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WORK PLAN FOR CONFIRMATION STUDY VERIFICATION PHASE NS MAYPORT FL
1/1/1986
E C JORDAN

U.S. DEPARTMENT OF THE NAVY
MAYPORT NAVAL STATION
MAYPORT, FLORIDA

# WORK PLAN

NACIP
CONFIRMATION STUDY
VERIFICATION PHASE

CONTRACT: N62467-86-C-0174

E.C. JORDAN PROJECT NO. 5097-00

PREPARED BY E.C. JORDAN CO.

NOVEMBER 1986

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## 1.0 INTRODUCTION

### 1.1 THE NACIP PROGRAM AND MAYPORT NAVAL STATION

Mayport Naval Station (NAVSTA) is included in the Navy Assessment and Control of Installation Pollutants (NACIP) program. The NACIP program was established to identify the presence of any suspected contamination at Navy and Marine Corps lands resulting from past operations, and if needed, to institute corrective remedial measures. The NACIP program is implemented in three parts:

1. Initial Assessment Study (IAS). The study consists of records searches and personnel interviews to collect and evaluate evidence supporting the existence of any potential contamination problems at NAVSTA.

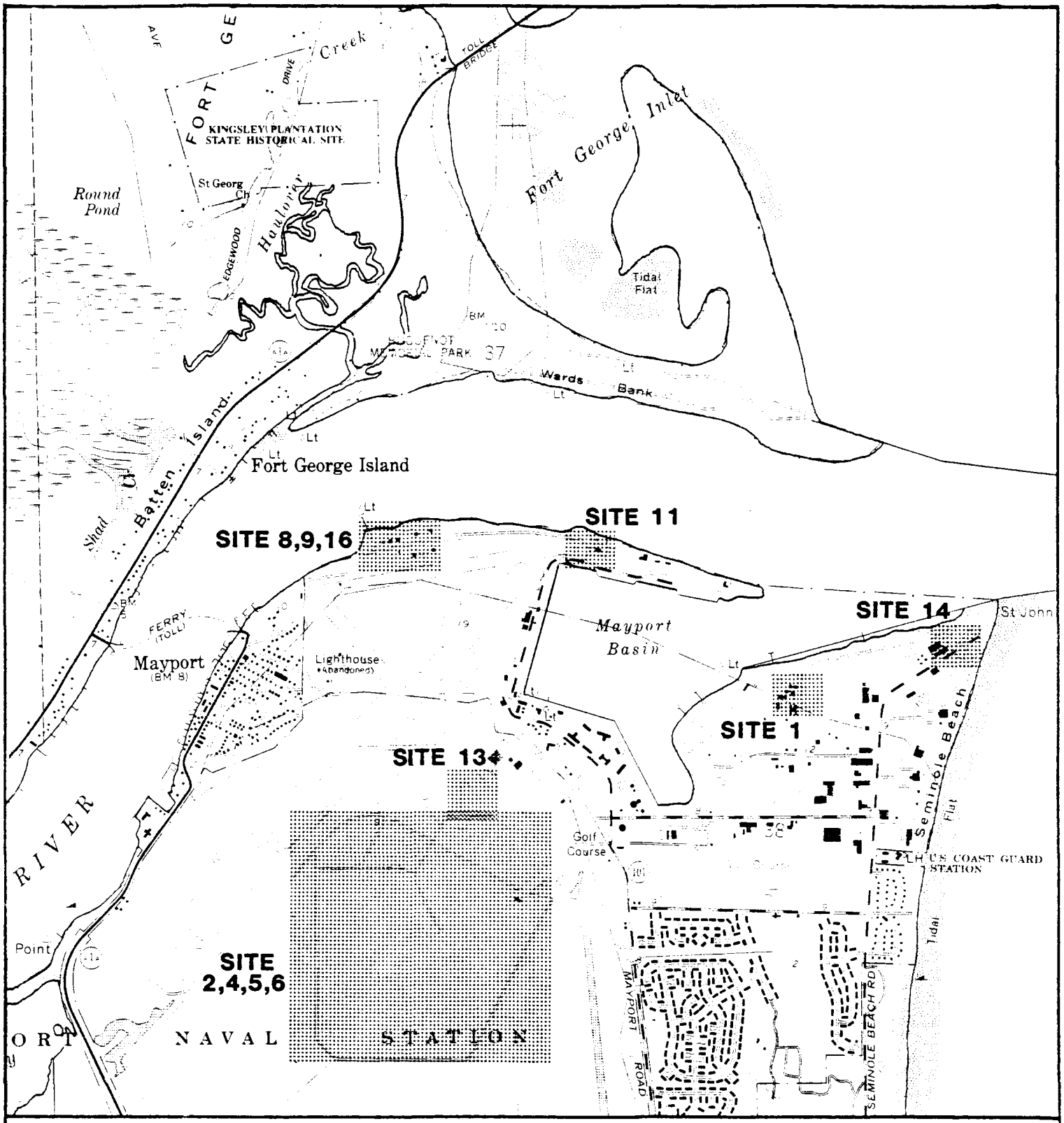
2. Confirmation Study. The study consists of on site investigations including physical and chemical analyses to confirm or deny the existence of contamination, to quantify the extent of the problem, and to recommend necessary corrective measures if contamination is present.

3. Remedial Measures. The study identifies corrective actions to control and mitigate contamination.

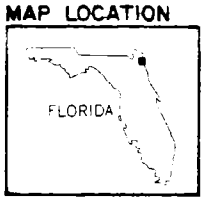
The IAS was completed for NAVSTA by Environmental Science and Engineering Inc. (ESE) and a report submitted to the Navy in May 1986. The IAS contains background information on the chemicals which were used at the Navy Facility and on specific sites where chemical wastes were known to have been stored or disposed or where such activity was suspected to have occurred. Sixteen sites were identified in the IAS report. The IAS provides a ranking of these sites based on the available information and any potential hazard to human health and the environment. On the basis of this ranking and a review of the IAS by the Florida Department of Environmental Regulation (FDER) and the U.S. Environmental Protection Agency (EPA), eleven sites were selected by the Navy for the Confirmation Study (Figure 1). The Confirmation Study is divided into four steps. The steps are described below:

CONFIRMATION STUDY PHASE

| Phase | Description |
|---|---|
| 1 | Verification of existence of contamination. |
| 2 | Characterization of extent and rate of migration of contaminants, hydrogeological and other factors. |
| 3 | Evaluation of alternatives to achieve compliance, preparation of cost estimates and project effectiveness of alternatives. |
| 4 | Preparation of site operation and government project documentation with cost estimate satisfactory for project funding requests for remedial measures. |




MAP LOCATION

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SCALE

0 2000 4000

E.C.JORDAN CO.
CONSULTING ENGINEERS

TITLE
SITE LOCATION MAP

CLIENT
U.S. DEPARTMENT OF THE NAVY

VERIFICATION PHASE
NACIP
CONFIRMATION STUDY

SITE
MAYPORT NAVAL STATION MAYPORT, FLORIDA

JOB NO. 5097-00

FIGURE 1

On September 9, 1986, E.C. Jordan Co. (Jordan) was contracted by the U.S. Department of the Navy to ~~complete~~ perform the ~~90 percent~~ Verification Phase of study for the eleven sites selected at NAVSTA. The eleven sites are grouped into the eight areas noted below.

| AREA | NAVSTA IDENTIFICATION |
|---|---|
| Site 1 | Landfill A |
| Sites 2,4,5,6 | Landfills B, D, E, F |
| Site 8 | Waste Oil Pit |
| Site 9 | Fuel Spill Area |
| Site 11 | Neutralization Basin |
| Site 13 | Old Fire Training Area |
| Site 14 | Mercury/Oily Waste Spill Site |
| Site 16 | Transformer Storage Area |

Sites 2, 4, 5 and 6 have been grouped into one area because they are all landfills with similar wastes and their geographic proximity to each other lends these sites to a group investigation. Grouping these sites together will allow design of a more cost- effective investigation. It will however, be the intent of this study to identify individual landfills in this area for further study under the characterization phase if warranted.

