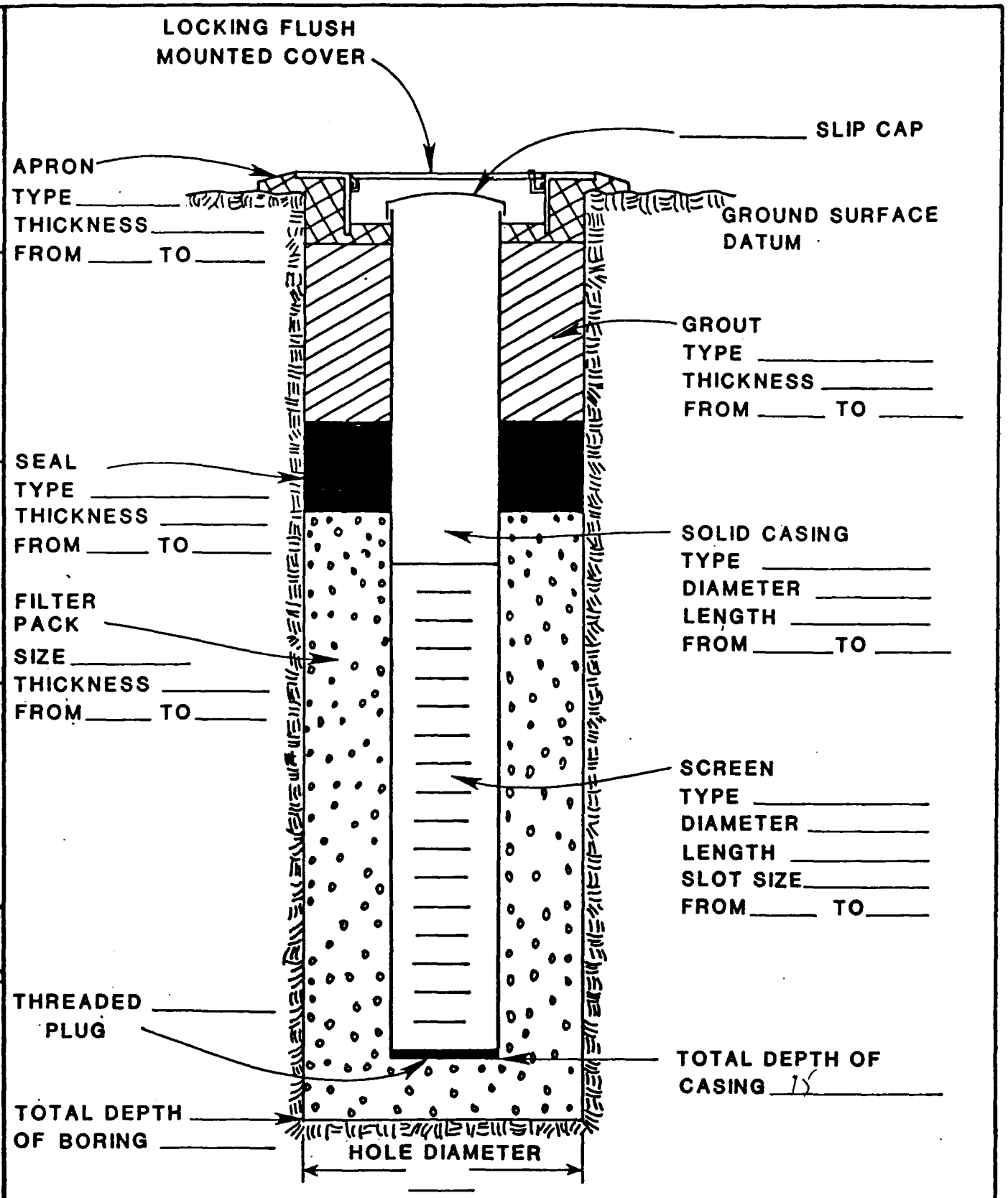
PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'	OTHER PROTECTION locking Riser
PROTECTIVE PIPE O.D. 3 3/4	Cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	Flush Mt 0'		[illegible]	
GROUND SURFACE	0.0		5.74	
BOTTOM OF PROTECTIVE PIPE	5'		0.74	
BOREHOLE FILL MATERIALS:				
GROUT	TOP 0'	BOTTOM 2'	TOP 5.74	BOTTOM 3.74
BENTONITE	TOP 2'	BOTTOM 3'	TOP 3.74	BOTTOM 2.74
SAND	TOP 3'	BOTTOM 15'	TOP 2.74	BOTTOM -9.26
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 5'	BOTTOM 15'	TOP 0.74	BOTTOM -9.26
BOTTOM OF BOREHOLE	15'		-9.26	
GWL AFTER INSTALLATION	5'		0.74	

FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED YES ☐ NO ☑
REMARKS Wells not developed as of 6/5/90. AWA Manhole Covers

BRUNING 44-132 67120



INSTALLED By GS Date 6/5/90
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STARTING DATE: 7/8/87 | DATE LAST REV.: | INITIATOR: M.Sturdevant | DRAWING NO.: Bid Package
DRAWN BY: J.Nosl | DRAWN BY: | PROJ. ENGR.: | PROJECT NO.:

MMS 7/15/87

IT CORPORATION

MONITOR WELL INSTALLATION SHEET

PROJECT NAME Key West ~~Pet~~ Pilot FIELD ENG./GEO. C L C DATE 6/6/90
PROJECT NO. ~~[illegible]~~ 595391 CHECKED BY _____ DATE _____
BORING NO. Pilot Study Trunbo Fuel Farm, ~~[illegible]~~ DATE OF INSTALLATION 6/6/90

BOREHOLE DRILLING

DRILLING METHOD Hollow stem Auger	TYPE OF BIT Rock Bit
DRILLING FLUID (S) USED: N.A.	CASING SIZE (S) USED:
FLUID _____ FROM _____ TO _____	SIZE 2" I.D. FROM _____ TO _____
FLUID _____ FROM _____ TO _____	SIZE _____ FROM _____ TO _____

DESCRIPTION

TYPE Sch 40 PVC	RISER PIPE MATERIAL Sch 40 PVC
DIAMETER OF PERFORATED SECTION _____	RISER PIPE DIAMETERS:
PERFORATION TYPE:	O.D. _____ I.D. 2"
SLOTS ☑ HOLES ☐ SCREEN ☑	LENGTH OF PIPE SECTIONS _____
AVERAGE SIZE OF PERFORATIONS .010	JOINING METHOD Flush Threaded
TOTAL PERFORATED AREA _____	

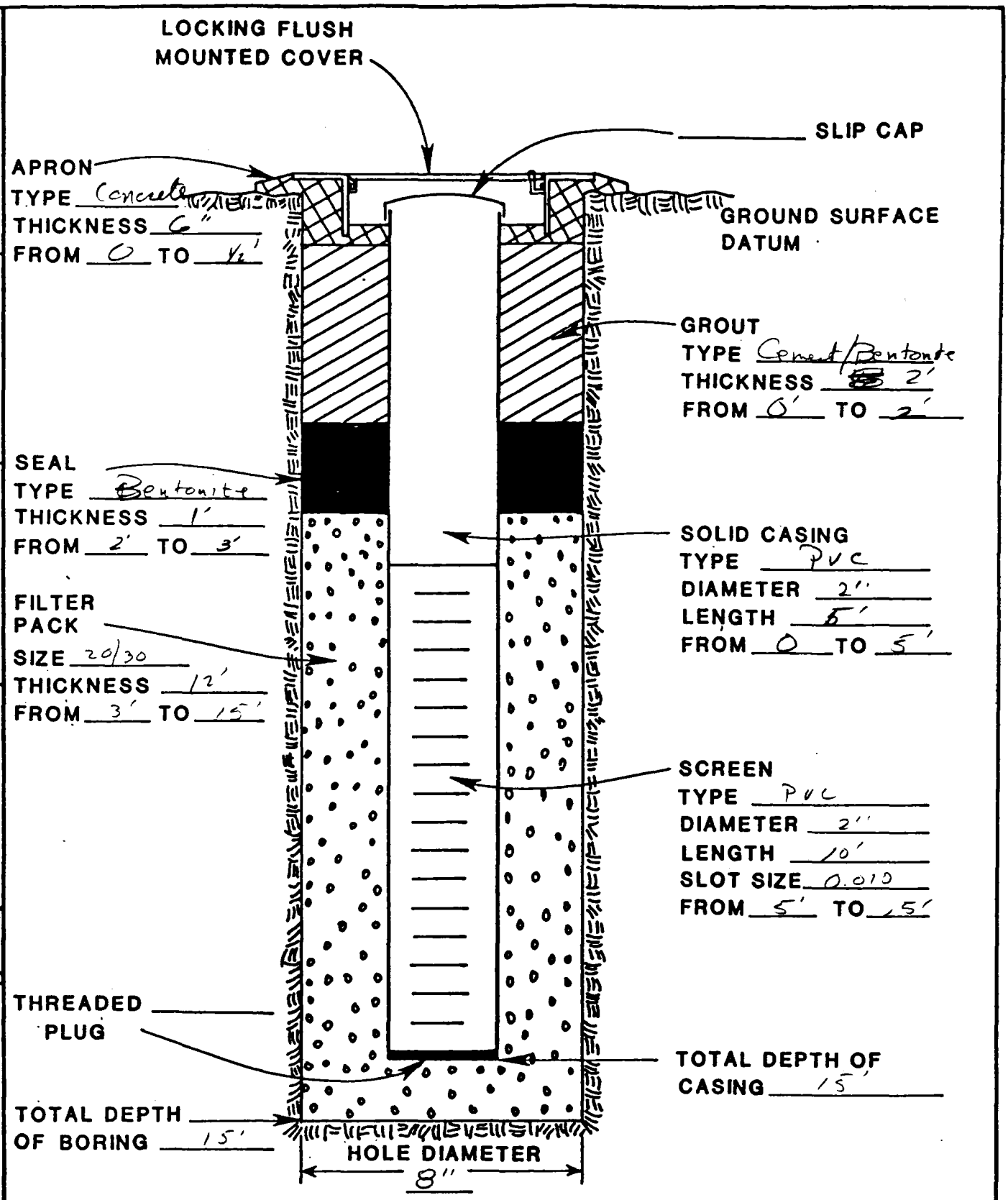
PROTECTION SYSTEM

RISER PROTECTIVE PIPE LENGTH 5'	OTHER PROTECTION locking Riser
PROTECTIVE PIPE O.D. 3 3/4	Cap

ITEM	DISTANCE ABOVE/BELOW GROUND SURFACE (ft)		ELEVATION (ft)	
TOP OF RISER PIPE	Flush Mount 0'		~~[illegible]~~	
GROUND SURFACE	0.0		5.88	
BOTTOM OF PROTECTIVE PIPE	5' BGS		0.88	
BOREHOLE FILL MATERIALS:				
GROUT	TOP 0	BOTTOM 2'	TOP 5.88	BOTTOM 3.88
BENTONITE	TOP 2'	BOTTOM 3'	TOP 3.88	BOTTOM 2.88
SAND	TOP 3'	BOTTOM 15'	TOP 2.88	BOTTOM -9.12
GRAVEL	TOP N/A	BOTTOM N/A	TOP N/A	BOTTOM N/A
PERFORATED SECTION	TOP 5'	BOTTOM 15'	TOP 0.88	BOTTOM -9.12
BOTTOM OF BOREHOLE	15'		-9.12	
GWL AFTER INSTALLATION	4'		1.88	

FLUSHED AFTER INSTALLATION? YES ☐ NO ☑
WAS A SENSITIVITY TEST PERFORMED YES ☐ NO ☑
REMARKS Wells were not developed as of 6/6/90
AWA Manhole covers

BRUNING 44-132 67120



STARTING DATE: 7/8/87 | DATE LAST REV.: | INITIATOR: M.Sturdevant | DRAWING NO.: Bid Package
DRAWN BY: J.Nesi | DRAWN BY: | PROJ. ENGR.: | PROJECT NO.:

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COPY

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?	✓	NOT IN OPERATION
PRODUCT PUMP OPERATING?	✓	WATER Shutdown
RECOVERED PDT. TANK LEVEL	✓	[illegible] Empty
TOTALIZER FQI-104 READING	✓	[illegible] 3.[illegible] gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.	✓	YES / 1.4 Psig
FLOW INDICATOR FI-101 RDG.	✓	0
TOTALIZER FQI-101 RDG.	✓	6565
FLOW INDICATOR FI-102 RDG.	✓	0
TOTALIZER FQI-102 RDG.	✓	11352
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING	✓	NOT IN [illegible]
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.	✓	NOT IN [illegible]
TOTALIZER FQI-103 RDG.	✓	10970
AUTO DIALER OPERATING?	✓	YES
LEAKS?	✓	NONE
RAIN GAUGE READING	✓	N/A
OTHER VARIANCES IF ANY	✓	NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION [illegible]

TIME OF INSPECTION 1445

WEATHER/TEMP. Sunny [illegible]

NAME OF OPERATOR [signature]

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?	✓	NOT IN OPR
PRODUCT PUMP OPERATING?	✓	WATER SHUTDOWN
RECOVERED PDT. TANK LEVEL	✓	Empty
TOTALIZER FQI-104 READING	✓	9 gal / 3.3
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.	✓	YES / 0.8 PSIG
FLOW INDICATOR FI-101 RDG.	✓	0
TOTALIZER FQI-101 RDG.	✓	7455
FLOW INDICATOR FI-102 RDG.	✓	0
TOTALIZER FQI-102 RDG.	✓	12670
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING	✓	Not operating now
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.	✓	Not operating now
TOTALIZER FQI-103 RDG.	✓	12225
AUTO DIALER OPERATING?	✓	OK
LEAKS?	✓	none
RAIN GAUGE READING		N/A
OTHER VARIANCES IF ANY	✓	None

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 8-21-90

TIME OF INSPECTION 9 AM

WEATHER/TEMP. SUNNY / 90 F

NAME OF OPERATOR K Sowards

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?	✓	operating
PRODUCT PUMP OPERATING?	✓	[illegible]
RECOVERED PDT. TANK LEVEL	✓	empty
TOTALIZER FQI-104 READING	✓	9 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.	✓	yes / 0.7 psig
FLOW INDICATOR FI-101 RDG.	✓	5 GPM
TOTALIZER FQI-101 RDG.	✓	8535
FLOW INDICATOR FI-102 RDG.	✓	5 GPM
TOTALIZER FQI-102 RDG.	✓	13325
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING	✓	2 psig
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.	✓	1 psig
TOTALIZER FQI-103 RDG.	✓	12850
AUTO DIALER OPERATING?	✓	OK
LEAKS?	✓	none
RAIN GAUGE READING		N/A
OTHER VARIANCES IF ANY	—	none

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 8-22-90

TIME OF INSPECTION 8 AM

WEATHER/TEMP. Sunny / [illegible]°F

NAME OF OPERATOR K Sarapata

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?	✓	Not in operation
PRODUCT PUMP OPERATING?	✓	Water shutdown
RECOVERED PDT. TANK LEVEL	✓	Empty - 0
TOTALIZER FQI-104 READING	✓	9 gal - 3.5 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.	✓	yes .7 psi
FLOW INDICATOR FI-101 RDG.	✓	0
TOTALIZER FQI-101 RDG.	✓	8904
FLOW INDICATOR FI-102 RDG.	✓	0
TOTALIZER FQI-102 RDG.	✓	14031
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING	✓	NOT IN OPERATION
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.	✓	11
TOTALIZER FQI-103 RDG.	✓	13530
AUTO DIALER OPERATING?	✓	YES
LEAKS?	✓	NONE
RAIN GAUGE READING	✓	N/A
OTHER VARIANCES IF ANY	✓	NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 82290

TIME OF INSPECTION 1600

WEATHER/TEMP. Sunny 90°

NAME OF OPERATOR Dennis

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NOT IN OP
PRODUCT PUMP OPERATING?		Water shutdown
RECOVERED PDT. TANK LEVEL		0", Empty
TOTALIZER FQI-104 READING		9 gal / 3.6 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes / 1.2 PSI
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		9906
FLOW INDICATOR FI-102 RDG.		~~[illegible]~~ 0
TOTALIZER FQI-102 RDG.		14774
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		NOT IN OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		NOT IN OP
TOTALIZER FQI-103 RDG.		14128
AUTO DIALER OPERATING?		Yes
LEAKS?		NONE
RAIN GAUGE READING		N/A
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 8 23 90

TIME OF INSPECTION 1600

WEATHER/TEMP. Sunny 93°

NAME OF OPERATOR Dennis

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NOT IN OP
PRODUCT PUMP OPERATING?		Water Shutdown
RECOVERED PDT. TANK LEVEL		0.
TOTALIZER FQI-104 READING		9 gal / 3.6
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes 1.2 PSI
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		10764
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		15320
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in OP
TOTALIZER FQI-103 RDG.		14735
AUTO DIALER OPERATING?		YES
LEAKS?		NONE
RAIN GAUGE READING		N/A
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 8-24-90

TIME OF INSPECTION 1600

WEATHER/TEMP. 85° Cloudy

NAME OF OPERATOR Dennis

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		water shutdown
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		9 gal / 3.8
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes 1.3 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		13122
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		17324
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in op
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in op
TOTALIZER FQI-103 RDG.		16766
AUTO DIALER OPERATING?		YES
LEAKS?		NONE
RAIN GAUGE READING		N/A
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 82790

TIME OF INSPECTION 1600

WEATHER/TEMP. 90° Cloudy

NAME OF OPERATOR Dennis

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		Water shutdown
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		9.9/3.9 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes, 1.3 p.i
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		13980
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		17960
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in op
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in op
TOTALIZER FQI-103 RDG.		17332
AUTO DIALER OPERATING?		yes
LEAKS?		None
RAIN GAUGE READING		N/A
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 8/28/90

TIME OF INSPECTION 1600

WEATHER/TEMP. Overcast

NAME OF OPERATOR Denis

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		No
PRODUCT PUMP OPERATING?		Water shutdown
RECOVERED PDT. TANK LEVEL		Ø
TOTALIZER FQI-104 READING		10 gal / 4.5
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes. 5 psi
FLOW INDICATOR FI-101 RDG.		Ø
TOTALIZER FQI-101 RDG.		14855
FLOW INDICATOR FI-102 RDG.		Ø
TOTALIZER FQI-102 RDG.		18995
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in op
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in OP
TOTALIZER FQI-103 RDG.		17332
AUTO DIALER OPERATING?		yes
LEAKS?		none
RAIN GAUGE READING		N/A
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

WELL / 6.42'

DATE OF INSPECTION 8 31 90

TIME OF INSPECTION 1600

WEATHER/TEMP. Cloudy 85°

NAME OF OPERATOR [illegible]

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		water shut down
RECOVERED PDT. TANK LEVEL		Ø
TOTALIZER FQI-104 READING		10 gal / 4.5 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes. .5 psi
FLOW INDICATOR FI-101 RDG.		Ø
TOTALIZER FQI-101 RDG.		14860
FLOW INDICATOR FI-102 RDG.		Ø
TOTALIZER FQI-102 RDG.		18995
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in OP
TOTALIZER FQI-103 RDG.		17332
AUTO DIALER OPERATING?		yes
LEAKS?		None
RAIN GAUGE READING		NA
OTHER VARIANCES IF ANY		None

Record significant variances or unusual condition in Daily Activity log.

WELL 6.4'

DATE OF INSPECTION 9/1/90

TIME OF INSPECTION 0900

WEATHER/TEMP. Sunny 80°

NAME OF OPERATOR [illegible]

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		Water shutdown
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		10 gal/4/8
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes 4.5 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		14860
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		18995
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		NOT IN OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		NOT IN OP
TOTALIZER FQI-103 RDG.		17332
AUTO DIALER OPERATING?		YES
LEAKS?		NONE
RAIN GAUGE READING		.5 in
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 9/3/95

TIME OF INSPECTION 1.200

WEATHER/TEMP. Sunny

NAME OF OPERATOR Dennis

apy

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		Water Shutdown
RECOVERED PDT. TANK LEVEL		Ø
TOTALIZER FQI-104 READING		10 gal 4.9 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes .4 psi
FLOW INDICATOR FI-101 RDG.		Ø
TOTALIZER FQI-101 RDG.		14860
FLOW INDICATOR FI-102 RDG.		Ø
TOTALIZER FQI-102 RDG.		18995
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		NOT IN OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		NOT IN OP
TOTALIZER FQI-103 RDG.		17332
AUTO DIALER OPERATING?		yes
LEAKS?		NONE
RAIN GAUGE READING		.8 IN
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

NBU 4.62

DATE OF INSPECTION 9/4/90

TIME OF INSPECTION 1600

WEATHER/TEMP. Cloudy 85°

NAME OF OPERATOR Dennis

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO —
PRODUCT PUMP OPERATING?		Water Switch [illegible]
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		10,[illegible]4.9 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes / .4 PSI
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		14860
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		18995
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		NOT IN OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		NOT IN OP
TOTALIZER FQI-103 RDG.		17332
AUTO DIALER OPERATING?		[illegible]
LEAKS?		None
RAIN GAUGE READING		.3 IN
OTHER VARIANCES IF ANY		[illegible]

Record significant variances or unusual condition in Daily Activity log.

4.34' WEL

DATE OF INSPECTION 9 5 90

TIME OF INSPECTION 1400

WEATHER/TEMP. Raining 80°

NAME OF OPERATOR [illegible]

Plant shut down for ~~maint~~ Repair.

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		NO
RECOVERED PDT. TANK LEVEL		Ø,N
TOTALIZER FQI-104 READING		30gal / 24.10
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		NO
FLOW INDICATOR FI-101 RDG.		Ø
TOTALIZER FQI-101 RDG.		16385
FLOW INDICATOR FI-102 RDG.		Ø
TOTALIZER FQI-102 RDG.		19230
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Ø
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Ø
TOTALIZER FQI-103 RDG.		18450
AUTO DIALER OPERATING?		yes
LEAKS?		None
RAIN GAUGE READING		Ø
OTHER VARIANCES IF ANY		Repairs in progress

Record significant variances or unusual condition in Daily Activity log.

5.7' well

DATE OF INSPECTION 9 6 90

TIME OF INSPECTION ~~[illegible]~~ 1100

WEATHER/TEMP. Cloudy

NAME OF OPERATOR [illegible]

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		Water Shutdown
RECOVERED PDT. TANK LEVEL		
TOTALIZER FQI-104 READING		37 gal / 32.1
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		1.2 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		18305
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		20610
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in OP
TOTALIZER FQI-103 RDG.		19670
AUTO DIALER OPERATING?		yes
LEAKS?		NONE
RAIN GAUGE READING		Ø
OTHER VARIANCES IF ANY		None

Record significant variances or unusual condition in Daily Activity log.

Replaced Sock
WELL - 8.5'

DATE OF INSPECTION 9 7 90

TIME OF INSPECTION 1200

WEATHER/TEMP. Sunny 90°

NAME OF OPERATOR [illegible]

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		Water Shutdown
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		37 gal 32.1
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		.7 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		19995
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		21560
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		NOT IN OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		NOT IN OP
TOTALIZER FQI-103 RDG.		20608
AUTO DIALER OPERATING?		yes
LEAKS?		NONE
RAIN GAUGE READING		0
OTHER VARIANCES IF ANY		

Record significant variances or unusual condition in Daily Activity log.

WELL 8.5'

DATE OF INSPECTION 9/8/90

TIME OF INSPECTION 1200

WEATHER/TEMP. Sunny 90°

NAME OF OPERATOR Dennis

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		No
PRODUCT PUMP OPERATING?		water shutdown
RECOVERED PDT. TANK LEVEL		Ø
TOTALIZER FQI-104 READING		38 gal / 32.4
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		.8 psi
FLOW INDICATOR FI-101 RDG.		Ø
TOTALIZER FQI-101 RDG.		23272
FLOW INDICATOR FI-102 RDG.		Ø
TOTALIZER FQI-102 RDG.		24915
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		not in op
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in op
TOTALIZER FQI-103 RDG.		23795
AUTO DIALER OPERATING?		yes
LEAKS?		None
RAIN GAUGE READING		1.5"
OTHER VARIANCES IF ANY		None

Record significant variances or unusual condition in Daily Activity log.

Well 8.5'

DATE OF INSPECTION 9/14/90

TIME OF INSPECTION 1100

WEATHER/TEMP. Sunny 85°

NAME OF OPERATOR [illegible]

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		yes
PRODUCT PUMP OPERATING?		yes
RECOVERED PDT. TANK LEVEL		OK
TOTALIZER FQI-104 READING		38 gal 33.9 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes, 8 psi
FLOW INDICATOR FI-101 RDG.		O
TOTALIZER FQI-101 RDG.		27095
FLOW INDICATOR FI-102 RDG.		C
TOTALIZER FQI-102 RDG.		28120
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in op
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in op
TOTALIZER FQI-103 RDG.		26770
AUTO DIALER OPERATING?		yes
LEAKS?		none
RAIN GAUGE READING		3.8 in
OTHER VARIANCES IF ANY		None

Record significant variances or unusual condition in Daily Activity log.

Well - 5.35'

DATE OF INSPECTION 9/1/90

TIME OF INSPECTION 1000

WEATHER/TEMP. Cloudy 85°

NAME OF OPERATOR

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		yes
PRODUCT PUMP OPERATING?		yes
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		43gal 38.2
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes 1.6 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		31590
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		32025
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		—
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		—
TOTALIZER FQI-103 RDG.		30530
AUTO DIALER OPERATING?		yes
LEAKS?		None
RAIN GAUGE READING		.1 IN
OTHER VARIANCES IF ANY		None

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 92090

TIME OF INSPECTION 1200

WEATHER/TEMP. Sunny 90

NAME OF OPERATOR [illegible]

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NOT in OP
PRODUCT PUMP OPERATING?		NOT IN OP
RECOVERED PDT. TANK LEVEL		0.
TOTALIZER FQI-104 READING		75 gal - 119.3
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes . 6 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		41065
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		40470
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		0
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		0
TOTALIZER FQI-103 RDG.		38625
AUTO DIALER OPERATING?		yes
LEAKS?		NONE
RAIN GAUGE READING		2.2 IN
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 10 2 90

TIME OF INSPECTION 1500

WEATHER/TEMP. Sunny 90°

NAME OF OPERATOR Denn

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		Not in op
PRODUCT PUMP OPERATING?		water Shutdown
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		174gal / 68.4gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		.8psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		46390
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		45784
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in op
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		not in op
TOTALIZER FQI-103 RDG.		43025
AUTO DIALER OPERATING?		yes
LEAKS?		No
RAIN GAUGE READING		0.3 IN
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 10/4/90

TIME OF INSPECTION 1200

WEATHER/TEMP. Rain 80°

NAME OF OPERATOR Denis

N

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		Water shutdown
RECOVERED PDT. TANK LEVEL		
TOTALIZER FQI-104 READING		174 gal; 69.1
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes . 6 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		53680
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		51555
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		NOT IN OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		NOT IN OP
TOTALIZER FQI-103 RDG.		49175
AUTO DIALER OPERATING?		yes
LEAKS?		NONE
RAIN GAUGE READING		1.2 IN
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 09/10

TIME OF INSPECTION 1200

WEATHER/TEMP. Rain/78°

NAME OF OPERATOR Don.

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		Water Shutdown
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		343 gal - 37.7 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes .8 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		66684
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		60990
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in op
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in op
TOTALIZER FQI-103 RDG.		58173
AUTO DIALER OPERATING?		yes
LEAKS?		NONE
RAIN GAUGE READING		3.9 in
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 101390

TIME OF INSPECTION 0900

WEATHER/TEMP. Sunny 80

NAME OF OPERATOR Don

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?	OK	NO
PRODUCT PUMP OPERATING?	OK	NO
RECOVERED PDT. TANK LEVEL	OK	0
TOTALIZER FQI-104 READING	OK	77.0
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.	OK	ON
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		85915
FLOW INDICATOR FI-102 RDG.		40
TOTALIZER FQI-102 RDG.		783 25
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		19/5
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		5/0
TOTALIZER FQI-103 RDG.		747 65
AUTO DIALER OPERATING?		OK
LEAKS?		NONE
RAIN GAUGE READING		OK
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 10-24-90

TIME OF INSPECTION 1300

WEATHER/TEMP. HOT

NAME OF OPERATOR REGGIE

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		Water Shutdown
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		511gal / 6.2 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes 1.4 PSI
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		89500
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		81081
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		NOT INOP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		NOT INOP
TOTALIZER FQI-103 RDG.		77297
AUTO DIALER OPERATING?		yes
LEAKS?		none
RAIN GAUGE READING		Ø
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 10/30/90

TIME OF INSPECTION 1300

WEATHER/TEMP. Sunny 80°

NAME OF OPERATOR Don

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		Water shutdown
RECOVERED PDT. TANK LEVEL		0
TOTALIZER FQI-104 READING		554 gal 48.8 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes. 1.5 psi.
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		94416
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		85012
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in op
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		NOT IN OP
TOTALIZER FQI-103 RDG.		~~5106~~ 81046
AUTO DIALER OPERATING?		yes
LEAKS?		NONE
RAIN GAUGE READING		~~None~~ Ø
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 11 2 90

TIME OF INSPECTION 1300

WEATHER/TEMP. Sunny 80°

NAME OF OPERATOR [illegible]

	FUEL		WATER		
MW 9-13	⊘	–	5.1'	=	NO FUEL
9-15	4.7'	–	7.9'	=	3.2' OF FUEL
9-16	4'	–	9.55'	=	5.55' "
9-17	3.6'		12.2'	=	8.6' "
Sump	6.5'	–	7'	=	.5' "

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		yes
PRODUCT PUMP OPERATING?		yes
RECOVERED PDT. TANK LEVEL		.5
TOTALIZER FQI-104 READING		817 gal 12.9 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		1.5 PSI
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		111752
FLOW INDICATOR FI-102 RDG.		3.6
TOTALIZER FQI-102 RDG.		106402
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		–
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		101-14 psi 102-12
TOTALIZER FQI-103 RDG.		101465
AUTO DIALER OPERATING?		yes
LEAKS?		[illegible]
RAIN GAUGE READING		0
OTHER VARIANCES IF ANY		

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 112790

TIME OF INSPECTION 1130

WEATHER/TEMP. Sunny 80

NAME OF OPERATOR Dennis

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		Water Shutdown
PRODUCT PUMP OPERATING?		—
RECOVERED PDT. TANK LEVEL		5"
TOTALIZER FQI-104 READING		867 gal 761.3 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes / 1.2 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		120350
FLOW INDICATOR FI-102 RDG.		
TOTALIZER FQI-102 RDG.		114255
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		12 and 12
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in op
TOTALIZER FQI-103 RDG.		108995
AUTO DIALER OPERATING?		yes
LEAKS?		NO
RAIN GAUGE READING		0.1 in
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 12 6 90

TIME OF INSPECTION 1700

WEATHER/TEMP. Cloudy 75°

NAME OF OPERATOR Dan/Reggie

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		Water Shutdown
PRODUCT PUMP OPERATING?		—
RECOVERED PDT. TANK LEVEL		5"
TOTALIZER FQI-104 READING		867 gal 61.8 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes 1.3 psi
FLOW INDICATOR FI-101 RDG.		
TOTALIZER FQI-101 RDG.		128706
FLOW INDICATOR FI-102 RDG.		1.8
TOTALIZER FQI-102 RDG.		122470
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		14 / 14 psi
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in op
TOTALIZER FQI-103 RDG.		116748
AUTO DIALER OPERATING?		yes
LEAKS?		NO
RAIN GAUGE READING		.06 in
OTHER VARIANCES IF ANY		NONE

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 12/14/90

TIME OF INSPECTION 1200

WEATHER/TEMP. Sunny 80

NAME OF OPERATOR Dan Regan

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		Water shutdown
PRODUCT PUMP OPERATING?		Not in op
RECOVERED PDT. TANK LEVEL		5"
TOTALIZER FQI-104 READING		868 gal / 62.3
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		yes / 1.8 psi
FLOW INDICATOR FI-101 RDG.		0
TOTALIZER FQI-101 RDG.		132893
FLOW INDICATOR FI-102 RDG.		0
TOTALIZER FQI-102 RDG.		125280
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		Not in op
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in op
TOTALIZER FQI-103 RDG.		119931
AUTO DIALER OPERATING?		yes
LEAKS?		No
RAIN GAUGE READING		0
OTHER VARIANCES IF ANY		

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 12 18 90

TIME OF INSPECTION 1200

WEATHER/TEMP. Sunny 80

NAME OF OPERATOR Don/Reggie

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		Not in [illegible]
PRODUCT PUMP OPERATING?		NO
RECOVERED PDT. TANK LEVEL		[illegible]
TOTALIZER FQI-104 READING		878 [illegible]
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		NO
FLOW INDICATOR FI-101 RDG.		—
TOTALIZER FQI-101 RDG.		127755
FLOW INDICATOR FI-102 RDG.		
TOTALIZER FQI-102 RDG.		132160
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		NOT IN OP
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		Not in op
TOTALIZER FQI-103 RDG.		126580
AUTO DIALER OPERATING?		yes
LEAKS?		NO
RAIN GAUGE READING		.9 in
OTHER VARIANCES IF ANY		[illegible] Bioremediation

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION [illegible]

TIME OF INSPECTION [illegible]

WEATHER/TEMP. [illegible]

NAME OF OPERATOR [illegible]

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		--
PRODUCT PUMP OPERATING?		--
RECOVERED PDT. TANK LEVEL		8"
TOTALIZER FQI-104 READING		63.1 gal / 1068 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		—
FLOW INDICATOR FI-101 RDG.		—
TOTALIZER FQI-101 RDG.		153450
FLOW INDICATOR FI-102 RDG.		—
TOTALIZER FQI-102 RDG.		151350
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		—
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		—
TOTALIZER FQI-103 RDG.		146143
AUTO DIALER OPERATING?		yes
LEAKS?		NONE
RAIN GAUGE READING		1.5 IN
OTHER VARIANCES IF ANY		System Shutdown

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 1·31·91

TIME OF INSPECTION 1200

WEATHER/TEMP. Sunny 85°

NAME OF OPERATOR Dem / Reggie

INSPECTION LOG
PILOT GROUND WATER TREATMENT SYSTEM
NAS-KEY WEST
KEY WEST, FLORIDA

ITEMS	STATUS	OBSERVATIONS/READINGS
GROUND WTR. PUMP OPERATING?		NO
PRODUCT PUMP OPERATING?		NO
RECOVERED PDT. TANK LEVEL		8"
TOTALIZER FQI-104 READING		63.1 gal / 1068 gal
AIR SPARGER OPERATING? AIR BLOWER PR. GAUGE RDG.		NO
FLOW INDICATOR FI-101 RDG.		—
TOTALIZER FQI-101 RDG.		153549
FLOW INDICATOR FI-102 RDG.		—
TOTALIZER FQI-102 RDG.		153690
FILTER BAGS INLET/OUTLET PRESSURE GAUGE READING		—
CARBON ADSORPTION SYSTEM IN/OUT PRESSURE GAUGE RDG.		—
TOTALIZER FQI-103 RDG.		1566606
AUTO DIALER OPERATING?		NO
LEAKS?		NONE
RAIN GAUGE READING		1.6 in
OTHER VARIANCES IF ANY		System shut down

Record significant variances or unusual condition in Daily Activity log.