## 1.2 WORK PROGRAM OVERVIEW

The Verification Phase Study work program consists of preparation of a Work Plan, Quality Assurance Project Plan and a Health and Safety Plan. Each of the three plans are a separate document which describes a different aspect of the Verification Phase of the NACIP Confirmation Study. These three major components of the work program are described briefly in the following overview.

### 1.2.1 Work Plan

This work plan document describes the scope of work, methodology and costs to conduct the Verification Phase studies. The major sections of this work plan include six tasks which are briefly reviewed in the following sections.

Task 1 - Exploration Program. The exploration program for the Verification Study will include:

- o TERRAIN conductivity/ GPR
- o electrical resistivity survey;
- o borings and soil sampling;
- o monitoring well installation;
- o groundwater sampling; and
- o surface water sampling.

Task 2 - Elevation Survey. This task will describe the scope of the survey program required for piezometric surface mapping and assessment of groundwater flow direction.

Task 3 - Analytical Program. Parameters and analytical methods to be used for analysis of samples of each media will be identified in this work plan. Further, the work plan will review the rationale for selection of parameters for each media sampled.

Task 4 - Evaluation and Draft Report. The work plan will describe the characteristics of each site evaluated. These characteristics include:

- o site geology;
- o site hydrogeology;
- o site hydrology;
- o presence and concentration of contaminants;
- o evaluation of contaminant concentrations relative to state and federal regulatory criteria;
- o impact assessment; and
- o recommendations.

Task 5 - Final Report. The work plan presents the process for review of the draft report and preparation of the final report. This process includes meetings with the Navy and/or regulatory agencies and preparation of the Final Draft Report and Final Report.

Task 6 - Meetings and Presentations. Project meetings with the Navy will be required and may take place in Tallahassee, Charleston, or Mayport. A recommendation for the number and location of meetings/presentations is provided in Section 1.7 of the work plan. Where is 1.7

Suggest mtg. after Agency Review & prior to work start @ Mayport. We will schedule. Other mtgs as required but can not be identified at this time.

?

1.2.2 Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) will provide methods, criteria and guidelines by which the work is to be conducted. The plan establishes the methods for quality assurance/quality control (QA/QC) for sampling and laboratory analysis. The QAPP is a separate document which will be produced and approved concurrent with the Work Plan and the Health and Safety Plan.

1.2.3 Health and Safety Plan

The Health and Safety Plan (HASP) will describe Jordan's health monitoring and safety training program and the site specific health and safety requirements for conducting the field operations of the Verification Study. The HASP will also include a presentation of the training experience for all personnel scheduled to work at NAVSTA. The HASP, like the QAPP is a separate document which will be concurrently produced and approved with the work plan.

1.3 PROJECT LOGISTICS

This section is devoted to the logistics of on-site field work to be carried out at the NAVSTA. Sites 4 and 5 are located adjacent to a highly restricted magazine area and to insure proper security arrangements for access and operations in this area and the base in general, a meeting was held on October 10, 1986, at NAVSTA with representatives from weapons, security, public works, engineering, safety and the NAVSTA fire department. The

following sections address the logistics of security arrangements, communications, field operations, decontamination facilities and disposal of wastes result of the October 10, 1986 meeting with base personnel.

### 1.3.1 Security Arrangements

Jordan personnel while on the base will use telephones to communicate with off-base parties and will have a list of emergency phone numbers available at all times. Personnel conducting on-site work in one area of the NAVSTA will use two-way radios with frequencies approved by the Navy to maintain a communication link with personnel working in other areas. Daily communications for access needs and scheduling site operations will be coordinated with one representative from the Naval Station and one representative from the Naval Air Station. As of this writing, the representative from the Naval Station will be Jose Negron from the Environmental Branch of ~~Civil~~ Engineering Div. The representative from the Naval Air ~~Station~~ Facility has not been named ~~by the Commanding Officer of Mayport NAVSTA.~~ at this time.

### 1.3.2 Communications

Access to the base in general and to the restricted area will be with one security pass. The pass will be a picture identification contractor pass and one pass will be adequate for the entire field program. All information on Jordan personnel involved in the project and a copy of the contract for the project will be provided to security at least 2 weeks before the field work begins.

### 1.3.3 Field Operations

what about conductivity?

The geophysical portion of the field investigation will require the use of a an EM-31 ~~electrical resistivity~~ terrain conductivity meter near the restricted magazine and airfield areas. The locations of all geophysical survey lines will be checked during a site reconnaissance, after the lines have been staked out in the field, by representatives from Weapons, Public Works, Ground Electronics and the Naval Airfield Operations.

Drill rigs and backhoes left in the restricted area overnight will be disabled each night before on-site personnel leave the restricted area. Final approval for boring locations will be given during the same site reconnaissance for geophysical explorations prior to the beginning of the field work. Potable water, which is necessary for drilling and decontamination procedures will be obtained at fire hydrant locations specified by Public Works; this will be arranged by engineering.

### 1.3.4 Decontamination Facilities

The field work at the NAVSTA sites will require mobilization and field support by subcontractors, sampling crews and survey crews. Staging and decontamination facilities will be needed to conduct these operations. Staging of the field operations will be done from vehicles used by Jordan personnel. These vehicles will be parked in uncontaminated areas identified at each site and will not require decontamination.

Decontamination zones for personnel and equipment during the reconnaissance will be established at locations to be determined for each site. All contaminated materials and protective gear will either be disposed of or decontaminated in these areas before site personnel proceed into the clean zone. The specific decontamination procedures to be employed are outlined in the Health and Safety Plan.

A heavy equipment decontamination zone will be designated at each site. Drill rigs, casing, rods and associated equipment will be decontaminated and steam cleaned prior to setting up at each boring or monitoring well location. Sampling tools will be decontaminated more frequently as required by the sampling protocol provided in the Quality Assurance Project Plan.

and leaving

should be cleaned at completion also - before moving

1.3.5 Disposal of Wastes

All fluids generated by personnel and equipment decontamination will be disposed of on-site, inside of the contamination reduction area. Contaminated items such as disposable safety and sampling equipment will be placed in doubled plastic bags which will be collected daily and stored in 55-gallon drums with locking ring lids. The drums will be supplied by Mayport NAVSTA Engineering and left on-site for future transportation by the Department of the Navy to a suitable disposal facility.