DATE OF INSPECTION 3.4.91

TIME OF INSPECTION 1200

WEATHER/TEMP. PtlyCldy / 75°

NAME OF OPERATOR Dan/Reggie

Appendix C
Data Analyses

Figure C—1

Groundwater Recovered and Treated

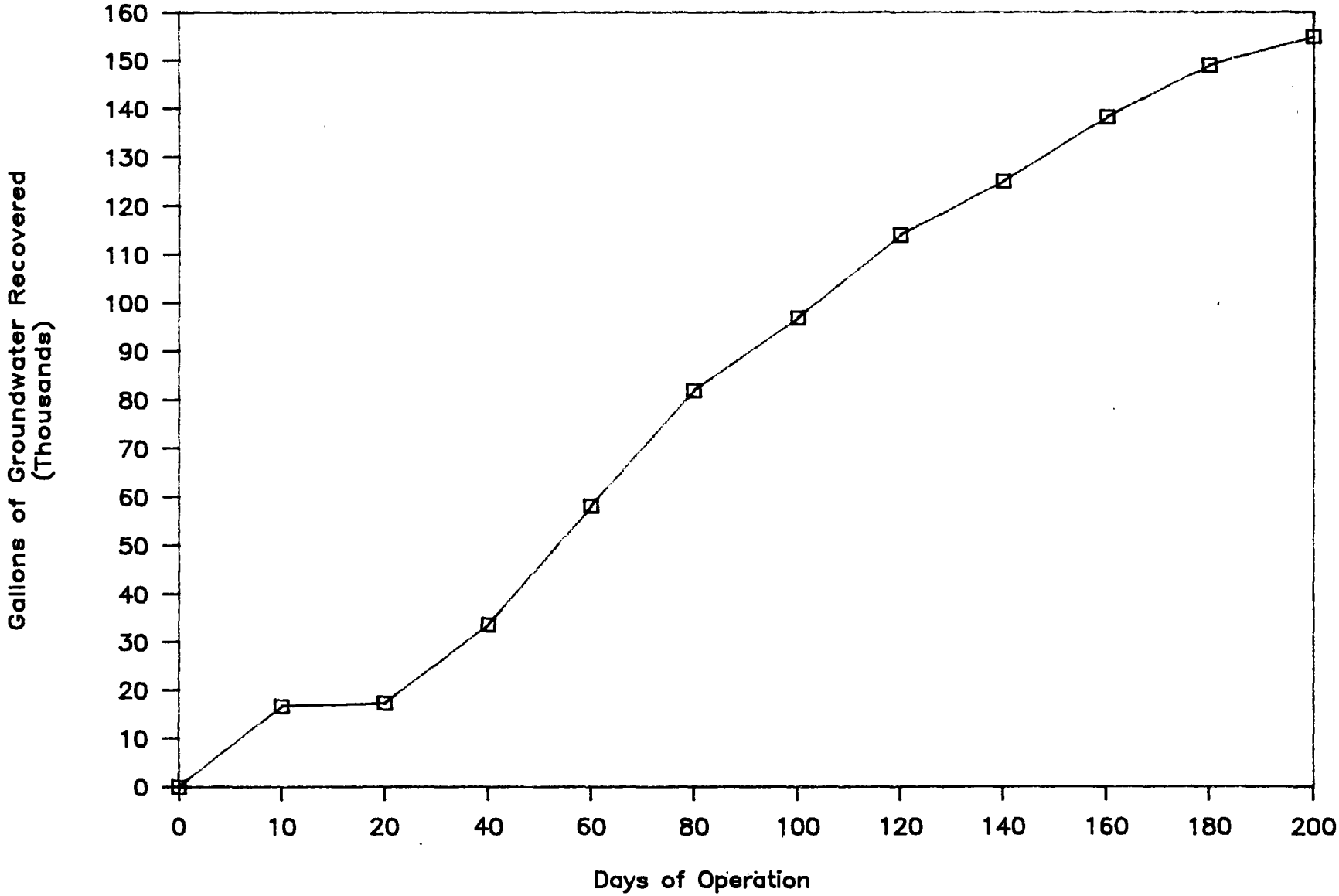
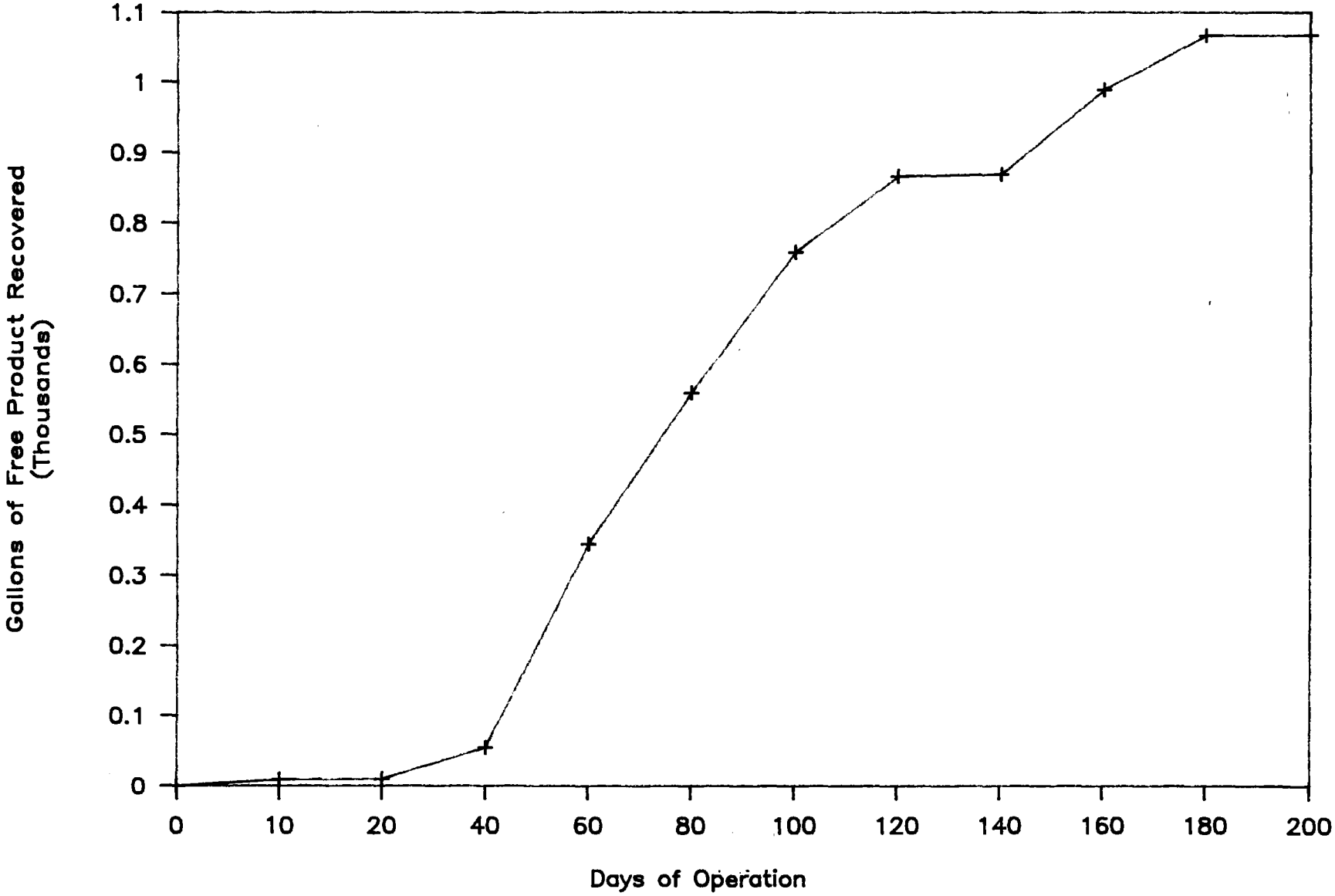
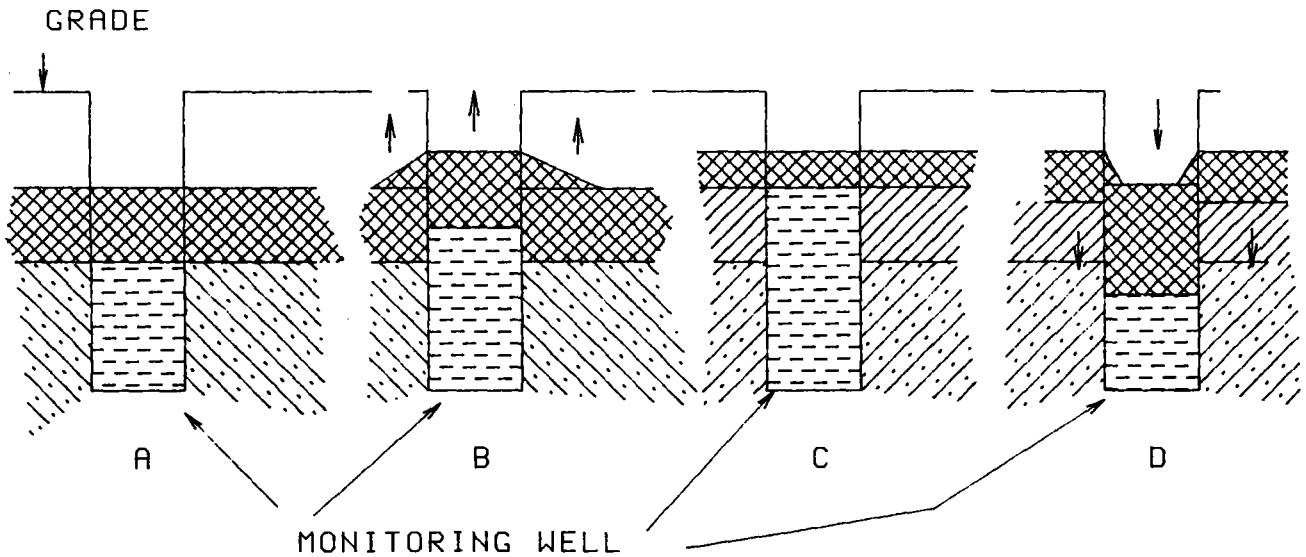


Figure C–2

Free Product Recovered





LEGEND

A = CONDITIONS AT LOW TIDE

B = PRODUCT FLOWING INTO VADOSE ZONE DUE TO RISING LIQUIDS IN WELL

C = REDUCED PRODUCT LAYER AT HIGH TIDE DUE TO ENTRAPPED PRODUCT

D = INCREASED PRODUCT LAYER DUE TO RELEASE OF ENTRAPPED PRODUCT AND FLOW FROM VADOSE ZONE

SATURATED ZONE

FREE PHASE PRODUCT

WATER INSIDE THE MONITORING WELL

ENTRAPPED PRODUCT

FIGURE C-3

VARIANCE IN PRODUCT THICKNESS DUE TO TIDAL EFFECTS

Figure C–4

Product Thickness & Interface Elevation

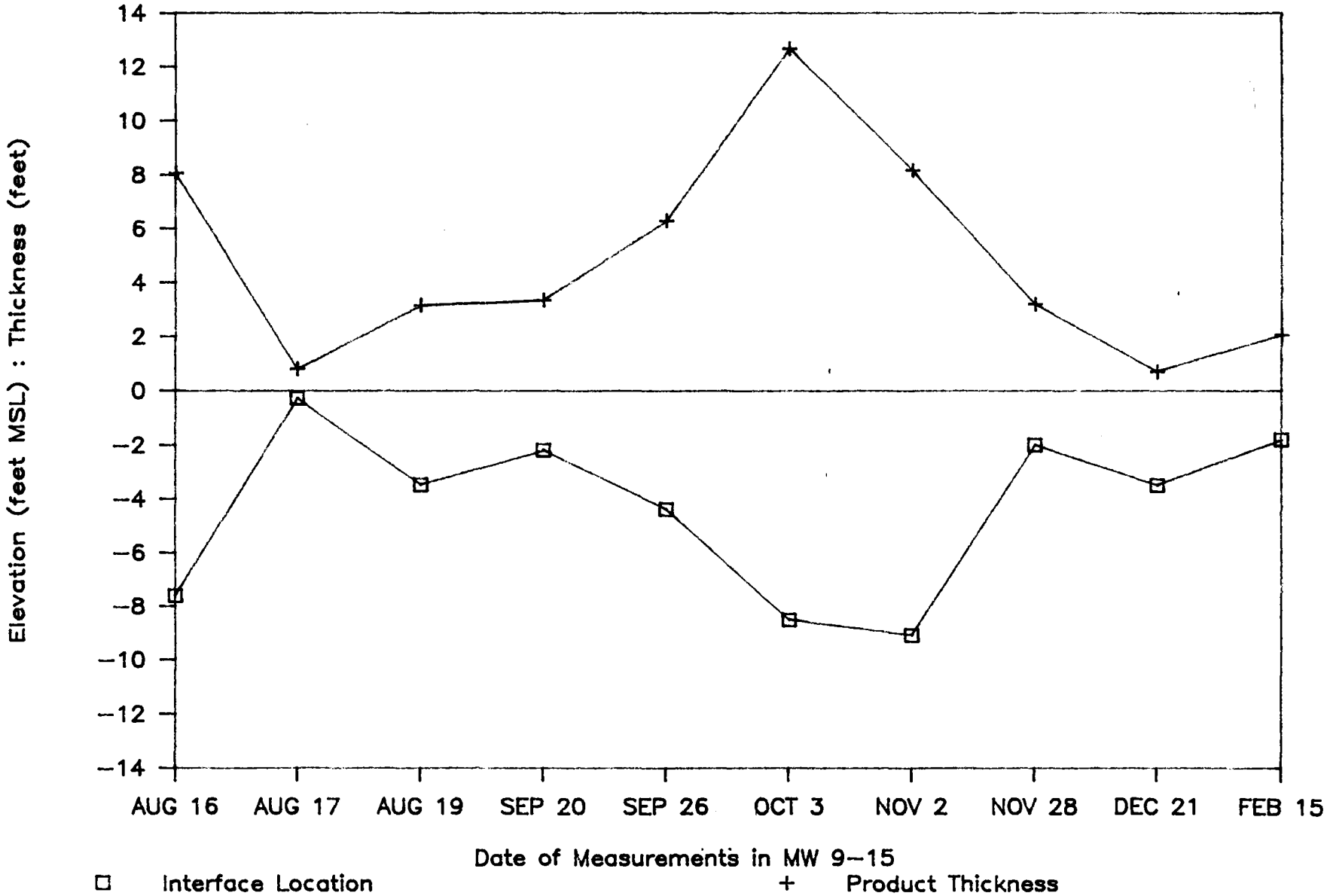


Figure C–5

Product Thickness & Interface Elevation

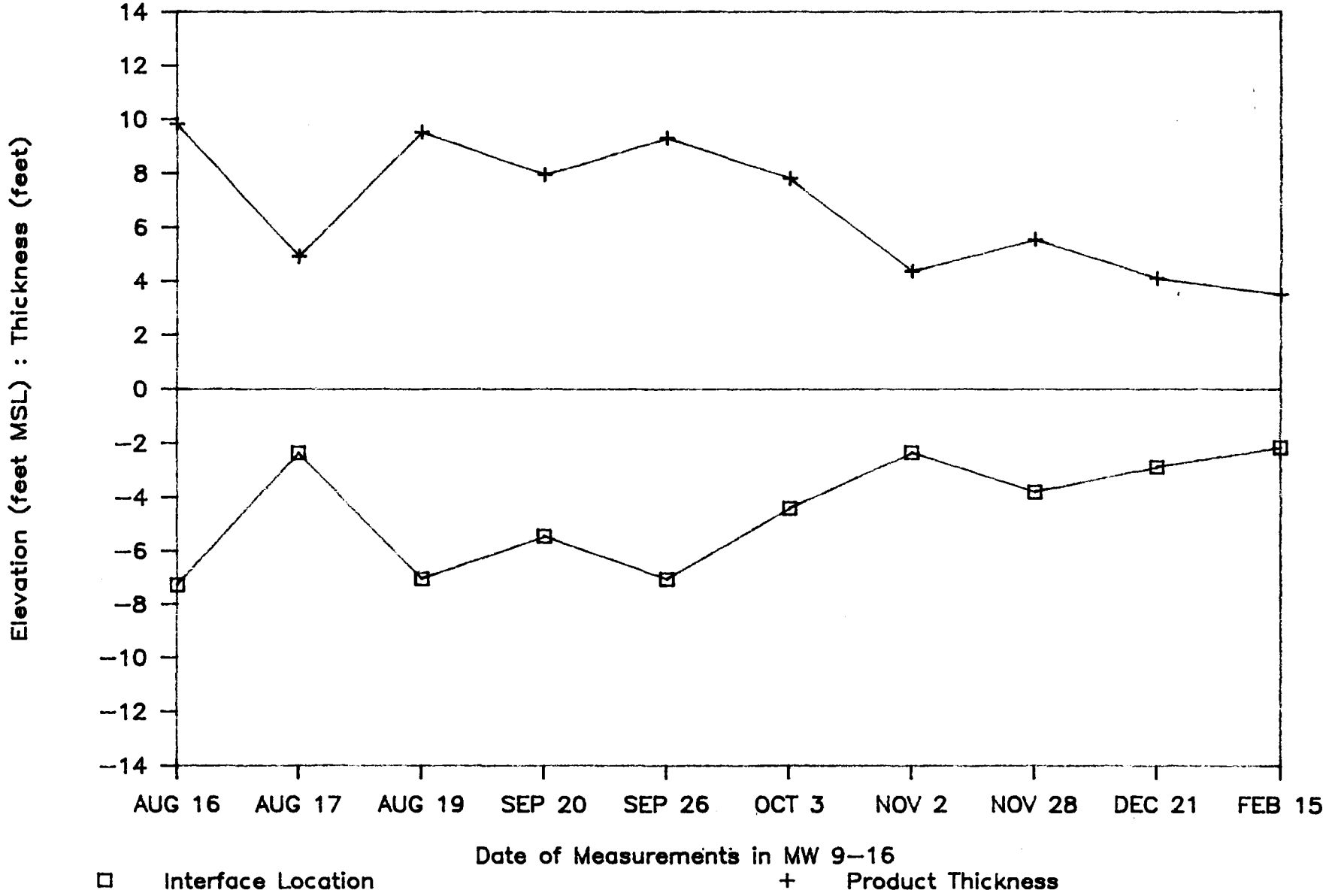


Figure C–6

Product Thickness & Interface Elevation

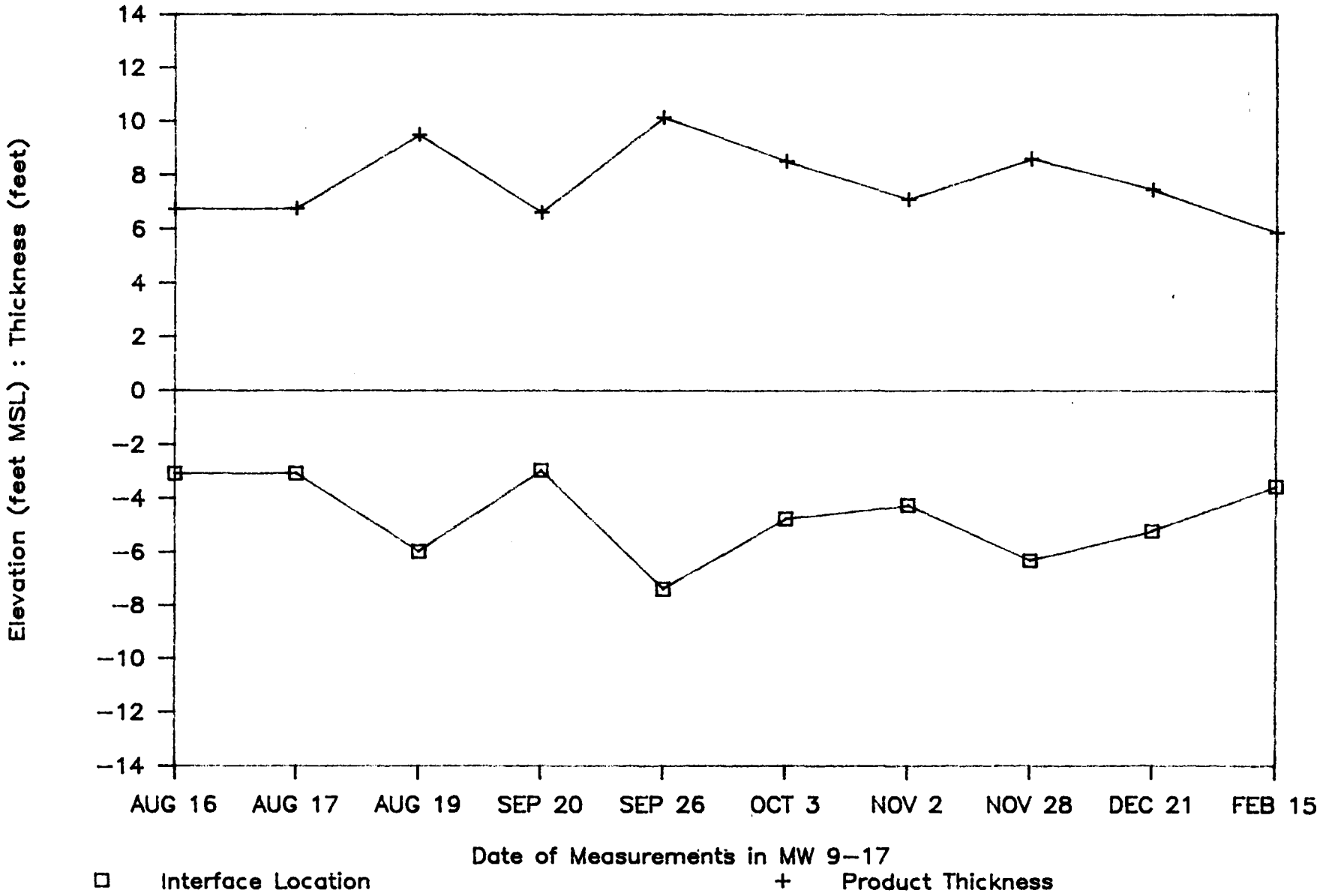


Figure C–7

Zone of Influence – 8/16/90

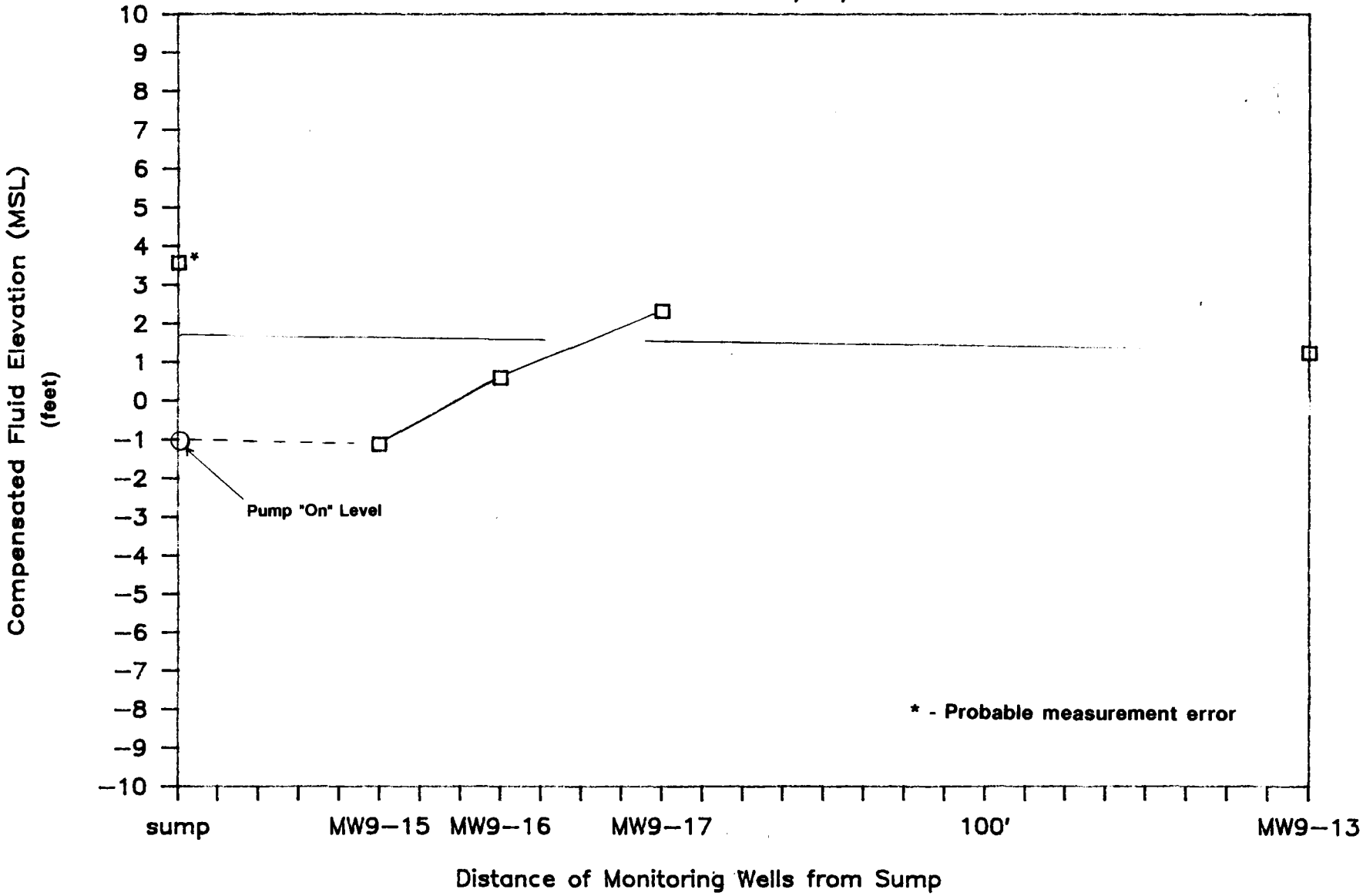


Figure C-8

Zone of Influence – 8/17/90

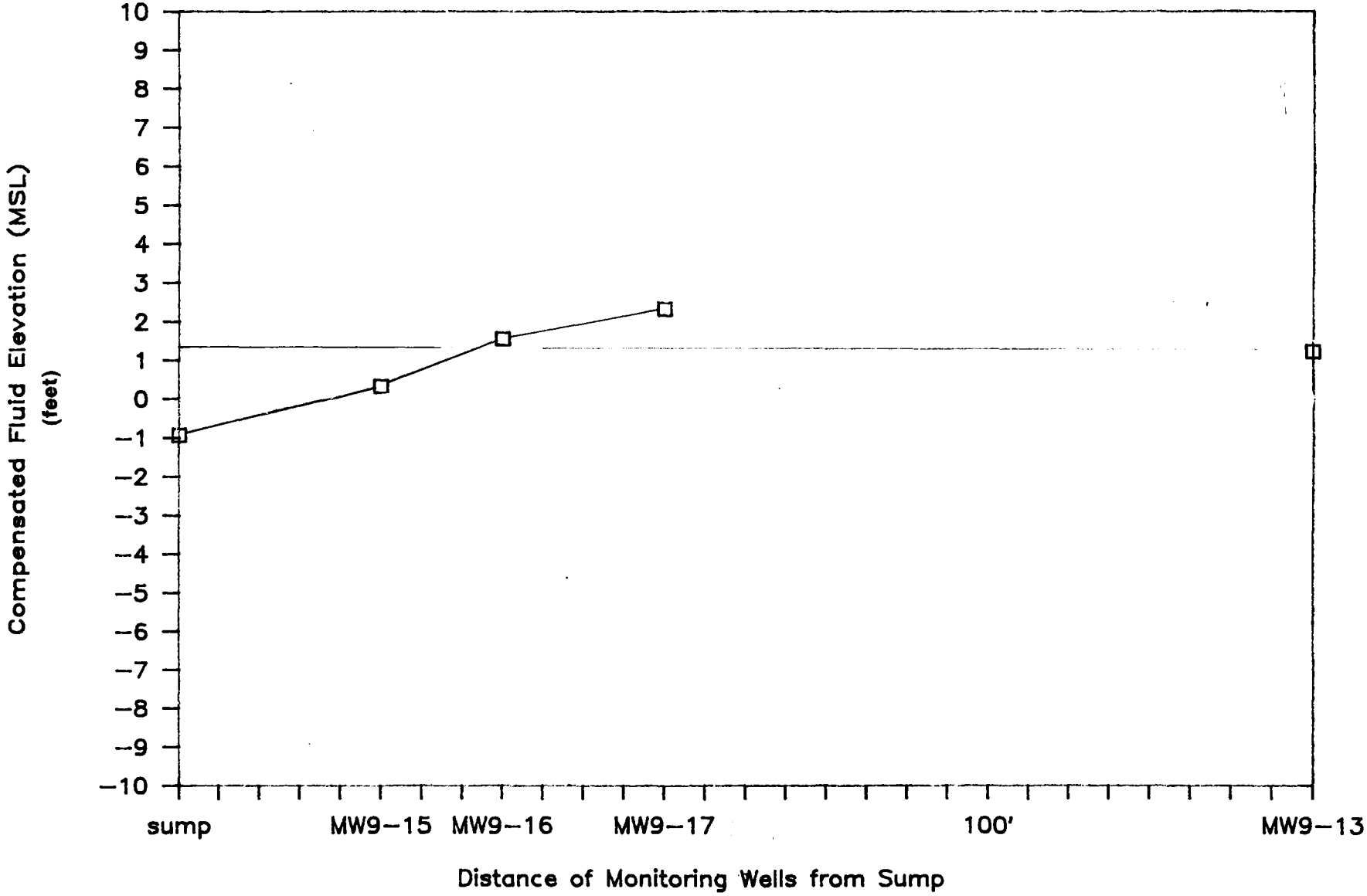


Figure C–9

Zone of Influence – 8/19/90

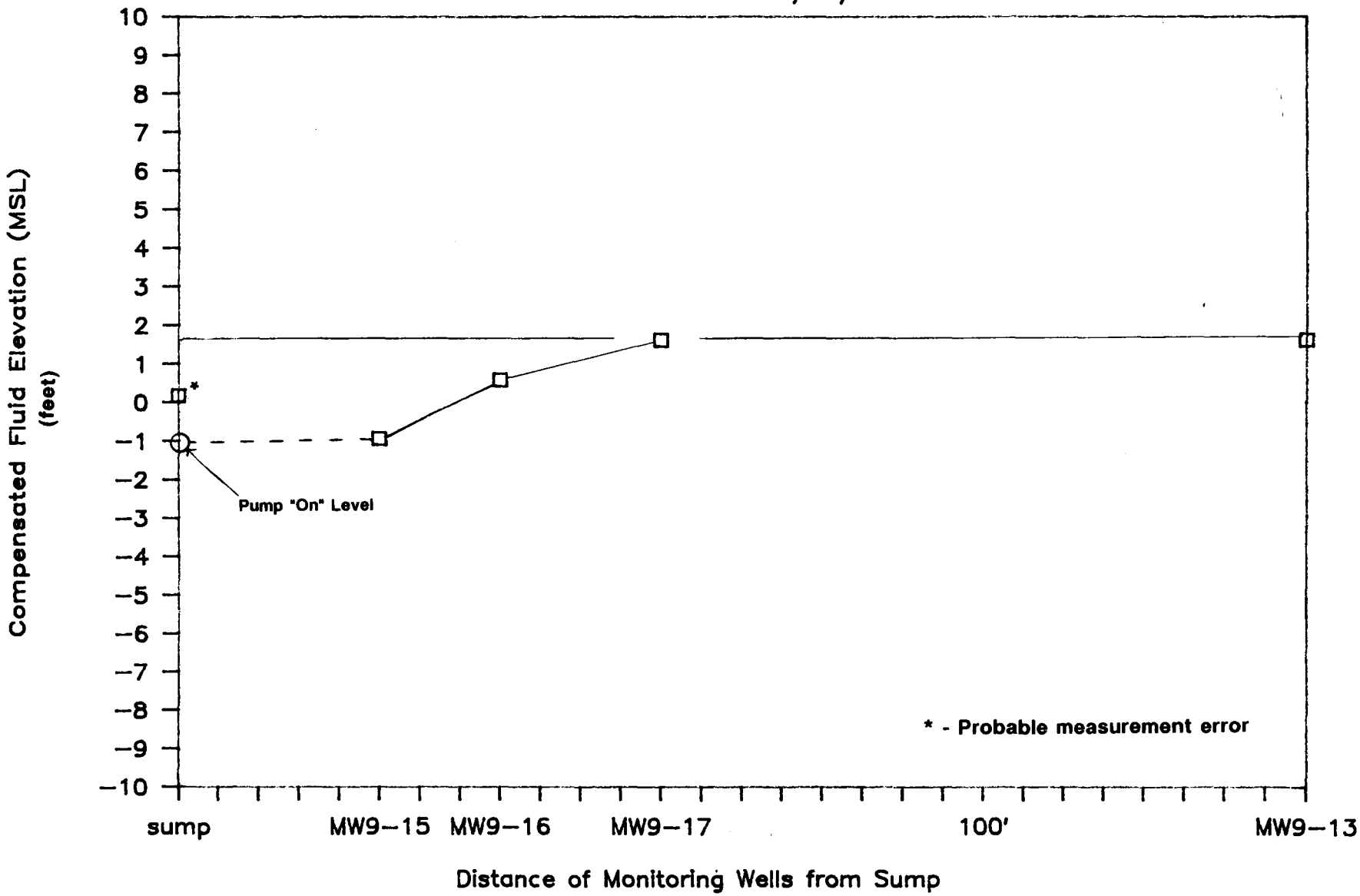


Figure C–10

Zone of Influence – 9/20/90

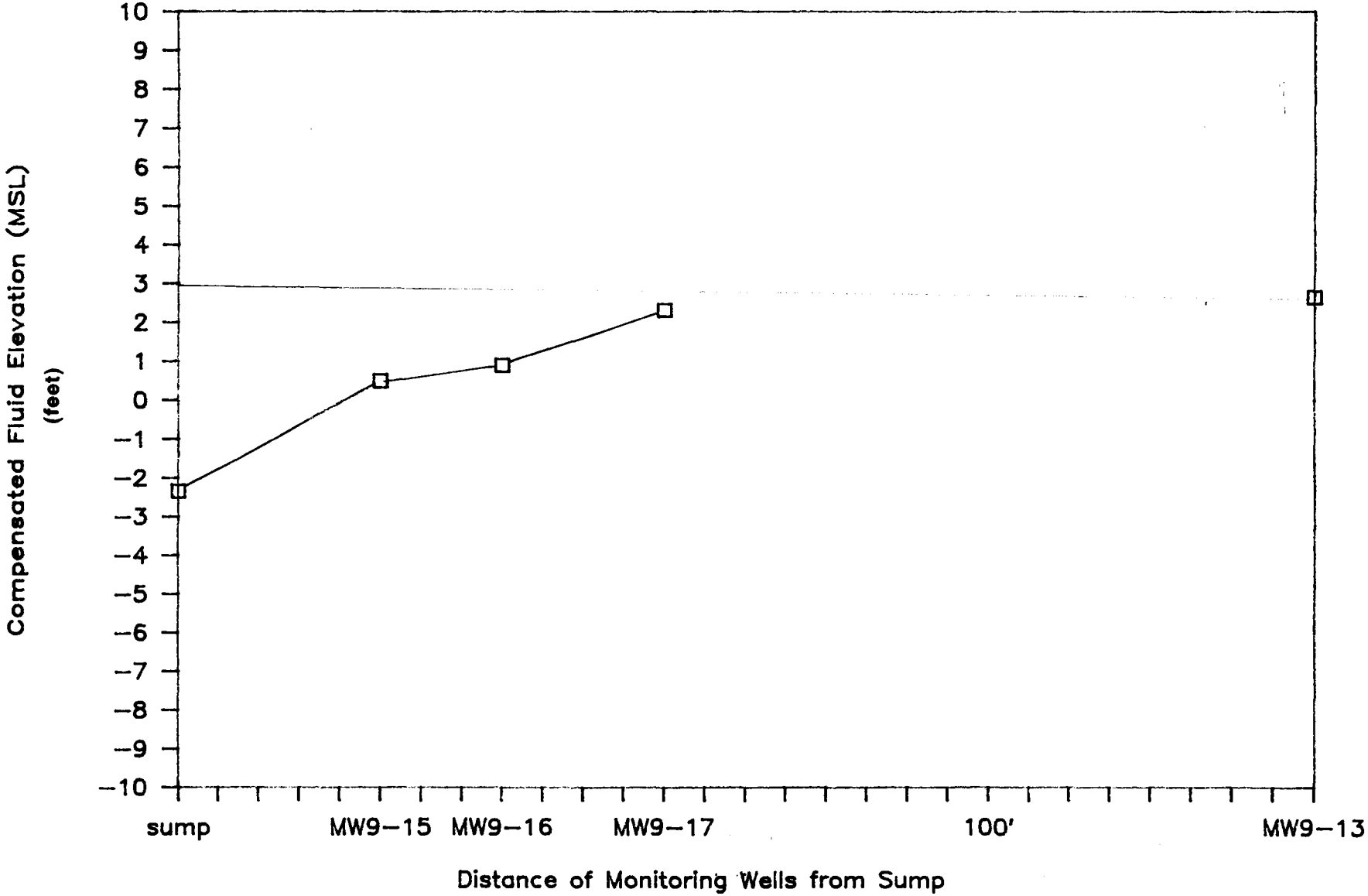


Figure C-11

Zone of Influence – 9/26/90

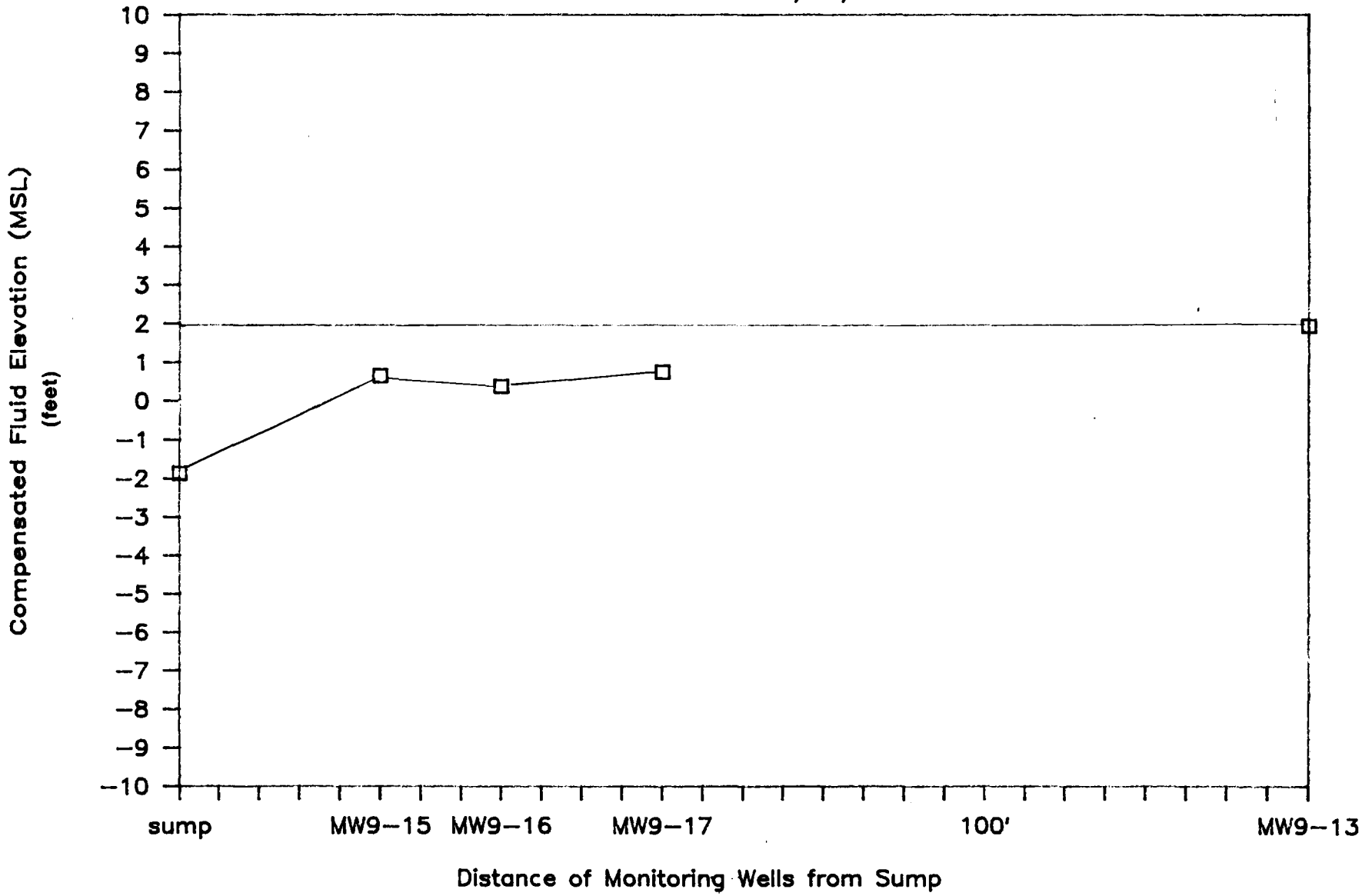


Figure C–12

Zone of Influence – 10/03/90

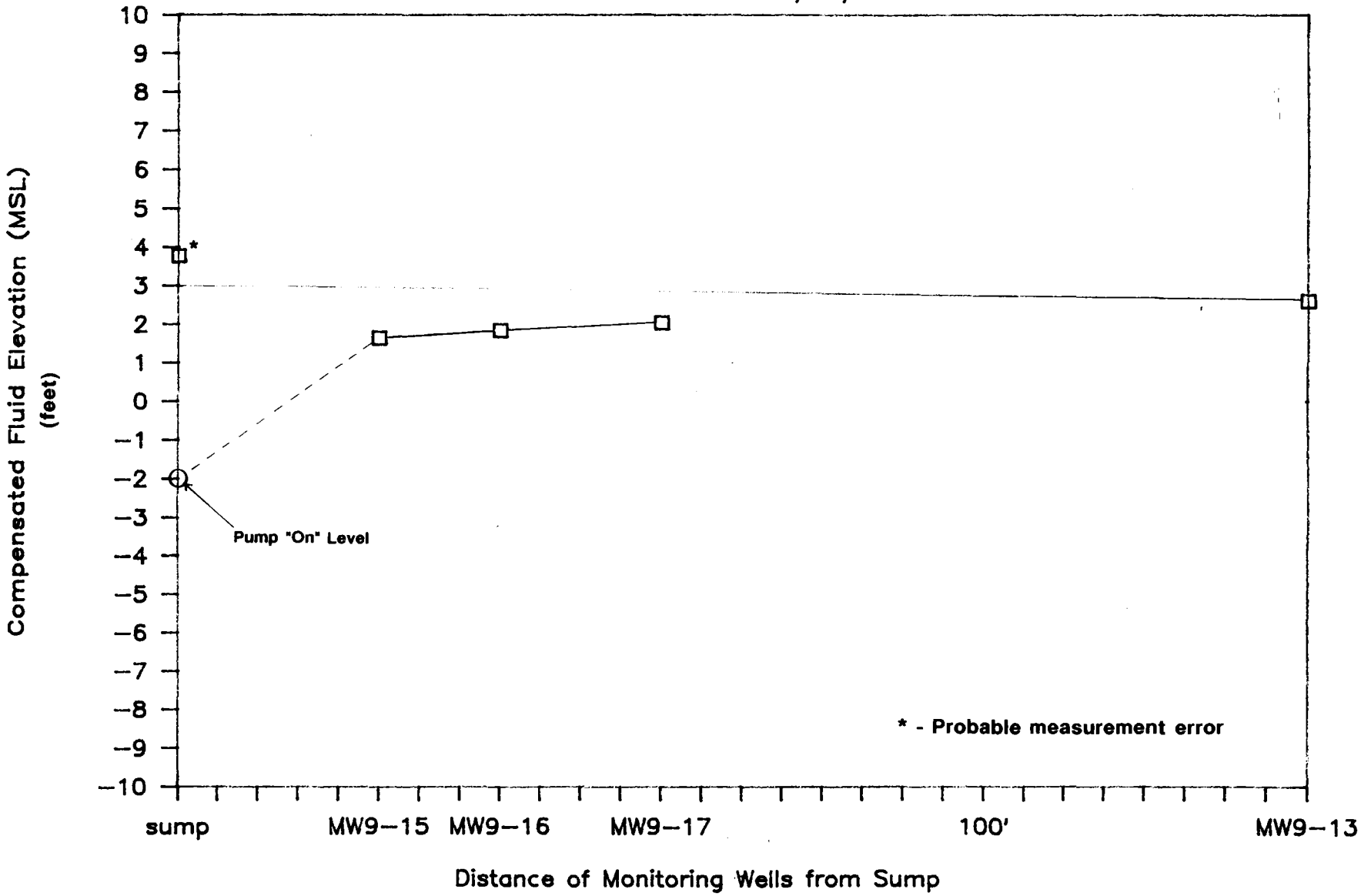


Figure C–13

Zone of Influence – 11/02/90

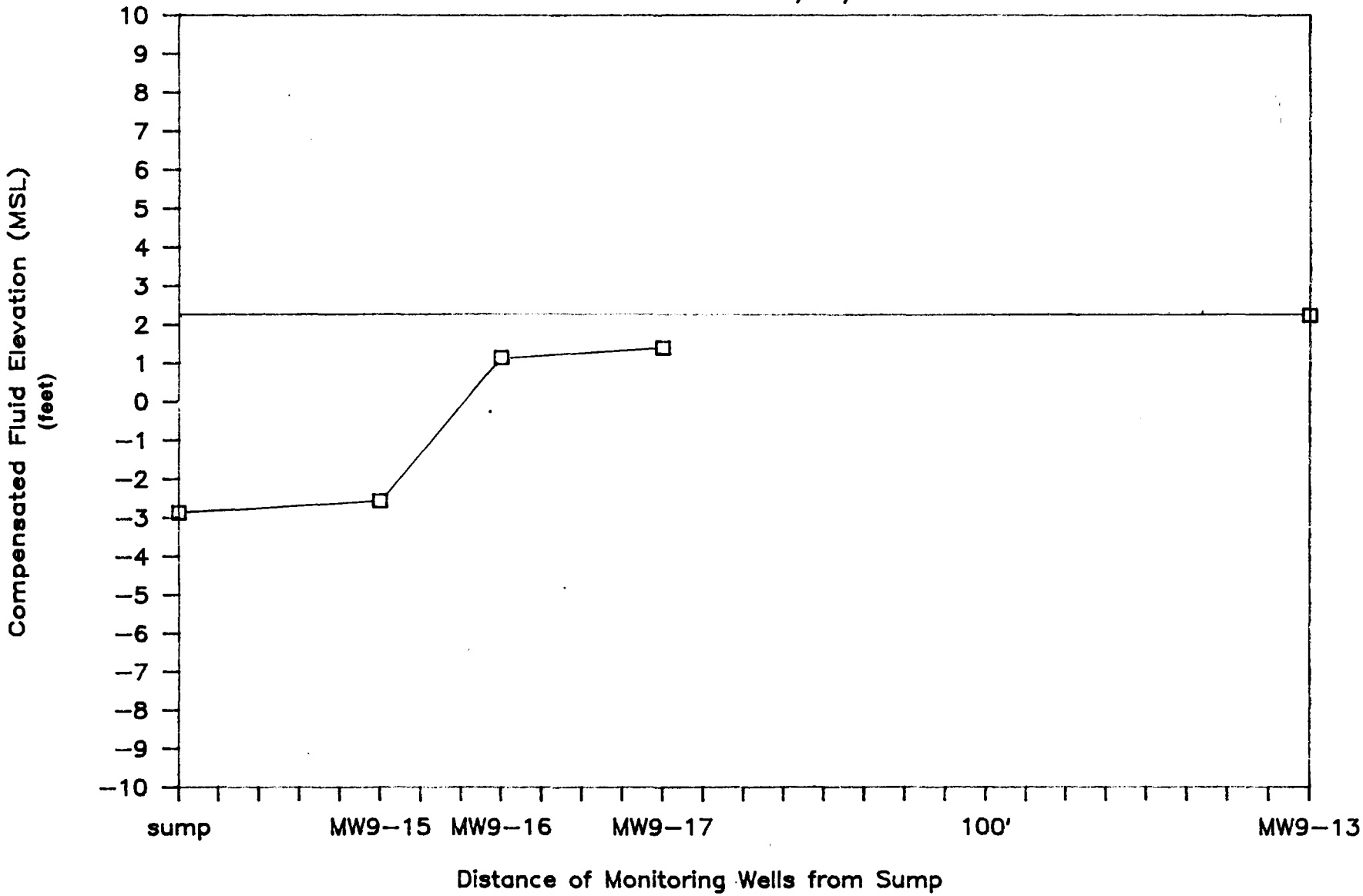


Figure C–14

Zone of Influence – 11/28/90

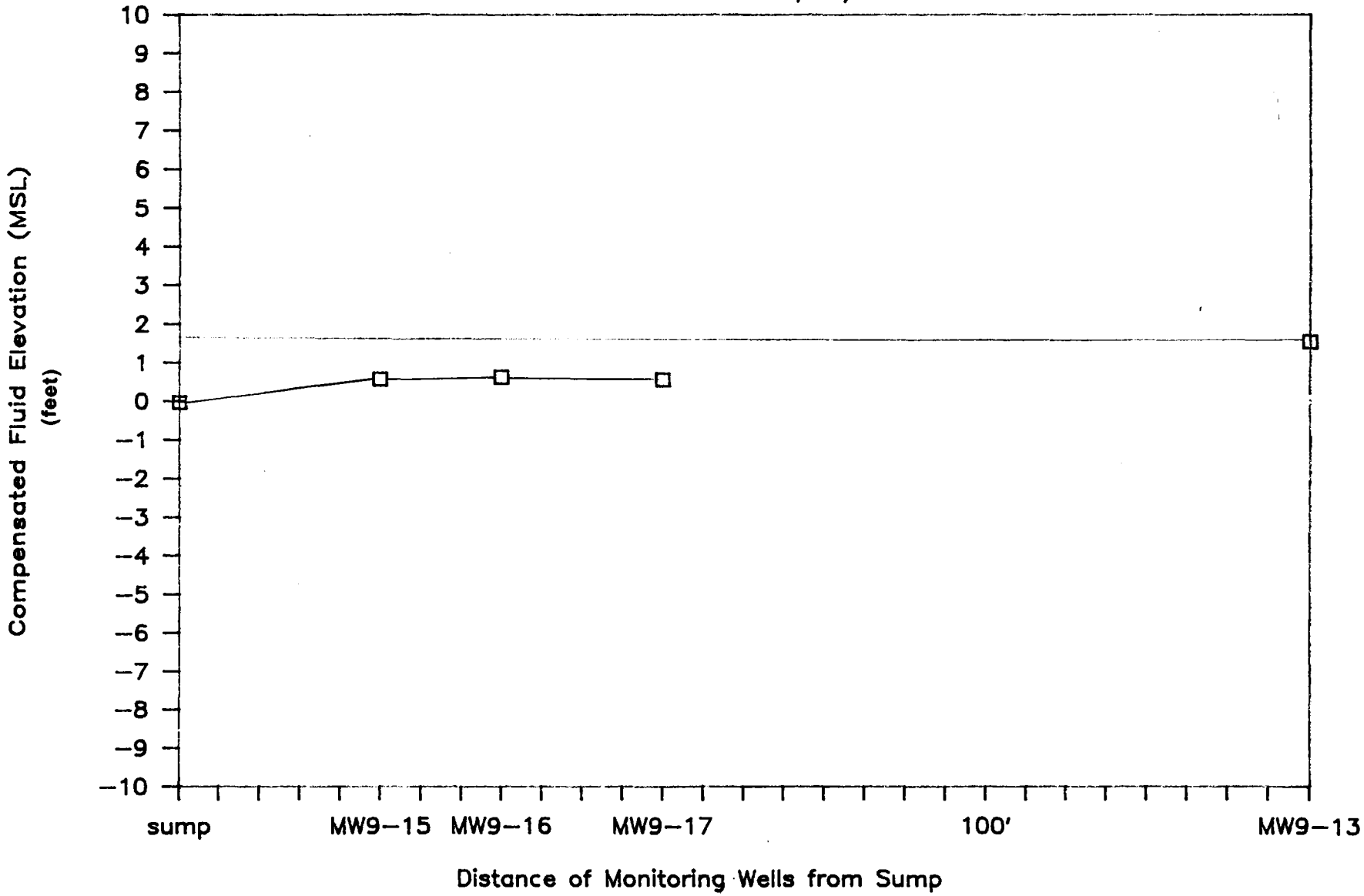


Figure C–15

Zone of Influence – 12/21/90

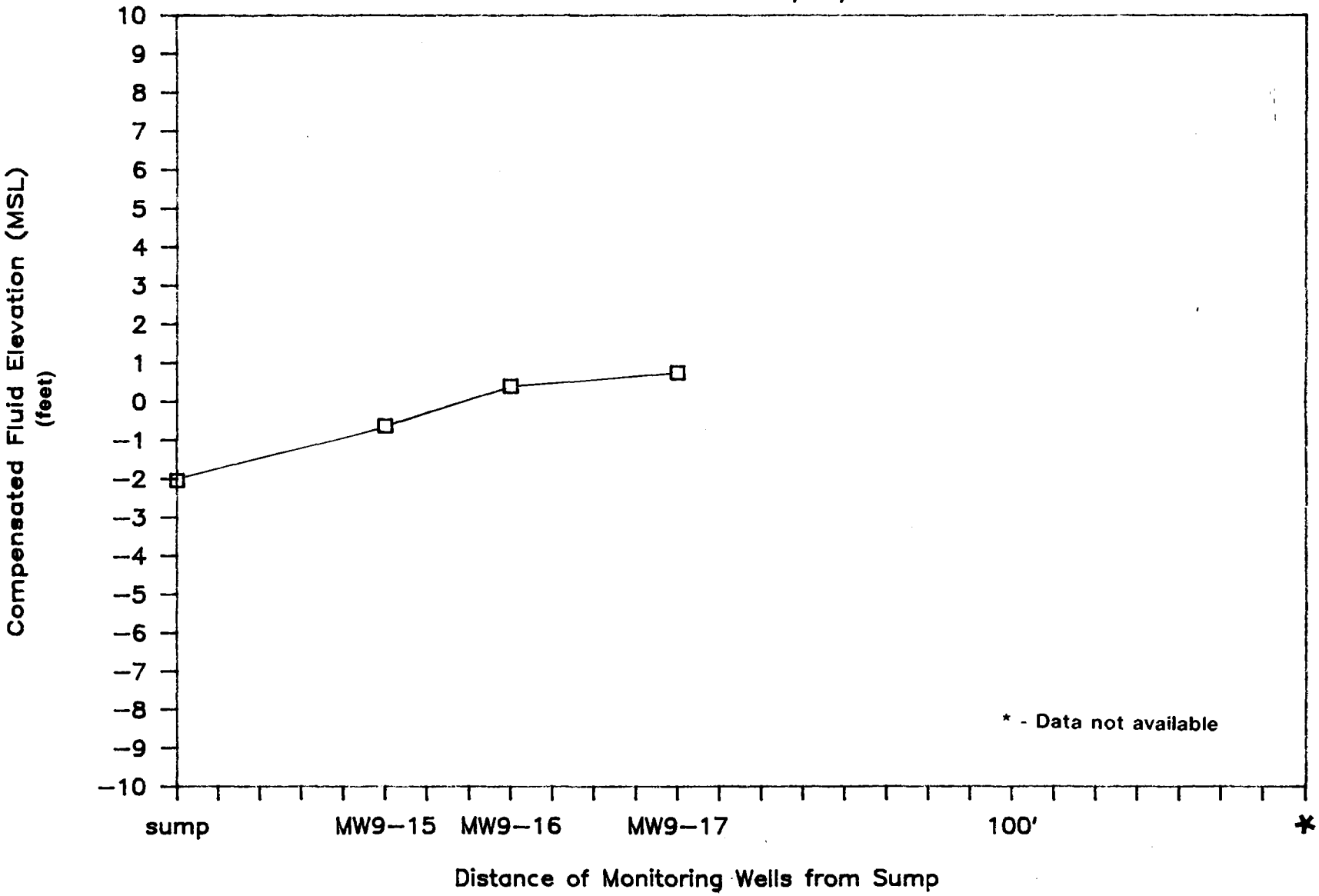
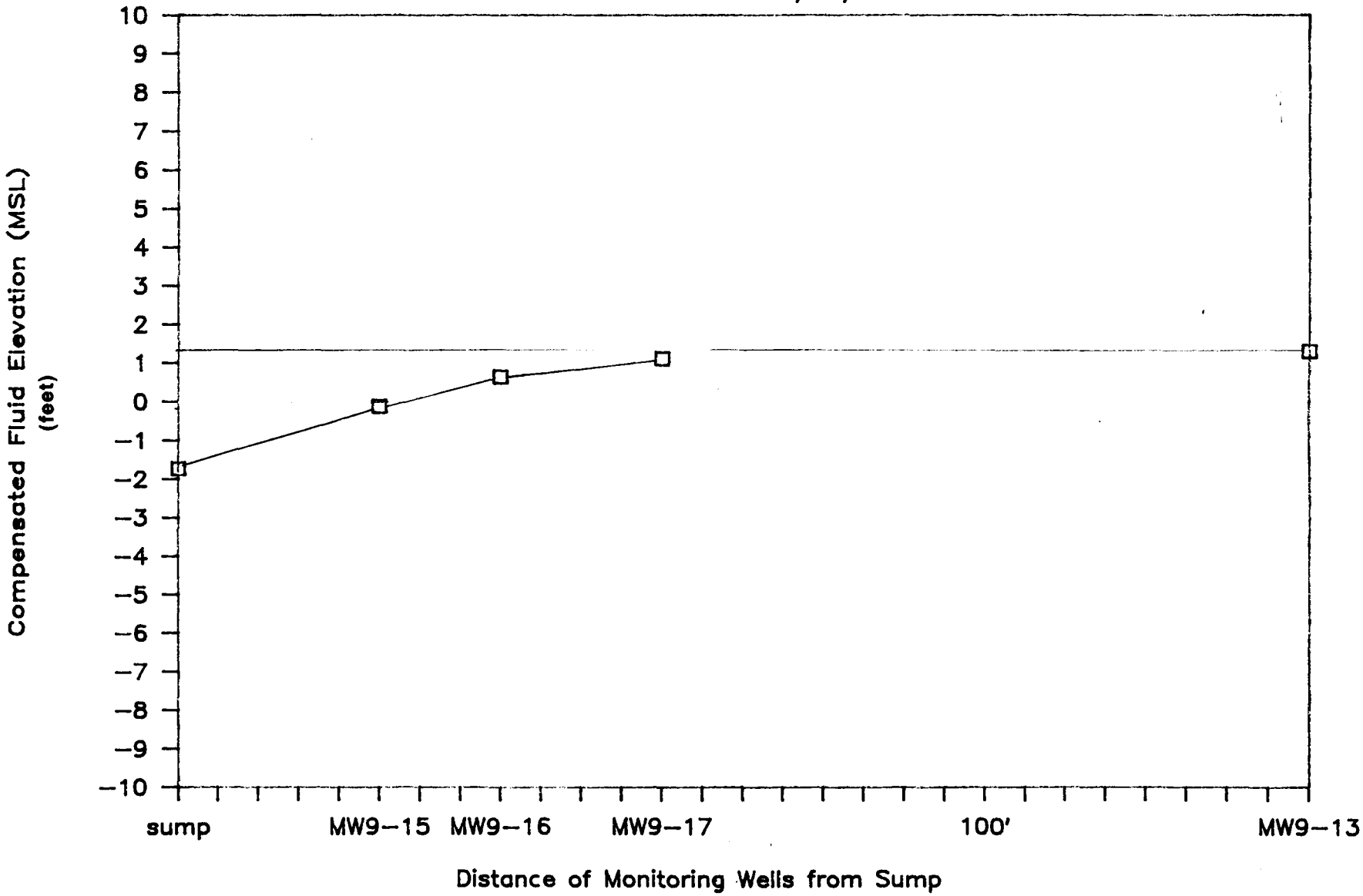


Figure C–16

Zone of Influence – 02/15/91



Appendix D
Sampling and Analysis Forms and Documents

SAMPLE LABEL

IT CORPORATION

Project Name _____

Project No. _____

Sample No. _____

Collection Date/Time _____

Collector's Name _____

Sample Location _____

Sample Type/Depth/Description _____

_____ Preservative _____

Analyze For _____

Bottle _____ of _____ _____ Filtered _____ Nonfiltered

INTERNATIONAL TECHNOLOGY CORPORATION

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

SAMPLE COLLECTION LOG

PROJECT NAME _____

SAMPLE NO. _____

SAMPLE LOCATION _____

SAMPLE TYPE _____

COMPOSITE _____ YES _____ NO

COMPOSITE TYPE _____

DEPTH OF SAMPLE _____

WEATHER _____

CONTAINERS USED	AMOUNT COLLECTED

COMMENTS:

PREPARED BY: _____

COMMENTS:
(Continued)

DATE	
TIME	
PAGE ____ OF ____	
PAGE	
PROJECT NO.	

PREPARED BY: _____

LEGEND

1. A SAMPLE COLLECTION LOG IS TO BE COMPLETED FOR EACH SAMPLE.
2. ALWAYS COMPLETE BOTH SIDES. IF SECOND SIDE IS NOT USED, DRAW A LINE THROUGH IT AND MARK N/A. FILL IN CONTROL BLOCK AND PREPARED BY.
3. ALL ENTRIES ON LOG ARE TO BE COMPLETED, IF NOT APPLICABLE MARK N/A.
4. DATE: USE MONTH/DAY/YEAR; I.E.. 10/30/85
5. TIME: USE 24-HOUR CLOCK; I.E., 1835 FOR 6:35 P.M.
6. PAGE: EACH SAMPLE TEAM SHOULD NUMBER PAGE _____ OF _____ FOR THE DAY'S ACTIVITIES FOR ALL SHEETS PREPARED ON A SINGLE DAY, I.E., IF THERE ARE A TOTAL OF 24 PAGES (INCLUDING FRONT AND BACK) NUMBER 1 OF 24, 2 OF 24, ETC.