Drill fluids, drill cuttings and water resulting from monitoring well and piezometer installation and development will be monitored for contamination using a portable photoionization meter. There is no plan to collect or store any of these materials. Those materials will remain on-site at the location where they are generated. Soil cuttings will be buried and drilling fluids will be allowed to infiltrate into the soil.

Cuttings + development water should also be drummed + labeled

No.

2.0 WORK PROGRAM

The Work Plan for the NAVSTA Verification Phase of the NACIP Confirmation Study has been developed based on Jordan's review of the Initial Assessment Study (IAS) for Mayport NAVSTA; a review of available information from previous studies; USEPA comments; FDER comments; a site reconnaissance conducted by Jordan on October 9 and 10, 1986; and discussions with U.S. Navy officials. The Work Plan for the Verification Phase investigation consists of tasks which were identified in Attachment A, Statement of Work - Confirmation Study received from the Department of Navy and dated November 20, 1985; and on the basis of negotiations with the Department of the Navy conducted on September 9, 1986.

The objective of this Verification Study will be to assess whether specific toxic and hazardous materials identified in the IAS, and possibly other contaminants, are present in concentrations considered to be hazardous to human health and the environment. The result of this phase of the confirmation study will be a general evaluation of contamination found, including hydrogeological, health, safety, and regulator aspects and a recommendation as to whether or not to proceed with the characterization phase of the NACIP Confirmation Study.

The Characterization Phase, if required, shall be a quantitative assessment of the distribution of contamination, sources, and contaminant migration pathways. The data developed during this phase of study will be sufficient to permit an evaluation of the levels and distribution of contamination, both vertical and horizontal around the site. It will also evaluate the specifics of the site hydrogeology and specifics of groundwater movement and/or surface water movement. This phase will also provide the data necessary to perform a risk assessment or critical habitat assessment, if warranted.

## 2.1 METHODS OF EXPLORATION

Soil borings, monitoring well installation and aquifer testing will be performed at most of the sites being investigated at Mayport NAVSTA. This section will describe the methods to be employed for these activities to avoid repeating the descriptions in each site specific exploration and sampling program section.

### 2.1.1 Soil Borings

Soil Borings will be advanced using a hollow stem auger technique to a depth of approximately 10 feet below the groundwater table. Geological characteristics of the site will be determined from soil samples collected at the ground surface and at 5-foot intervals to the completion depth using a split spoon sampler advanced by standard penetration methods. One soil sample from each boring location will be submitted for laboratory chemical analysis. Because of shallow groundwater conditions throughout the base, only one soil borings for laboratory analysis will be collected at each boring location.

Sample?

Will the borings be advanced to the first confining layer? How will depth be determined? check QAPP report

This will be collected between the ground surface and the shallow groundwater table. The purpose for this soil sample will be to assess the presence and concentration of contamination in the unsaturated zone which may be acting as a source of contaminants to groundwater. The laboratory methods and parameters to be analyzed for are presented in Section 2.4 and all sampling methods, sampling protocol and laboratory protocol to be followed are included in the Quality Assurance Project Plan.

contamination?

### 2.1.2 Monitoring Well Installation

Monitoring wells will be installed in each of the completed soil borings for the purpose of monitoring groundwater quality and assessing the direction and rate of groundwater flow in the shallow aquifer. The total depth of soil drilling is estimated at 665 lineal feet and the depths, number of analytical samples and quantities of materials for monitoring well installation are presented in Table 1. The installation of monitoring wells will comply with the following:

- 40 CFR and 265 Subpart F;
- "Groundwater Monitoring Guide," NEESA 20.2-013A;
- NACIP Technical Note, No. 4, Materials for Monitoring Well Construction." October 1984; and
- applicable FDER monitoring well construction guidance.

Southern Division

" MPT "

NACIP well desig.

TABLE 1
SUMMARY OF ESTIMATED QUANTITIES FOR
MONITORING WELL INSTALLATION
VERIFICATION PHASE NACIP CONFIRMATION STUDY
MAYPORT NAVAL AIR STATION

| SITE NO. | MONITORING WELL NO. | ESTIMATED DEPTH (FT)[1] | NUMBER OF ANALYTICAL SOIL SAMPLES | WELL MATERIALS 2" PVC SCREEN (FT) | WELL MATERIALS 2" PVC RISER (FT) |
|---|---|---|---|---|---|
| SITE 1 | MW-101 | 15 | 1 | 10 | 5 |
| | MW-102 | 15 | 1 | 10 | 5 |
| | MW-103 | 15 | 1 | 10 | 5 |
| | MW-104 | 15 | 1 | 10 | 5 |
| SITE 2, 4,5,6 | MW-201 | 45 | 1 | 10 | 35 |
| | MW-202 | 45 | 1 | 10 | 35 |
| | MW-203 | 15 | 1 | 10 | 5 |
| | MW-204 | 15 | 1 | 10 | 5 |
| | MW-205 | 15 | 1 | 10 | 5 |
| | MW-206 | 15 | 1 | 10 | 5 |
| | MW-207 | 45 | 1 | 10 | 35 |
| | MW-208 | 15 | 1 | 10 | 5 |
| | MW-209 | 15 | 1 | 10 | 5 |
| | MW-210 | 15 | 1 | 10 | 5 |
| | MW-211 | 45 | 1 | 10 | 35 |
| | MW-212 | 45 | 1 | 10 | 35 |
| | MW-213 | 15 | 1 | 10 | 5 |
| | MW-214 | 15 | 1 | 10 | 5 |
| | MW-215 | 15 | 1 | 10 | 5 |
| SITE 8 | MW-801 | 25 | 1 | 10 | 15 |
| | MW-802 | 25 | 1 | 10 | 15 |
| | MW-803 | 25 | 1 | 10 | 15 |
| SITE 9 | MW-901 | 20 | 1 | 10 | 10 |
| | MW-902 | 20 | 1 | 10 | 10 |
| | MW-903 | 20 | 1 | 10 | 10 |
| SITE 11 | MW-1101 | 20 | 1 | 10 | 10 |

MPT.

TABLE 1 (Continued)

| SITE NO. | MONITORING WELL NO. | ESTIMATED DEPTH (FT)[1] | NUMBER OF ANALYTICAL SOIL SAMPLES | WELL MATERIALS 2" PVC SCREEN (FT) | WELL MATERIALS 2" PVC RISER (FT) |
|---|---|---|---|---|---|
| SITE 13 | MW-1301 | 15 | 1 | 10 | 5 |
| | MW-1302 | 15 | 1 | 10 | 5 |
| | MW-1303 | 15 | 1 | 10 | 5 |
| SITE 14 | MW-1401 | 15 | 1 | 10 | 5 |
| | MW-1402 | 15 | 1 | 10 | 5 |
| | TOTAL | 665 | 31 | 310 | 355 |

NOTE: [1] Estimated depths are from ground surface. Borings used as 45 feet deep are in the dredge spoil area.