7. SAMPLE LOCATION: USE BORING OR MONITORING WELL NUMBER, GRID LOCATION (TRANSECT), SAMPLING STATION I.D., OR COORDINATE TO PHYSICAL FEATURES WITH DISTANCES. INCLUDE SKETCH IN COMMENT SECTION IF NECESSARY.
8. SAMPLE TYPE: USE THE FOLLOWING - SOIL; WATER (SURFACE OR GROUND); AIR (FILTERS, TUBES, AMBIENT, PERSONNEL); SLUDGE; DRUM CONTENTS; OIL; VEGETATION; WIPE; SEDIMENT.
9. COMPOSITE TYPE: I.E., 24-HOUR, LIST SAMPLE NUMBERS IN COMPOSITE, SPATIAL COMPOSITE.
10. DEPTH OF SAMPLE: GIVE UNITS, WRITE OUT UNITS SUCH AS INCHES, FEET. DON'T USE ' OR ".
11. WEATHER: APPROXIMATE TEMPERATURE, SUN AND MOISTURE CONDITIONS.
12. CONTAINERS USED: LIST EACH CONTAINER TYPE AS NUMBER, VOLUME, MATERIAL (E.G., 2 - IL GLASS; 4 - 40 ML GLASS VIAL; 1 - 400 ML PLASTIC; 1 - 3 INCH STEEL TUBE; 1 - 8 OZ. GLASS JAR).
13. AMOUNT COLLECTED: VOLUME IN CONTAINERS (E.G. 1/2 FULL).

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211432

C/C Control No.

PROJECT NAME: KEY WEST TRUMBO PT.

PROJECT NUMBER: 595391-07-83

PROFIT CENTER NUMBER: 2285

PROJECT MANAGER: DAN PHELPS

BILL TO: Same

PURCHASE ORDER NO.: IC-102

DATE SAMPLES SHIPPED: 8-17-90

LAB DESTINATION: ITAS KNOXVILLE

LABORATORY CONTACT: DANE JONES

SEND LAB REPORT TO: K. SENAPATI IT TAMPA

DATE REPORT REQUIRED: AS SPECIFIED

PROJECT CONTACT: DAN PHELPS

PROJECT CONTACT PHONE NO.: 813-622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT	WATER	as SPECIFIED 40 ML & 1 Lt	YES/HCl	EPA 602 & EPA 610	
EFFLUENT #1					
EFFLUENT #2					

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)

Normal ✓ **Rush** _____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)

I _____ **II** _____ **III** _____ **Project Specific** _____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)

Non-hazard X **Flammable** _____ **Skin Irritant** _____ **Highly Toxic** _____ **Other** _____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)

Return to Client _____ **Disposal by Lab** X **Archive** _____ **(Indicate number of months.)**

FOR LAB USE ONLY

Received by J. E. Armstrong **Date/Time** 8/18/90 0900

WHITE - Original, to accompany samples
YELLOW - Field copy

ITCN46445

126A 10-85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 21452

C/C Control No. 188035

PROJECT NAME/NUMBER KEY WEST TRUMBO PT. LAB DESTINATION ITAS KNOXVILLE

SAMPLE TEAM MEMBERS K. SENAPATI CARRIER/WAYBILL NO. 8204183341

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
INFLUENT	same	3-15 PM	WATER	GLASS	OK GSA 8/18/90	
EFFLUENT #1		8-17-90				
EFFLUENT #2	WATER					

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: K Senapati 8-17-90 4-25 PM GSA 8/18/90
   Received By: JE Armstrong ITAS-K ~~8/18/90~~ ~~8/18/90~~ GSA 8/18/90 0900
2. Relinquished By: GSA 8/18/90
   Received By:
3. Relinquished By:
   Received by:
4. Relinquished By:
   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY46445

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211431