Monitoring well installation details are presented in Figure 2. Well screens for shallow monitorign wells will be placed to extend from approximately 2 feet above the water table to approximately 8 feet in depth below the water table to allow for the estimated annual or diurnal fluctuations in the groundwater table surface. The monitoring wells will be developed by pumping and/or surge block techniques to insure a good hydraulic connection between the well and the aquifer. Top of Casing survey by reg FL survey crew? Not needed

### 2.1.3 Aquifer Testing

Subsequent to the completion of monitoring well installation and well development, aquifer testing will be conducted in monitoring wells using a rising head test method. This data will develop information on hydraulic conductivity of the aquifer tested. Water level observations surveyed to a known datum will provide hydraulic gradient and this information combined with the aquifer testing data will allow an assessment of groundwater flow direction and rate.

## 2.2 TASK 1 - EXPLORATION AND SAMPLING PROGRAM

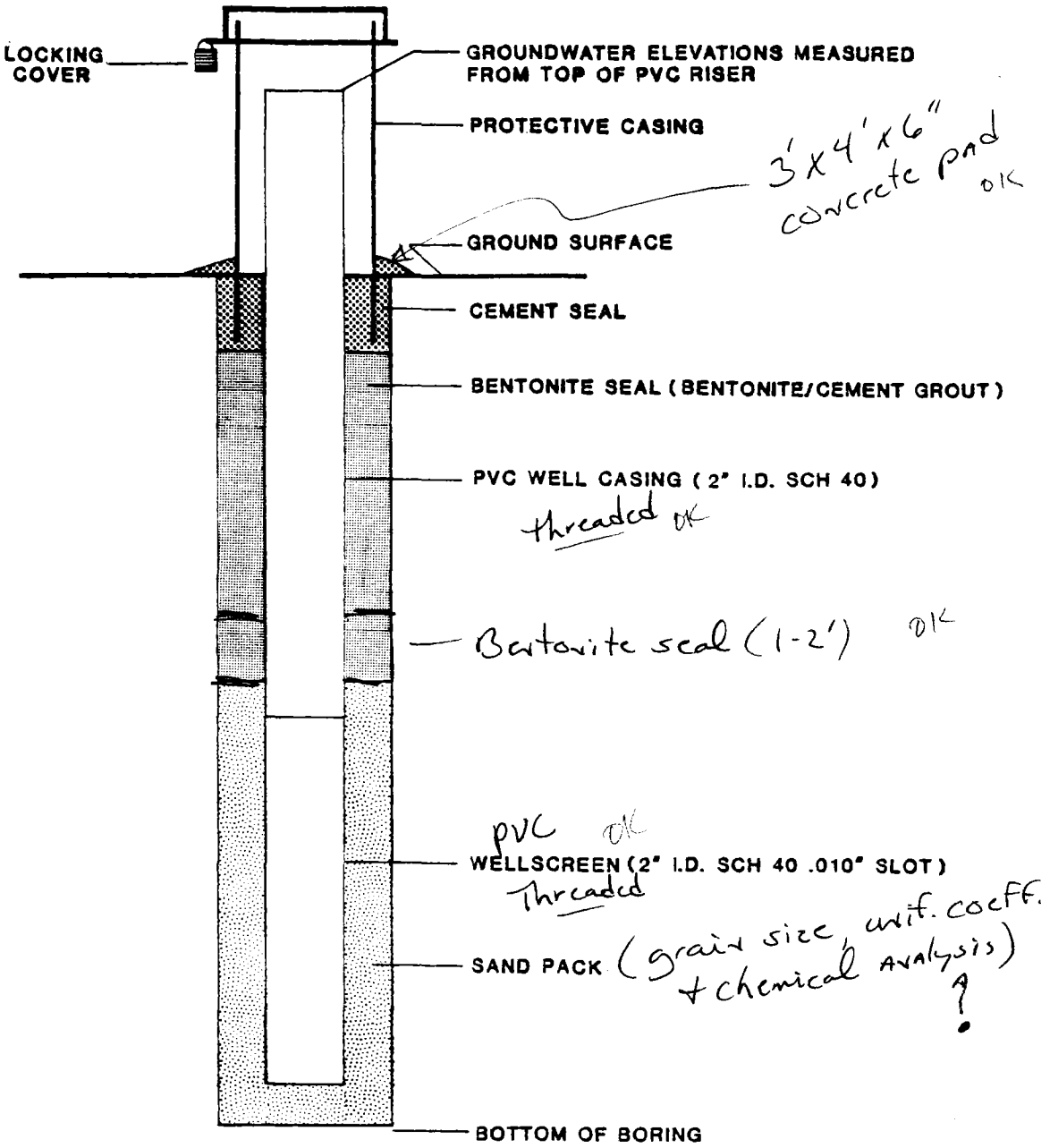
The following sections describe the specific number, location and rationale for the exploration and sampling program to be conducted at each site at Mayport NAVSTA. Background information and history of operations for each site may be found in the IAS (NEESA Doc. 13-104), dated May 1986.

### 2.2.1 Site 1 - Landfill A 3 wells

The exploration program at Site 1 will consist of four soil borings completed with monitoring well installation, four soil samples and four groundwater samples. The location of these explorations is presented in Figure 3 and the specific rationale for each boring/monitoring well location is presented below.

Use NACIP designations

- MPT-1-1 MW-101 will be a shallow monitoring well located south of Site 1 and is anticipated to be upgradient of Site 1.
- MPT-1-2 MW-102 will be a shallow monitoring well located west of Site 1 and is anticipated to be downgradient of the landfill if the major component of groundwater flow is to the northwest towards the St. Johns River. Should groundwater flow direction be to the northeast, then this monitoring well location is anticipated to be upgradient of Site 1.
- MPT-1-3 MW-103 will be a shallow monitoring well located north of Site 1 and is anticipated to be downgradient of the landfill assuming groundwater flow direction is towards the St. Johns River.
- MW-104 will be a shallow monitoring well located east of Site 1 and is anticipated to be downgradient of the landfill if the groundwater flow direction is northeast to the St. Johns River. If groundwater flow direction is northwest towards the St. Johns River, however, then this monitoring well location is anticipated to be upgradient of Site 1.

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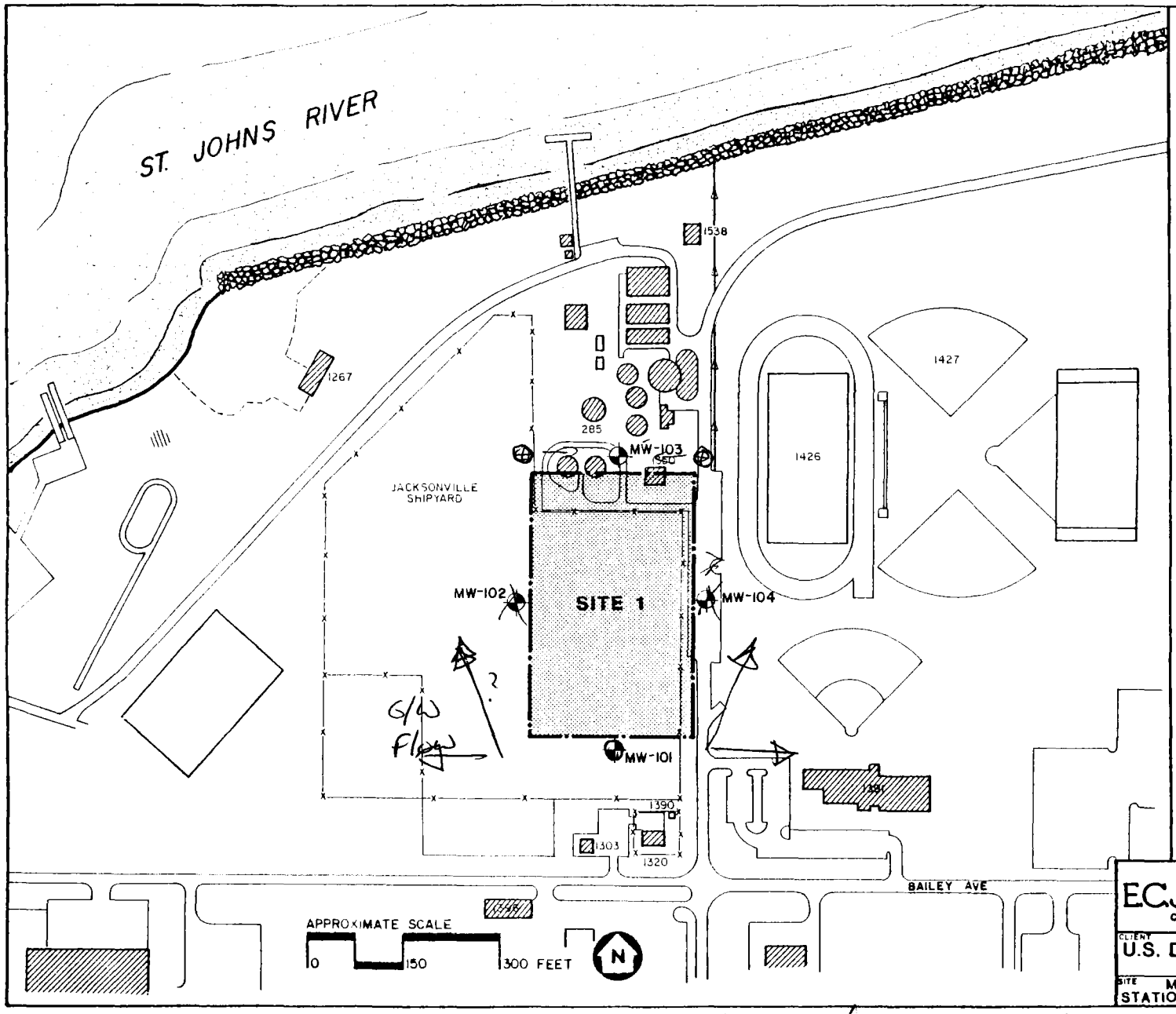
| E.C.JORDAN CO. CONSULTING ENGINEERS | TITLE MONITORING WELL INSTALLATION DETAIL |
| CLIENT U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 2 |

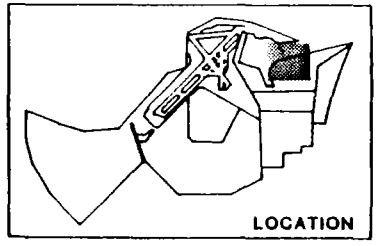



## LEGEND

- MW-101 — PROPOSED MONITORING WELL LOCATION (MW-101 THROUGH MW-104).
- x—x—x — FENCE
- SITE LOCATION AREA
- STORM DRAINAGE DITCH INDICATING DIRECTION OF FLOW

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 1 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM P.W.D. DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'




| | |
|---|---|
| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 1 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO 5097-00 FIGURE 3 |

* Suggest put in three wells ~~Dee~~ measure $H_2O$ level & see which way G/W is moving - northeast or northwest & locate 4th well accordingly.

One soil sample will be collected from each boring for laboratory chemical analysis. The samples will be collected from the unsaturated soils between the ground surface and the groundwater table in each boring. Subsequent to monitoring well installation, a groundwater sample will be collected from each of the four monitoring wells for laboratory chemical analysis. The specific methods and parameters of analyses to be performed on the soil and groundwater samples collected at this site are presented in Section 2.4.

Water level measurements observed in these well locations described above, coupled with aquifer testing will allow an assessment of groundwater flow rate and direction.

### 2.2.2 Sites 2, 4, 5 and 6 - Landfills B, D, E and F

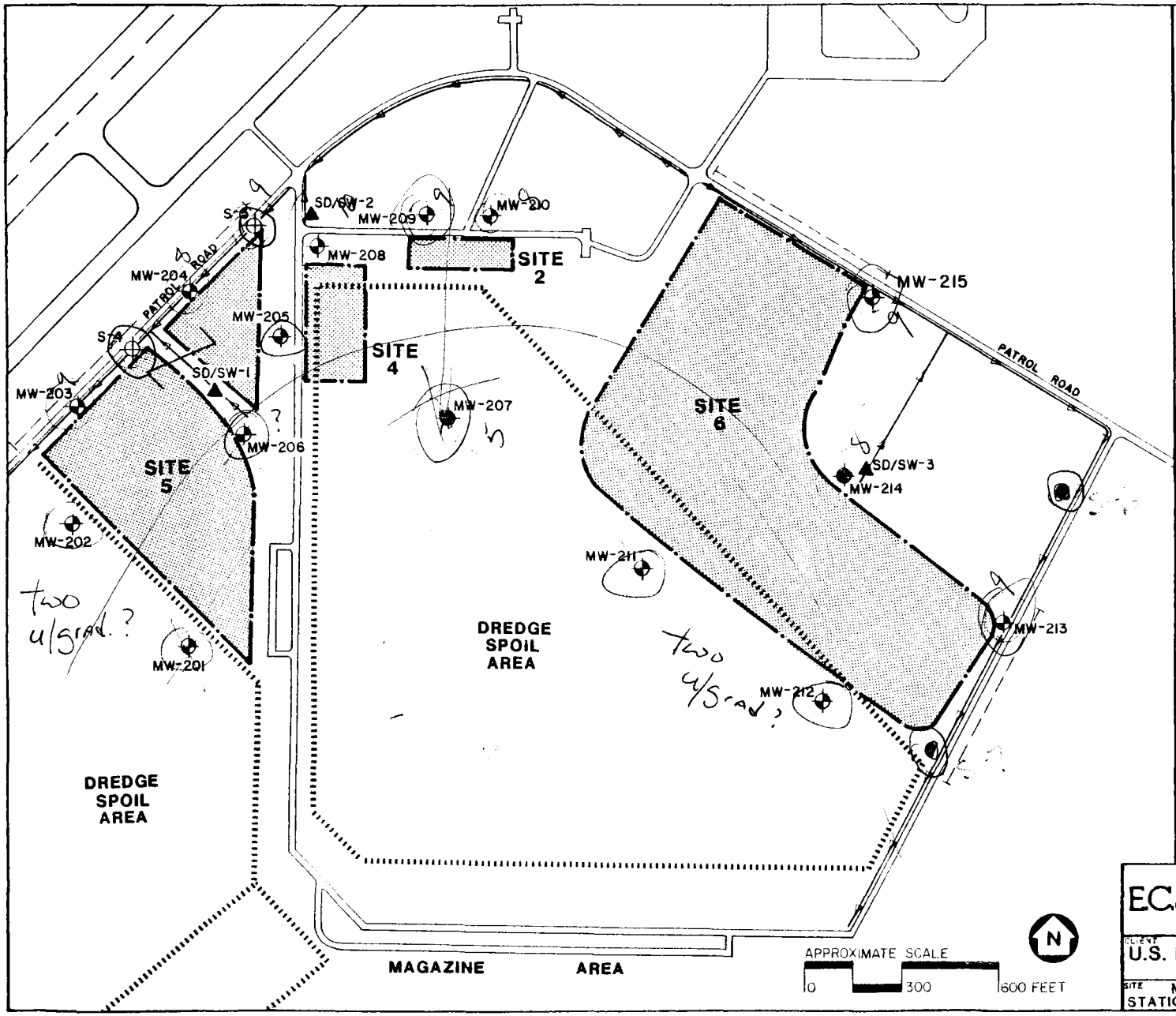
The exploration program at Sites 2, 4, 5 and 6 will consist of a geophysical survey, 15 shallow soil borings completed with monitoring well installation, 15 soil samples, 15 groundwater samples and 3 surface water/sediment samples.