C/C Control No. 188034

PROJECT NAME: 595391 / Key West
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285-
PROJECT MANAGER: DAN PHELPS
BILL TO: Sender

PURCHASE ORDER NO.: IC NO. 102

DATE SAMPLES SHIPPED: 8-17-90
LAB DESTINATION: IT - KNOXVILLE
LABORATORY CONTACT: DIANE JONES
SEND LAB REPORT TO: K. SENAPATI IT TAMPA

DATE REPORT REQUIRED: As Specified
PROJECT CONTACT: Dan Phelps
PROJECT CONTACT PHONE NO.: 813-622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW-9-13	WATER	As SPECIFIED	AS REQD	EPA 601	Please refer to purchase order
INFLUENT				EPA 602	
EFFLUENT #1				EPA 625	
EFFLUENT #2				EPA 610	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard ____ **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** ____ **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
Received by J E Armstrong **Date/Time** 8/18/90 0900

WHITE - Original, to accompany samples
YELLOW - Field copy

ITCY 46445

126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. [illegible] 1

C/C Control No. 188034

PROJECT NAME/NUMBER 595391-07-83

LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS K. SENAPATI

CARRIER/WAYBILL NO. 8204 183433

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW9-13	WATER	8-16-90	WATER	GLASS	OK JCA 8/18/90	
INFLUENT		6 PM				
EFFLUENT #1						
EFFLUENT #2						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: KSenapati / IT Corp 8/17/90

Received By: J. Armstrong ITAS-K 8/18/90 10 AM 0900

2. Relinquished By:

Received By:

3. Relinquished By:

Received by:

4. Relinquished By:

Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY46995

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211436
C/C Control No. 188039

PROJECT NAME: KEY WEST TRUMBO FUEL FARM
PROJECT NUMBER: 595391 - 0783
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: DAN PHELPS
BILL TO: SENDER

PURCHASE ORDER NO.: IC 102

DATE SAMPLES SHIPPED: 8/20/90
LAB DESTINATION: KNOXVILLE
LABORATORY CONTACT: DANA
SEND LAB REPORT TO: K. SENAPATI, IT TAMPA
DATE REPORT REQUIRED: AS SPECIFIED
PROJECT CONTACT: K. SENAPATI
PROJECT CONTACT PHONE NO.: 813 622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT	WATER	40 mL and 1000 mL	AS REQUIRED	EPA 602 and 610	
EFFLUENT-1	"			"	
EFFLUENT-2	"			"	
Field Blk	"	40 mL		602	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X Rush ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ Project Specific ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X Flammable ____ Skin Irritant ____ Highly Toxic ____ Other ____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ Disposal by Lab X Archive ____ (Indicate number of months.)

FOR LAB USE ONLY
Received by: J. Armstrong Date/Time: 8/21/90 09:00

WHITE - Original, to accompany samples
YELLOW - Field copy

126A 10 85

ITC 946445

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 211436

C/C Control No. 188039

PROJECT NAME/NUMBER TRUMBO FUEL FARM/595391

LAB DESTINATION KNOXVILLE TN.