The rationale for each of the above explorations is described in detail in the following sections.

Geophysical Survey - An electrical resistivity survey is recommended on the airfield side of the drainage ditch for Sites 5 and 6 to assess whether the shallow aquifer, which may contain leachate contamination from the landfills, is being intercepted by the drainage ditch located between the landfills and the airstrip. Electrical resistivity will detect a leachate plume in groundwater due to its high specific conductivity in comparison with background groundwater quality. If the drainage ditch is intercepting all of the leachate emanating from the landfills bordering along the drainage ditches, then no leachate plume will be detected by an electrical resistivity survey on the opposite side of the drainage ditches from the landfill. If the shallow aquifer, however, is not discharging to the drainage ditches then leachate plumes will be detected during the electrical resistivity survey.

Approximately 2,000 feet of electrical survey are recommended at Sites 5 and 6. The location of the survey lines is presented in Figure 4. Depending on the results of the geophysical survey, these lines may be extended to complete mapping of the plume. ~~providing this additional exploration is possible within the budget~~. This survey will aid in final determination of soil boring/monitoring well installation locations for the Verification Phase investigation and subsequent Characterization Phase study, if necessary. This survey will be conducted by Jordan personnel using a Bison Instruments Earth Resistivity Meter, Model 2350B.

Soil Borings/Monitoring Well Installation - The exploration program at Sites 2, 4, 5 and 6 will consist of 15 shallow soil borings completed with monitoring well installations. The location of these boring/monitoring wells is presented in Figure 4 and the specific rationale for each location is presented below.

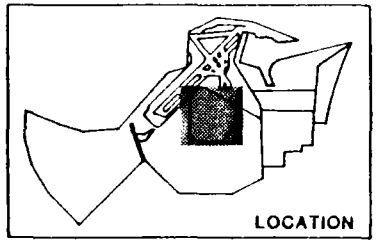



## LEGEND

| | |
|---|---|
| MW-201 | PROPOSED MONITORING WELL LOCATION (MW-201 THROUGH MW-215). |
| S-4 | EXISTING MONITORING WELL LOCATIONS S-4 AND S-5 |
| SD/SW-1 | SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS SD/SW-1 THROUGH SD/SW-3 |
| | STORM DRAINAGE DITCH INDICATING DIRECTION OF FLOW. |
| | BERMED SOIL 25' ABOVE GROUND SURFACE CONTAINING DREDGE SOIL. |
| | ELECTRICAL RESISTIVITY SURVEY LINE LOCATION. |
| | SITE LOCATION AREA |

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 2,4,5, & 6 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM RWD. DRAWING NO. 217 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'

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|---|---|
| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 2,4,5, & 6 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 4 |

MPT-5-1

- o MW-201 will be a shallow monitoring well located south of Site 5 on the edge of the dredge spoil area and is anticipated to be upgradient of Site 5. why two upgradient wells?

- o MW-202 will be a shallow monitoring well located southwest of Site 5 on the edge of the dredge spoil area and is anticipated to be upgradient of Site 5.

- o MW-203 will be a shallow monitoring well located northwest of the south cell of the landfill, between the landfill and the drainage ditch and is anticipated to be downgradient of the site and upgradient of the drainage ditch.

- o MW-204 will be a shallow monitoring well located northwest of the north cell of the landfill between the landfill and the drainage ditch and is anticipated to be downgradient of the site and upgradient of the drainage ditch.

- o MW-205 will be a shallow monitoring well located east of the north cell of the Site 5 landfill and is anticipated to be upgradient of Site 5 and downgradient of Site 4. why do you need this well?

- o MW-206 will be a shallow monitoring well located north of the south cell of Site 5 and is anticipated to be downgradient of Site 5 and upgradient of the drainage ditch which separates the south cell from the north cell of Site 5.

- o MW-207 will be a shallow monitoring well located in the dredge spoil area northwest of Site 6 and southeast of Site 4. This location is anticipated to be upgradient of Sites 2, 4 and 6.

MPT-4-1

- o MW-208 will be a shallow monitoring well located north of Site 4 and west of Site 2 and is anticipated to be downgradient of Site 4 and upgradient of the drainage ditch system.

- o MW-209 will be a shallow monitoring well located north of Site 2 and is anticipated to be downgradient of Site 2 and upgradient of the drainage ditch system.

- o MW-210 will be a shallow monitoring well located north of Site 2 and is anticipated to be downgradient of Site 2 and upgradient of the drainage ditch system.

- o MW-211 will be a shallow monitoring well located southwest of Site 6 in the dredge spoil area and is anticipated to be upgradient of Site 6. why two upgradient?

- o MW-212 will be a shallow monitoring well located southwest of Site 6 in the dredge spoil area and is anticipated to be upgradient of Site 6.

- MW-213 will be a shallow monitoring well located east of Site 5 and is anticipated to be downgradient of Site 6 and upgradient of the drainage ditch.

- MW-214 will be a shallow monitoring well located northeast of Site 6 and is anticipated to be downgradient of Site 6 and upgradient of the drainage ditch system.

- MW-215 will be a shallow monitoring well located east of Site 6 and is anticipated to be downgradient of Site 6 and upgradient of the drainage ditch.

The current theory for groundwater flow direction at these sites is that the dredge spoil areas, because they capture and contain large amounts of precipitation, are acting as recharge areas to shallow groundwater. Groundwater flow direction in the shallow aquifer, then would be radially from these dredge spoil areas to the drainage ditch surrounding these sites. There is another potential theory for groundwater flow at these sites which is as follows. The dredge spoil areas may contain fine-grain sediments which may act as confining beds thereby preventing recharge to groundwater. Should this theory be the case, then shallow groundwater may flow south towards Sherman Creek. Monitoring wells MW-201, MW-202, MW-207, MW-211 and MW-212 are all background or upgradient monitoring wells if the current theory is correct. This may seem like a lot of background monitoring wells, however, if the second theory is correct then these five wells become the only downgradient monitoring wells. Jordan will phase the installation of these five wells and if the current theory is correct, eliminate monitoring wells MW-202 and MW-212.

Move Para. to Front of section

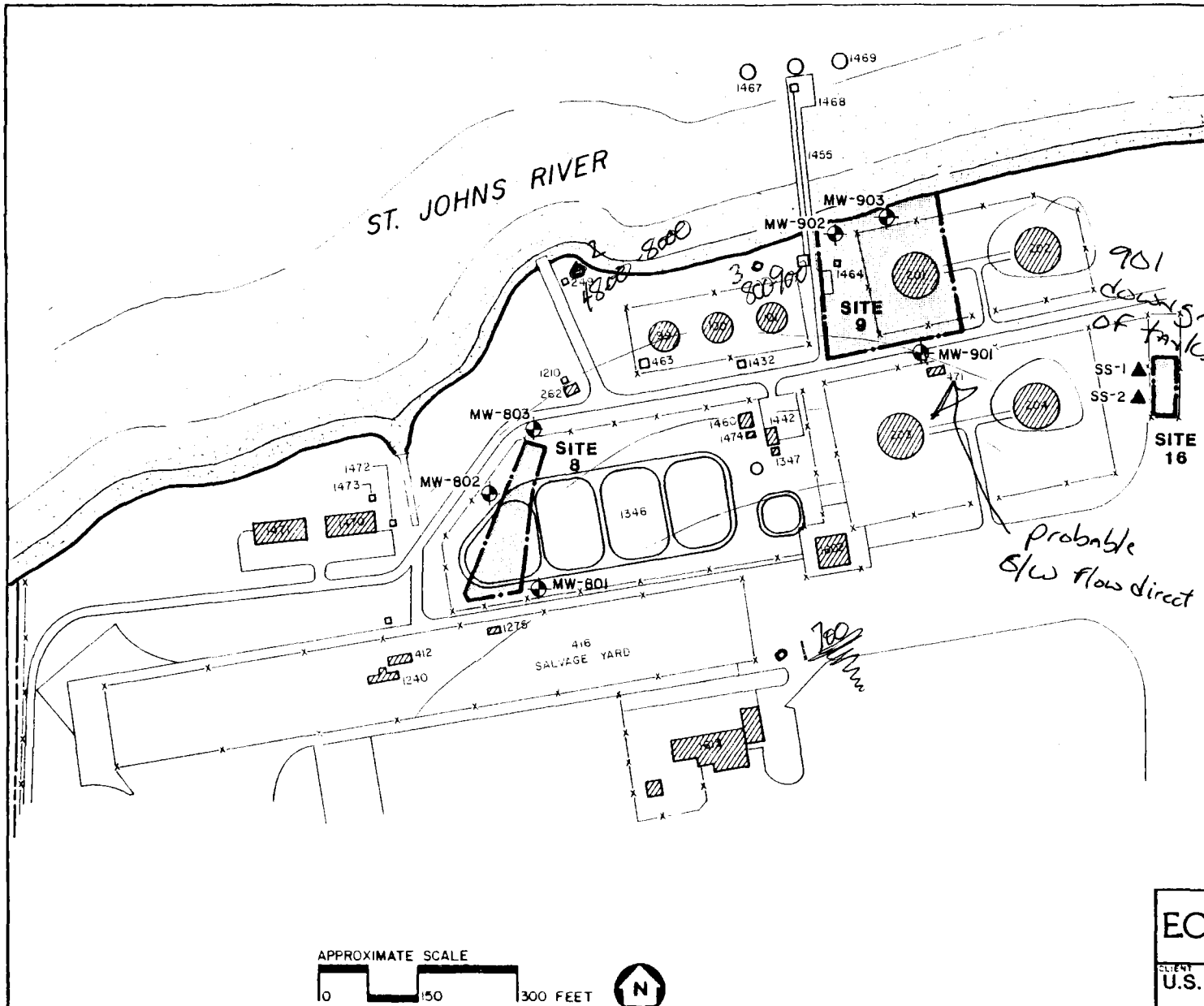
Water level readings observed in these well locations described above coupled with aquifer testing will allow an assessment of the groundwater flow rate and direction.

Soil, Groundwater, Surface Water and Sediment Sampling

The sampling program at Sites 2, 4, 5 and 6 will consist of 15 soil samples, 17 groundwater samples and 3 sediment and surface water samples. One soil sample will be collected from each boring for laboratory chemical analysis. The soil sample will be collected from the unsaturated soils between the ground surface and the groundwater table. Subsequent to monitoring well installation, a groundwater sample will be collected from each existing monitoring well and the two existing monitoring wells S-4 and S-5 and submitted for laboratory chemical analysis. The sediment and surface water sampling locations are presented on Figure 4. The purpose of these samples will be to assess the impact of these sites on the drainage ditches. The specific methods and parameters of analysis are discussed in Section 2.4.

### 2.2.3 Site 8 - Waste Oil Pit

The exploration program at Site 8 will consist of three soil borings completed with monitoring well installations, three soil samples and three groundwater samples. The location of these explorations is presented in Figure 5 and the

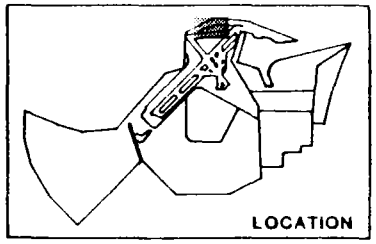



## LEGEND

| | |
|---|---|
| MW-801 | PROPOSED MONITORING WELL LOCATION (MW-801 THROUGH MW-803 AND MW-901 THROUGH MW-903) |
| SS-1 | PROPOSED SOIL SAMPLING LOCATION (SS-1 THROUGH SS-2) |
| | SITE LOCATION AREA |
| | FENCE |

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 8, 9, & 16 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM PWD. DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'




APPROXIMATE SCALE

0 150 300 FEET

N

| | |
|---|---|
| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 8, 9, & 16 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 5 |

specific rationale for each boring/monitoring well location is presented below.

MPT-8-1

- o MW-801 will be a shallow monitoring well located southeast of Site 8 and is anticipated to be upgradient of Site 8 and downgradient of the abandoned runway presently used by Defense Reutilization and Marketing Operation which was Site 10 as identified by the IAS Study.

- o MW-802 will be a shallow monitoring well located northwest of Site 8 and is anticipated to be downgradient of Site 8 and upgradient of the St. Johns River.