SAMPLE TEAM MEMBERS DENNIS FRYE / K. SENAPATI

CARRIER/WAYBILL NO. 8204183385

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
INFLUENT	TRUMBO FUEL FARM	1530	WATER	GLASS	OK JSA 8/21/90	
EFFLUENT-1	KEY WEST /	"	"	"	5°C	
EFFLUENT-2	WATER	"	"	"	↓	
Field Blk	water	"	"	"	↓	

Special Instructions: NONE

Possible Sample Hazards: NONE

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Dennis J Frye

Received By: J S Armstrong ITA S-K 8/21/90 0900

2. Relinquished By:

Received By:

3. Relinquished By:

Received by:

4. Relinquished By:

Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY46445

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211437
C/C Control No. 188040

PROJECT NAME: KEY WEST, TRUMBO POINT FARM
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: DAN PHELPS
BILL TO: SENABR
PURCHASE ORDER NO.: IC-102

DATE SAMPLES SHIPPED: 8-21-90
LAB DESTINATION: I.T. KNOXVILLE
LABORATORY CONTACT: DANA JONES
SEND LAB REPORT TO: K. SENAPATI, IT TAMPA
DATE REPORT REQUIRED: AS SPECIFIED
PROJECT CONTACT: K. SENAPATI
PROJECT CONTACT PHONE NO.: 813-622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT	WATER	40 ML	AS REQUIRED	601 + 610	
EFFLUENT-1	"	1000 ML			
EFFLUENT-2	"				
BLANK	"				

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ **II** ____ **III** ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
Received by K. J. Haig **Date/Time** 8-22-90, 9:00

WHITE - Original, to accompany samples
YELLOW - Field copy

ITC4 46479 126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 211431

C/C Control No. 188040

PROJECT NAME/NUMBER KEYWEST / 595391-07-83

LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS DENNIS / KIRON

CARRIER/WAYBILL NO. 8204183411

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
INFLUENT	KEYWEST, TRUMBO FUEL FARM	8/21/90-1600	WATER	GLASS	OK @ 4°C KL 8-24-90	
EFFLUENT 1	"	"	"	"		
EFFLUENT 2	"	"	"	"		
BLANK	"	"	"	"		

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [illegible]

   Received By: Kimberly J. Lausy, 8-22-90, 9:00

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

ITC4 46479

WHITE - To accompany samples
YELLOW - Field copy

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211438
C/C Control No. 188041

PROJECT NAME: KEY WEST, TRUMBO FUEL FARM
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: DAN PHELPS
BILL TO: SENDER
PURCHASE ORDER NO.: IC-102

DATE SAMPLES SHIPPED: 8 22 90
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: DANA JONES
SEND LAB REPORT TO: K. SENAPATI, IT TAMPA
DATE REPORT REQUIRED: AS SPECIFIED
PROJECT CONTACT: K. SENAPATI
PROJECT CONTACT PHONE NO.: 813. 622.7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT	WATER	40 ml x 2, 1000 ml		602 / 610	
EFFLUENT #1	"	"			
EFFLUENT #2	"	"			
BLANK	"	40 ml x 2		602 only (KJ	8-24-90)

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager)
Normal X Rush ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ Project Specific ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X Flammable ____ Skin Irritant ____ Highly Toxic ____ Other ____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ Disposal by Lab X Archive ____ (Indicate number of months.)

FOR LAB USE ONLY
Received by K. J. Haig Date/Time 8-23-90 9:00 AM

WHITE - Original, to accompany samples
YELLOW - Field copy

ITC4 46479 126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 211438

C/C Control No. 188041

PROJECT NAME/NUMBER KEYWEST, TRUMBO FUEL FARM/595391-07-83 LAB DESTINATION I T KNOXVILLE

SAMPLE TEAM MEMBERS DENNIS FRYE CARRIER/WAYBILL NO. 8204183374

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
INFLUENT	TRUMBO FUEL FARM	8/22/90-1600	WATER	GLASS	OK @ 4°C KL 8-24-0	
EFFLUENT #1	"	"	"	"		
EFFLUENT #2	"	"	"	"		
BLANK	"	"	"	"		

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [signature]
   Received By: Kimberly J. Harsy 8-23-90 9:00 AM
2. Relinquished By:
   Received By:
3. Relinquished By:
   Received by:
4. Relinquished By:
   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITC4 46479

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211439
C/C Control No. 188042

PROJECT NAME: KEY WEST, TRUMBO FUEL FARM
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: DAN PHELPS
BILL TO: SENDA
PURCHASE ORDER NO.: IC-102

DATE SAMPLES SHIPPED: 82390
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: DANA JONES
SEND LAB REPORT TO: K. SENAPATI, IT TAMPA
DATE REPORT REQUIRED: AS SPECIFIED
PROJECT CONTACT: K. SENAPATI
PROJECT CONTACT PHONE NO.: 813-622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT	WATER	40mL x 2, 1000mL		602-610	
EFFLUENT #1		"			
EFFLUENT #2		"	40 MIL ONLY		
BLANK		40mL x 2			

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X Rush ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ Project Specific ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X Flammable ____ Skin Irritant ____ Highly Toxic ____ Other ____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ Disposal by Lab X Archive ____ (Indicate number of months.)

FOR LAB USE ONLY
Received by: K. J. Hausy Date/Time: 8-24-90, 9:00

WHITE - Original, to accompany samples
YELLOW - Field copy

ITC4 46479 126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 211439

C/C Control No. 188042

PROJECT NAME/NUMBER KEY WEST / 595391-07-83

LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS DENNIS

CARRIER/WAYBILL NO. 8204183363

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No
INFLUENT	TRUMBO FUEL FARM	8-23-90/1600	WATER	GLASS	OK @ 4°C, KJL 8-24-90	
EFFLUENT #1	"	"	"	"		
EFFLUENT #2	"	"	"	"		

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Dennis [illegible]

   Received By: K. J. Hausy, 8-24-90, 9:00.

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITC4 46479

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211441
C/C Control No. 188043

PROJECT NAME: KEY WEST, TRUMBO FUEL FARM
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: DAN PHELPS
BILL TO: SENDER
PURCHASE ORDER NO.: I-102

DATE SAMPLES SHIPPED: ~~8 27 90~~ 8·28·90
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: DANA JONES
SEND LAB REPORT TO: K. SENAPATI, IT TAMPA
DATE REPORT REQUIRED: AS SPECIFIED
PROJECT CONTACT: K. SENAPATI
PROJECT CONTACT PHONE NO.: 813-622 7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT	water	40 mL x 2	40 mL ONLY	602-610	
EFFLUENT #1		1000 mL			
EFFLUENT #2					
BLANK		40 mL x 2			

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X Rush ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ Project Specific ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X Flammable ____ Skin Irritant ____ Highly Toxic ____ Other ____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ Disposal by Lab X Archive ____ (Indicate number of months.)

FOR LAB USE ONLY
Received by S Patari ITAS Date/Time 8-29-90 0900

WHITE - Original, to accompany samples
YELLOW - Field copy

ITCY 46512

126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 211441 ~~#440~~

C/C Control No. 188043

PROJECT NAME/NUMBER KEY WEST / 595931-07-83 LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS DENNIS CARRIER/WAYBILL NO. 8204183400

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
INFLUENT	TRUMBO FUEL FARM	~~8-24~~ 8-29-90	WATER	GLASS	OK @ 2°C / 8-29-90	
EFFLUENT #1	"	"	"	"		
EFFLUENT #2	"	"	"	"		
BLANK	"	"	"	"		

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Dennis J. [illegible]

   Received By: [illegible] ITAS 8-29-90 0900

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY 46512

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211442
C/C Control No. 188044

PROJECT NAME: KEYWEST TRumbo feedlot farm
PROJECT NUMBER: 595591.07.83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: DAN PHELPS
BILL TO: SENDEK

PURCHASE ORDER NO.: IC-102

DATE SAMPLES SHIPPED: 8 30 90
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: DANA JONES
SEND LAB REPORT TO: K. SENapati, IT Tampa

DATE REPORT REQUIRED: ASAP specified
PROJECT CONTACT: K. Senapati
PROJECT CONTACT PHONE NO.: 813-622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT	water	40mL x 2	40mL ONLY	602/610	
EFFLUENT #1					
EFFLUENT #2					
Blank		1000mL			

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ **II** ____ **III** ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
Received by Sa Kennedy **Date/Time** 8/31/90 0900

WHITE - Original, to accompany samples
YELLOW - Field copy

126A 10 89

ITV 111 000

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 211442

C/C Control No. 188044

PROJECT NAME/NUMBER KEY West / 59539-07-83 LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS Dennis CARRIER/WAYBILL NO. 8204183396

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
INFLUENT	TRumbo fuel farm	8/30/90/1600	water	Glass	OK, sal 8/31/90	
EFFLUENT #1					cooler 10°C	
EFFLUENT #2						
Blank						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Dennis Tye

   Received By: Sd Kennedy, ITAS, 8/31/90 0900

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY 46555

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211443
C/C Control No. 188045

PROJECT NAME: KEY WEST Turnkey Quad Farm
PROJECT NUMBER: 595-391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: Dan Phelps
BILL TO: Sender

PURCHASE ORDER NO.:

DATE SAMPLES SHIPPED: 9 6 90
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: Dana Jones
SEND LAB REPORT TO: K. Senapati, IT Tampa

DATE REPORT REQUIRED: as specified
PROJECT CONTACT: K. Senapati
PROJECT CONTACT PHONE NO.: 813-622 7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
Influent	Water	40ml x2	40ml only	602/610	
Effluent #1		1000 ml			
Effluent #2		40ml x2			
Blank					

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ **II** ____ **III** ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
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ITCY 46594

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YELLOW - Field copy

126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 211443

C/C Control No. 188045

PROJECT NAME/NUMBER KEYNEST / 595391-07-83 LAB DESTINATION IT Knoxville

SAMPLE TEAM MEMBERS Dennis Fry CARRIER/WAYBILL NO. 8306932911

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
Influent	Humboldt farm	9/6/90	Water	glass	OK @ 2°C SPH 9-7-90	
Effluent #1		1600				
Effluent #2						
Blank						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Dennis Fry
   Received By: S Hair ITAS 9-7-90 0900
2. Relinquished By:
   Received By:
3. Relinquished By:
   Received by:
4. Relinquished By:
   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY46594

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211444
C/C Control No. 188046

PROJECT NAME: KEY WEST, TRUMBO FUEL FARM
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: Dan Phelps
BILL TO: Sender

PURCHASE ORDER NO.:

DATE SAMPLES SHIPPED: 9 13 90
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: Dana Jones
SEND LAB REPORT TO: K. SENAPATI, IT TAMPA

DATE REPORT REQUIRED: As Specified
PROJECT CONTACT: K. Senapati
PROJECT CONTACT PHONE NO.: 813 622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
Influent	Water	40 ml x 2	40 ml only	602/610	
Effluent #1		1000 ml			
Effluent #2					
Blank		40 ml x 2			

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
Received by J E Armstrong **Date/Time** 9-14-90 0900

WHITE - Original, to accompany samples
YELLOW - Field copy.

126A 10 85

ITCY46667

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 211444

C/C Control No. 188046

PROJECT NAME/NUMBER KEYWEST, TRUMBO FUEL FARM 595391-07-83

LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS Dennis Fye

CARRIER/WAYBILL NO. 8306932966

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
Influent	Trumbo fuel farm	9/13/90 1200	Water	Glass	OK JSA 9/14/90 5°C	
Effluent #1						
Effluent #2						
Blank						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Dennis Fye
   Received By: J S Armstrong ITAS-K 9-14-90 0900
2. Relinquished By:
   Received By:
3. Relinquished By:
   Received by:
4. Relinquished By:
   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY46667

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211445
C/C Control No. 188048

PROJECT NAME: KEY WEST, TRUMBO FUEL Farm
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: DAN PHELPS
BILL TO: SENDER
PURCHASE ORDER NO.: IC 102

DATE SAMPLES SHIPPED: 9/20/90
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: DANA JONES
SEND LAB REPORT TO: K. SENAPATI
DATE REPORT REQUIRED: AS SPECIFIED
PROJECT CONTACT: K. SENAPATI
PROJECT CONTACT PHONE NO.: 813-622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW-9-13	WATER			601, 602, 625 MW9-13 ONLY	
INFLUENT		40 mL x 2	40 mL ONLY		
EFFLUENT#1		1000 mL			
EFFLUENT#2				602 610	
Blank	"	40 mL x 2			

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X Rush ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ Project Specific ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X Flammable ____ Skin Irritant ____ Highly Toxic ____ Other ____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ Disposal by Lab X Archive ____ (Indicate number of months.)

FOR LAB USE ONLY
Received by Sd Kennedy Date/Time 9/21/90 0900

WHITE - Original, to accompany samples
YELLOW - Field copy

126A 10-85

ITCY 46724

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 21445

C/C Control No. 188048

PROJECT NAME/NUMBER KEYWEST / 595391-07-83

LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS DENNIS FRYE

CARRIER/WAYBILL NO. 8306932933

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW-9-13	KEYWEST, TRUMBO FUEL FARM	9/20/90-1200	WATER	Glass	OK @ 2°C, sak 9/21/90	
INFLUENT						
EFFLUENT #1						
EFFLUENT #2						
BLANK						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Dennis Frye

   Received By: SA Kennedy, ITAS, 9/21/90 0900

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY 46724

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211447
C/C Control No. 188049

PROJECT NAME: Key West, Trumbo fuel farm
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: Don Phelps
BILL TO: Sender

PURCHASE ORDER NO.:

DATE SAMPLES SHIPPED: 10-4-90
LAB DESTINATION: IT Knoxville
LABORATORY CONTACT: Dema Jones
SEND LAB REPORT TO: K. Senapati

DATE REPORT REQUIRED: as specified
PROJECT CONTACT: K. Senapati
PROJECT CONTACT PHONE NO.: 813-622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT					
Effluent #1	Water	40ml	HCl only	602	
Effluent #2		1000ml		610	
Blank	/				

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ **II** ____ **III** ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
Received by Robert Sym **Date/Time** 10-5-90/0900

WHITE - Original, to accompany samples
YELLOW - Field copy

ITCY46845

126A 10-85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 211447

C/C Control No. 188049

PROJECT NAME/NUMBER Key West / 595 391-07-83

LAB DESTINATION IT Knoxville

SAMPLE TEAM MEMBERS Dennis Frye

CARRIER/WAYBILL NO. 8306932955

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
influent	Key West Trumbo Point	10 4 90	Water	glass	Samples Received in good condition, 12°C	
effluent #1						
effluent #2						
Blank						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [signature]

   Received By: Robert Dyer Jr 10-5-90 0900

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY 46845

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 188137
C/C Control No. 136567

PROJECT NAME: KEY NEST, TRUMBO FUEL Farm
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: DAN PHELPS
BILL TO: SENDER
PURCHASE ORDER NO.: IC 102

DATE SAMPLES SHIPPED: 10/11/90
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: DANA JONES
SEND LAB REPORT TO: K. SENADATI
DATE REPORT REQUIRED: AS SPECIFIED
PROJECT CONTACT: K. SENADATI
PROJECT CONTACT PHONE NO.: 813-622-7174

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW-9-13	Water			601, 602, 625 MW9-13 ONLY	
INFLUENT		40 ML X 2	40 ML		
EFFLUENT #1		1000 ML		602/610	
EFFLUENT #2					
Blank					

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X Rush ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ Project Specific ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X Flammable ____ Skin Irritant ____ Highly Toxic ____ Other ____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ Disposal by Lab X Archive ____ (Indicate number of months.)

FOR LAB USE ONLY
Received by JE Armstrong Date/Time 10-12-90 0830
ITCY 46903

WHITE - Original, to accompany samples
YELLOW - Field copy

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. _____

C/C Control No. 136567

PROJECT NAME/NUMBER KEY WEST / 595391-07-83 LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS DENNIS FRYE / REGGIE CONNCE CARRIER/WAYBILL NO. 8

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW-9.13					OK KMC 10/12/90	
INFLUENT	Key West Turnover Pond Farm	10/11/90 1600	Water	Glass		
EFFLUENT #1						
EFFLUENT #2						
BLANK						

Special Instructions: _____

Possible Sample Hazards: _____

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: Dennis Frye
   Received By: [signature] ITAS-K 10-12-90 0830
2. Relinquished By: _____
   Received By: _____
3. Relinquished By: _____
   Received by: _____
4. Relinquished By: _____
   Received By: _____

ITCY 46903

WHITE - To accompany samples
YELLOW - Field copy

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 187167
C/C Control No. 187585

PROJECT NAME: Key West
PROJECT NUMBER: 595391
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: M. HAMPTON
BILL TO: IT-TAMPA

PURCHASE ORDER NO.:

DATE SAMPLES SHIPPED: 10/24/90
LAB DESTINATION: ITAS-MPL
LABORATORY CONTACT: KIM LAISEY
SEND LAB REPORT TO: IT-TAMPA

DATE REPORT REQUIRED:
PROJECT CONTACT: KIRON SENAPATI
PROJECT CONTACT PHONE NO.:

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW9-13	WATER	2@ 40ml	HCl	601/602	
MW9-13		1l	NONE	625	
INFLUENT		2@ 40ml	HCl	602	
INFLUENT		1l	NONE	610	
EFFLUENT 1		2@ 40ml	HCl	602	
EFFLUENT 1		1l	NONE	610	
EFFLUENT 2		2@ 40ml	HCl	602	
EFFLUENT 2		1l	NONE	610	
TRIP BLANK		2@ 40ml	HCl	601/602	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ **Project Specific** X

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
Received by S. Kennedy **Date/Time** 10/25/90 0900

WHITE - Original, to accompany samples
YELLOW - Field copy

ITCY 46978

126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 187167

C/C Control No. 187585

PROJECT NAME/NUMBER Key West 595391

LAB DESTINATION ITAS MPL

SAMPLE TEAM MEMBERS BARROTT / COONIS

CARRIER/WAYBILL NO. FED EX 7426913480

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
9-13	MW 9-13	10/24 1220	WATER	2@ 40ml	OK @ 5°C, Sak 10/25/90	
9-13	↓			1 l		
INFLUENT	INFLUENT	10/24 1240		2@ 40m		
INFLUENT	↓			1 l		
EFF. 1	EFFLUENT 1	10/24 1245		2@ 40ml		
EFF1	↓			1 l		
EFF2	EFFLUENT 2	10/24 1250		2@ 40ml		
EFF2	↓			1 l		
TRIP	TRIP BLANK	10/24		2@ 40ml		

Special Instructions: SEE PARAMETER LIST

Possible Sample Hazards: NONE

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: William Barrott ITC 10/24/90 1400
   Received By: SA Kennedy, ITAS, 10/25/90 0900
2. Relinquished By:
   Received By:
3. Relinquished By:
   Received by:
4. Relinquished By:
   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCV 41090

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 188140
C/C Control No. 136562

PROJECT NAME: Key West, trumbo fuel farm
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: Dan Phelps
BILL TO: Sanden

PURCHASE ORDER NO.:

DATE SAMPLES SHIPPED: 11/1/90
LAB DESTINATION: IT Knoxville
LABORATORY CONTACT: Dana Jones
SEND LAB REPORT TO: K. Senapati

DATE REPORT REQUIRED: as specified
PROJECT CONTACT: K. Senapati
PROJECT CONTACT PHONE NO.: 813 622-7174
971-2701

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
Influent	Water	40 ml x 2 and 1000 ml	40 ml only	602/610	
Effluent #1					
Effluent #2					
Blank					

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ **II** ____ **III** ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
Received by [signature] ITAS **Date/Time** 11-2-90 0900

WHITE - Original, to accompany samples
YELLOW - Field copy

ITCY47030

126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 10810

C/C Control No. 136562

PROJECT NAME/NUMBER KEY WEST 595391

LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS REGGIE / DENNIS

CARRIER/WAYBILL NO. 924498863

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
Influent	Tanks fuel farm Keywest	11/1/90 1600	Water	Glass	OK @ 3°C SGR 11-2-90	
effluent #1					↓	
effluent #2						
Blank					Rec'd Empty Bottles SGR 11-2-90	

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [signature]

   Received By: [signature] ITAS 11-2-90 0900

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 188141

C/C Control No. 136566

PROJECT NAME: KEY WEST/TRUMBO FUEL FARM

PROJECT NUMBER: 595391-07-83

PROFIT CENTER NUMBER: 2285

PROJECT MANAGER: DAN PHELPS

BILL TO: SENDER

PURCHASE ORDER NO.: IC -102

DATE SAMPLES SHIPPED: 11 15 90

LAB DESTINATION: IT KNOXVILLE

LABORATORY CONTACT: DANA JONES

SEND LAB REPORT TO: K. SENAPATI IT - TAMPA

DATE REPORT REQUIRED: AS SPECIFIED

PROJECT CONTACT: K. SENAPATI

PROJECT CONTACT PHONE NO.: 813 971 2701

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW-9-13	WATER	40mL x 2 + 1000mL	40 mL ONLY	601-602-625	
INFLUENT	WATER	40mL x 4 + 1000mL x 3	40 mL ONLY	602-610-TDS-8015 TPH	
EFFLUENT #1	"	40mL x 4 + 1000 mL x 2	"	602-610-8015 TPH	
EFFLUENT #2	"	40mL x 4 + 1000 mL 2	"	602-610-8015 TPH	
BLANK	"	40mL x 2	"	602	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)

Normal X **Rush** _____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)

I _____ **II** _____ **III** _____ **Project Specific** _____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)

Non-hazard _____ **Flammable** _____ **Skin Irritant** _____ **Highly Toxic** _____ **Other** _____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)

Return to Client _____ **Disposal by Lab** X **Archive** _____ **(Indicate number of months.)**

FOR LAB USE ONLY

Received by S Hari ITAS **Date/Time** 11-16-90 0900

ITCY 47168

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126A 10/85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 188141

C/C Control No. 136566

PROJECT NAME/NUMBER KEY WEST / 595391 07 83

LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS DENNIS / REGGIE

CARRIER/WAYBILL NO. 1615157594

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW-9-13	TRUMBO FUEL FARM	11/15/90-1600	water	GLASS	OK@2°C [illegible] 11-16-90	
INFLUENT	↓	↓	↓	↓	↓	
EFFLUENT #1						
EFFLUENT #2						
BLANK						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [illegible] 11-15-90-1600

   Received By: [illegible] ITAS 11-16-90 0900

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY 47168

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211448
C/C Control No. 136563

PROJECT NAME: Key West/Trumbo Fuel farm
PROJECT NUMBER: 595391.07.83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: Dan Phelps
BILL TO: Sender

PURCHASE ORDER NO.: IC-102

DATE SAMPLES SHIPPED: 12-13-90
LAB DESTINATION: IT Knoxville
LABORATORY CONTACT: Dana Jones
SEND LAB REPORT TO: K. Senapati

DATE REPORT REQUIRED: As Specified
PROJECT CONTACT: K. Senapati
PROJECT CONTACT PHONE NO.: 813-971-2701

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW-9-13	Water	40mL x 2 + 1000mL	40mL only	601-602-625	
INFLUENT					
EFFLUENT #1				602/610	
EFFLUENT #2					
Blank					

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ **II** ____ **III** ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
Received by [signature] **Date/Time** 12-14-90 0830

ITCY 47332

WHITE - Original, to accompany samples
YELLOW - Field copy

126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 61146

C/C Control No. 136563

PROJECT NAME/NUMBER KEY WEST / 595391.07.83 LAB DESTINATION IT Knoxville

SAMPLE TEAM MEMBERS DENNIS / Freggie CARRIER/WAYBILL NO. 7613231334

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW-9-13	KEY WEST TRUMBO	12/13/90	water	Glass	2°	
	FUEL Farm	1600				
INFLUENT						
EFFLUENT #1						
EFFLUENT #2						
Blank						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [signature]

Received By: [signature] ITAS K 12-14-90 0850

2. Relinquished By:

Received By:

3. Relinquished By:

Received by:

4. Relinquished By:

Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY 47332

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211450
C/C Control No. 188053

PROJECT NAME: Key West, Trumbo fuel farm
PROJECT NUMBER: 595391.07.83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: Dan Phelps
BILL TO: Sender
PURCHASE ORDER NO.: IC 102

DATE SAMPLES SHIPPED: 1.8.91
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: Dana Jones
SEND LAB REPORT TO: K. Senapati
DATE REPORT REQUIRED: As received
PROJECT CONTACT: K. Senapati
PROJECT CONTACT PHONE NO.: 813 971 2701

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT	Water	40 ml x 2	40 ml only	602	
Effluent #1		1000 ml		610	
Effluent #2					
Blank					

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ **II** ____ **III** ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ **(Please Specify)**

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ **(Indicate number of months.)**

FOR LAB USE ONLY
Received by J E Armstrong **Date/Time** 1-9-91 0945

WHITE - Original, to accompany samples
YELLOW - Field copy

126A 10 85

ITCY 47486

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 011450

C/C Control No. 188053

PROJECT NAME/NUMBER Key West / 595391.07.83

LAB DESTINATION IT Knoxville

SAMPLE TEAM MEMBERS Dennis / Reggie

CARRIER/WAYBILL NO. 9732151483

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
INFLUENT	Key West	1.8.91	Water	glass	Rec'd @ 7°c, sak	
Effluent #1	Trumbo fuel farm	1200			1/9/91	
Effluent #2					↓	
Blank						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [signature]

   Received By: [signature] IT/C 1/9/91 0945

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY 47486

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 211449
C/C Control No. 188055

PROJECT NAME: KEYWEST TRUMBO Fuel Farm
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: DAN PHELPS
BILL TO: SENASR

PURCHASE ORDER NO.: IC-102

DATE SAMPLES SHIPPED: 1-28-91
LAB DESTINATION: IT KNOXVILLE
LABORATORY CONTACT: DANA JONES
SEND LAB REPORT TO: K. SENAPATI

DATE REPORT REQUIRED: AS SPECIFIED
PROJECT CONTACT: K. SENAPATI
PROJECT CONTACT PHONE NO.: 813-971-2701

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT				602/610	
EFFLUENT #1	Water	40ml x 2	40ml ONLY		
EFFLUENT #2		1000 ML			
MW-9-13				601-602-625	
BLANK				602	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X **Rush** ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ **Project Specific** ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X **Flammable** ____ **Skin Irritant** ____ **Highly Toxic** ____ **Other** ____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ **Disposal by Lab** X **Archive** ____ (Indicate number of months.)

FOR LAB USE ONLY
Received by S. Hari ITAS **Date/Time** 1-29-91 0830

WHITE - Original, to accompany samples
YELLOW - Field copy

ITCY47663

126A 10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 61449

C/C Control No. 188055

PROJECT NAME/NUMBER KEYWEST / 595391-07-83

LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS DENNIS / REGGIE

CARRIER/WAYBILL NO. 7614121141

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
INFLUENT	Tranquillo fuel farm	1.28.91	Water	Glass	12°C, OK SRB 1-29-91	
EFFLUENT #1						
EFFLUENT #2						
MW-9.13						
BLANK						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [signature]

   Received By: [signature] ITAS 1-29-91 0830

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY47663

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 231903
C/C Control No. 195287

PROJECT NAME: Key West tanks fuel farm
PROJECT NUMBER: 595391-07-83
PROFIT CENTER NUMBER: 2285
PROJECT MANAGER: Dan Phelps
BILL TO: Sender

PURCHASE ORDER NO.: IC-102

DATE SAMPLES SHIPPED: 2/14/91
LAB DESTINATION: IT Knoxville
LABORATORY CONTACT: Dana Jones
SEND LAB REPORT TO: K. Senapati

DATE REPORT REQUIRED: As specified
PROJECT CONTACT: K. Senapati
PROJECT CONTACT PHONE NO.: 813 971 2701

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
INFLUENT	Water	40 ml	40 ml only	COD 40 ml	
Effluent #1		1000 ml		TDS - 1000 ml	
Effluent #2					

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)
Normal X Rush ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)
I ____ II ____ III ____ Project Specific ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)
Non-hazard X Flammable ____ Skin Irritant ____ Highly Toxic ____ Other ____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)
Return to Client ____ Disposal by Lab X Archive ____ (Indicate number of months.)

FOR LAB USE ONLY
Received by J. E. Armstrong Date/Time 2/15/91 0830

WHITE - Original, to accompany samples
YELLOW - Field copy

ITCY 47822

126A-10 85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 231903

C/C Control No. 195287

PROJECT NAME/NUMBER Key West trunks, 5955391-07-83 LAB DESTINATION IT Knoxville

SAMPLE TEAM MEMBERS Dennis Frye/Reggie Cooper CARRIER/WAYBILL NO. 9732278441

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
INFLUENT	Trunks	2/14/91	Water	Glass/	OK@2°C [illegible] 2-16-91	
EFFLUENT #1	[illegible]	1600		Plastic	↓	
EFFLUENT #2						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [signature]

   Received By: [signature] ITAS-K 2/15/91 0830

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY47822

INTERNATIONAL TECHNOLOGY CORPORATION

REQUEST FOR ANALYSIS

R/A Control No. 188139

C/C Control No. 188057

PROJECT NAME: Key West, Trumbo fuel farm

PROJECT NUMBER: 595391-07-83

PROFIT CENTER NUMBER: 2285

PROJECT MANAGER: DAN Phelps

BILL TO: Sender

PURCHASE ORDER NO.: IC 102

DATE SAMPLES SHIPPED: ~~IT KNOXVILLE~~ 2-21-91

LAB DESTINATION: IT KNOXVILLE

LABORATORY CONTACT: Dena Jones

SEND LAB REPORT TO: K. Senapati

DATE REPORT REQUIRED: AS SPECIFIED

PROJECT CONTACT: K. Senapati

PROJECT CONTACT PHONE NO.: 813-971-2701

Sample No.	Sample Type	Sample Volume	Preservative	Requested Testing Program	Special Instructions
MW 9.13	Water			601, 602, 625	
INFLUENT		40 m	40 m only		
Effluent #1		1000 m			
Effluent #2				602 610	
Blank				TDS	

TURNAROUND TIME REQUIRED: (Rush must be approved by the Laboratory Project Manager.)

Normal X Rush ____ (Subject to rush surcharge.)

QC LEVEL: (Levels II and III subject to surcharge; project-specific requirements must be submitted to lab before beginning work.)

I ____ II ____ III ____ Project Specific ____

POSSIBLE HAZARD IDENTIFICATION: (Please indicate if sample(s) are hazardous materials and/or suspected to contain high levels of hazardous substances.)

Non-hazard X Flammable ____ Skin Irritant ____ Highly Toxic ____ Other ____ (Please Specify)

SAMPLE DISPOSAL: (Please indicate disposition of sample following analysis. Lab will charge for packing, shipping, archive and disposal.)

Return to Client ____ Disposal by Lab X Archive ____ (Indicate number of months.)

FOR LAB USE ONLY

Received by SA Summers Date/Time 2/22/91 0830

WHITE - Original, to accompany samples
YELLOW - Field copy

ITCY 47871

EGA 10-85

INTERNATIONAL TECHNOLOGY CORPORATION

CHAIN-OF-CUSTODY RECORD

R/A Control No. 188139

C/C Control No. 188057

PROJECT NAME/NUMBER Key West / 595391-07-83

LAB DESTINATION IT KNOXVILLE

SAMPLE TEAM MEMBERS DENNIS / Reggie

CARRIER/WAYBILL NO. 905 4033365

Sample Number	Sample Location and Description	Date and Time Collected	Sample Type	Container Type	Condition on Receipt (Name and Date)	Disposal Record No.
MW 9-13	Key West, Trumbo fuel farm	2/21/91 1200	Water	glass	OK @ 4°C, sak 2/22/91	
INFLUENT						
Effluent #1						
Effluent #2						
Blank						

Special Instructions:

Possible Sample Hazards:

SIGNATURES: (Name, Company, Date and Time)

1. Relinquished By: [signature]

   Received By: SA Summers ITKS 2/22/91 0830

2. Relinquished By:

   Received By:

3. Relinquished By:

   Received by:

4. Relinquished By:

   Received By:

WHITE - To accompany samples
YELLOW - Field copy

ITCY 47871

Cliff Berry, Inc.
2601 S.E. 14th Ave., Bldg. 65, Ft. Lauderdale, FL 33316
(305) 763-3390

Transportation & Receiving Manifest

DOCUMENT 003599

A. IDENTIFICATION

GENERATOR	TRANSPORTER	RECEIVING FACILITY	BILLING ADDRESS
COMPANY NAME: USCG Group Key West	COMPANY NAME: Cliff Berry Inc.	COMPANY NAME: Cliff Berry Inc.	COMPANY NAME: JT Corp.
ADDRESS: Trumble Pt. Annex	ADDRESS: 2601 SE 14th Ave.	ADDRESS: 2601 SE 14th Ave.	ADDRESS: 8100 Hoover River Pkwy
CITY: Key West ST: Fl ZIP CODE:	CITY: Fort Lauderdale ST: Fl ZIP CODE: 33316	CITY: Fort Lauderdale ST: Fl ZIP CODE: 33316	CITY: Tampa ST: Fla ZIP CODE: 33637
TELEPHONE:	TELEPHONE: 763-3390	TELEPHONE: 763-3390	TELEPHONE: 815-971-

B. WASTE OIL INFORMATION

EPA DESCRIPTION AND PROPER DOT SHIPPING NAME	CLASS	DOT ID USE NAS	QUANTITY VOLUME (UNITS)
NON-HAZARDOUS WASTE, H.O.			1000 Gal.

D. TANK GAUGING DATA

(ETI Only)

TANK NUMBER:

GAUGE READING START:

GAUGE READING FINISH:

TOTAL DIFFERENCE:

CUSTOMER PURCHASE ORDER NUMBER

REMARKS SPACE: * All Liquids to Be Picked up will Be Recycled.

C. DISPATCH INFO: Time & Date of Pick up:

Driver: [illegible]

Truck: Freight. Inc. 2600 Pump Requirement

Tractor: Hose Requirement

Trailer: Time Start

Time Finish:

Mileage Start: Mileage Finish:

E. ANALYTICAL DATA (ETI Only)

VIS:	Gross Gallons:
Gravity:	Actual Liquid Gallons:
% Water:	Acceptable Gauge Gallons:
% BS:	
% Sulfur:	
% Ash	
Arsenic, PPM:	
Cadmium, PPM:	
Chromium, PPM:	
Lead, PPM:	Total Halogen:
Flash Point °F:	PCB, PPM:

INSTRUCTIONS!

1. GENERATOR must identify TRANSPORTER and TREATMENT FACILITY of controlled waste prior to shipment. (Sec. A)
2. GENERATOR must complete "Waste Material Information" (Sec. B) prior to shipment.
3. DO NOT REMOVE the GENERATOR'S last copy until the form has been completed and signed by all parties.
4. EMERGENCY AND SPILL ASSISTANCE Call: NATIONAL RESPONSE CENTER U.S. COAST GUARD 800-424-8802

F. CERTIFICATION

GENERATOR

This is to certify that the above named oily waste is properly classified, described, packaged, marked and labeled and are in proper condition for transporting according to the applicable regulations of the U.S. Department of Transportation, Environmental Protection Agency and contains no toxic or hazardous substances that would cause oily waste to be classified as a characteristic or listed hazardous waste.

AUTHORIZED SIGNATURE (press hard - 5 copies)

TITLE: [illegible] DATE OF SHIPMENT: 4-30-91

TRANSPORTER

This is to certify the acceptance of the above oily waste in the amounts and descriptions given and in proper condition for transport to be delivered to the treatment facility

AUTHORIZED SIGNATURE (press hard - 5 copies)

TITLE: Equip. Operator DATE ACCEPTED: 4-30-91

TREATMENT FACILITY

This is to certify the acceptance of the above named oily waste in the amounts and descriptions given from the named Transporter for treatment, storage disposal or recycling.

AUTHORIZED SIGNATURE (press hard - 5 copies)

TITLE: Foreman DATE OF RECEIPT: 4-30-91