- o MW-803 will be a shallow monitoring well located north of Site 8 and is anticipated to be downgradient of Site 8 and upgradient of St. Johns River.

One soil sample will be collected from each boring for laboratory chemical analysis. The soil sample will be collected from the unsaturated soils between the ground surface and the groundwater table. Subsequent to monitoring well installation, a groundwater sample will be collected from each monitoring well and submitted for laboratory chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.

Water level readings observed in these well locations described above, coupled with aquifer testing will allow an assessment of the groundwater flow rate and direction.

Site 9 is on Fig 5

### 2.2.4 Site 9 - Fuel Spill Area

The exploration program for Site 9 will consist of three soil borings completed with monitoring well installations, three soil samples and three groundwater samples. The location of these explorations is presented in Figure 6 and the specific rationale for each boring/monitoring well location is presented below.

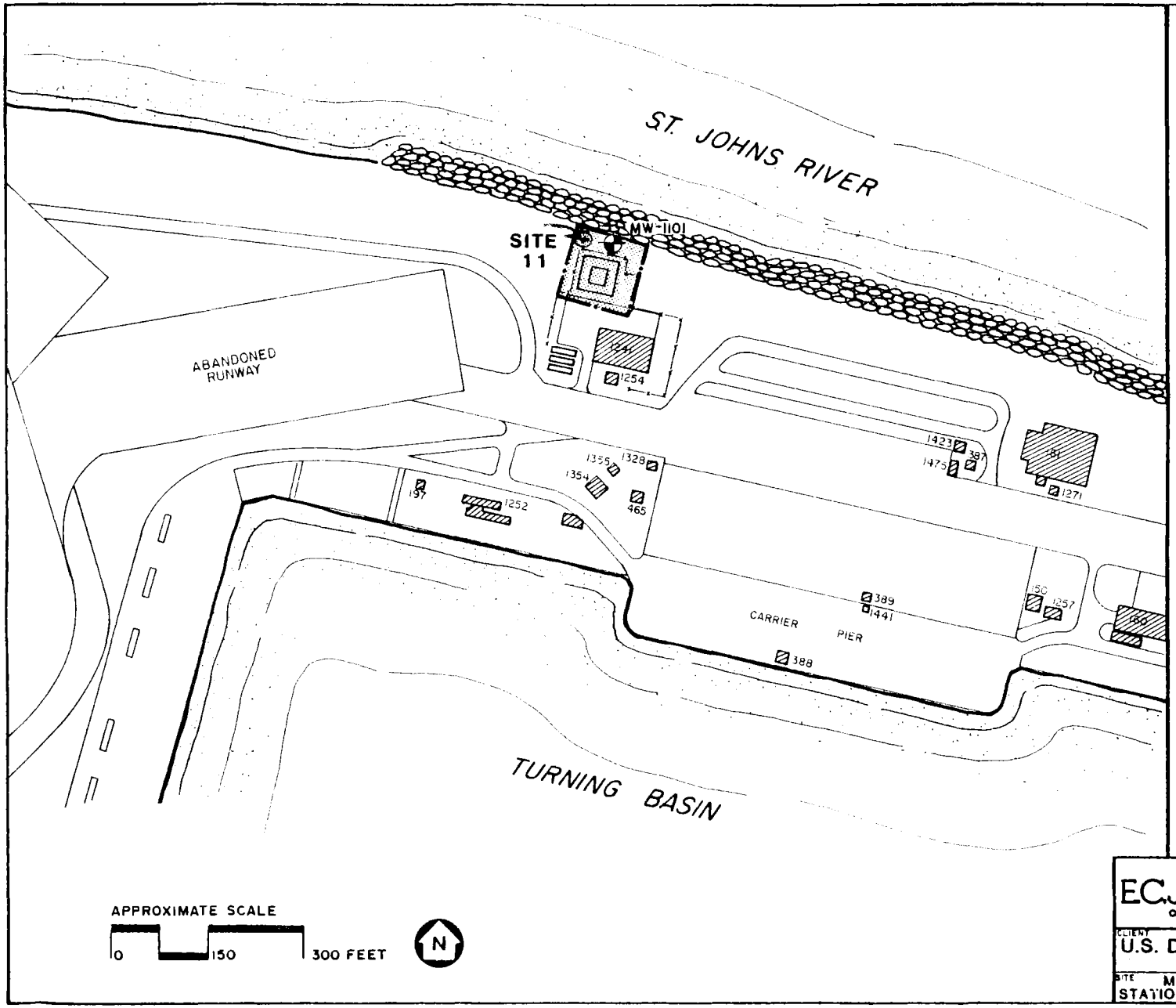
MPT-9-1

- o MW-901 will be a shallow monitoring well located northeast of tank #203 and southwest of tank #201 and is anticipated to be upgradient of the suspected spill area. ~~and downgradient of tanks #202 and #204.~~ NO WAY

- o MW-902 will be a shallow monitoring well located northwest of tank #201 and is anticipated to be downgradient of the fuel spill area and upgradient of the St. Johns River. 203

- o MW-903 will be a shallow monitoring well located north of tank #201 and is anticipated to be downgradient of the fuel spill area and upgradient of the St. Johns River.

One soil sample will be collected from each boring in the unsaturated soils above the groundwater table and will be submitted for laboratory chemical analysis. Subsequent to monitoring well installation, a groundwater sample will be collected from each monitoring well and submitted for laboratory




## LEGEND

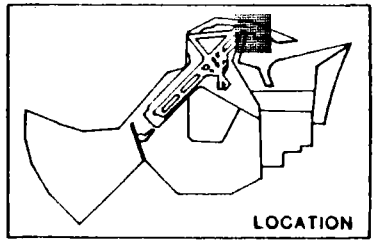
MW-1101 — PROPOSED MONITORING WELL LOCATION

SITE LOCATION AREA

x——x——x FENCE

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 11 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM RWD DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'

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|---|---|
| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 11 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO 5097-00 FIGURE 6 |

chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.

Water level measurements observed in these well locations, coupled with aquifer testing will allow an assessment of groundwater flow rate and direction beneath the site.

### 2.2.5 Site 11 - Neutralization Basin

The exploration program for Site 11 will consist of one soil boring completed with a monitoring well installation, one soil sample and one groundwater sample. The location of these explorations is presented in Figure 6 and the specific rationale for the boring/monitoring well location is presented below.

- MW-1101 will be a shallow monitoring well located north of the Neutralization Basin and is anticipated to be downgradient of Site 11 and upgradient of the St. Johns River.

One soil sample will be collected from the soil boring in the unsaturated soils above the groundwater table and will be submitted for laboratory chemical analysis. Subsequent to monitoring well installation, a groundwater sample will be collected from the monitoring well and will be submitted for laboratory chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.

### 2.2.6 Site 13 - Old Fire Training Area

The exploration program at Site 13 will consist of three soil borings completed with monitoring well installations, three soil samples and three groundwater samples. The location of these explorations is presented on Figure 7 and the specific rationale for each boring/monitoring well location is presented below.

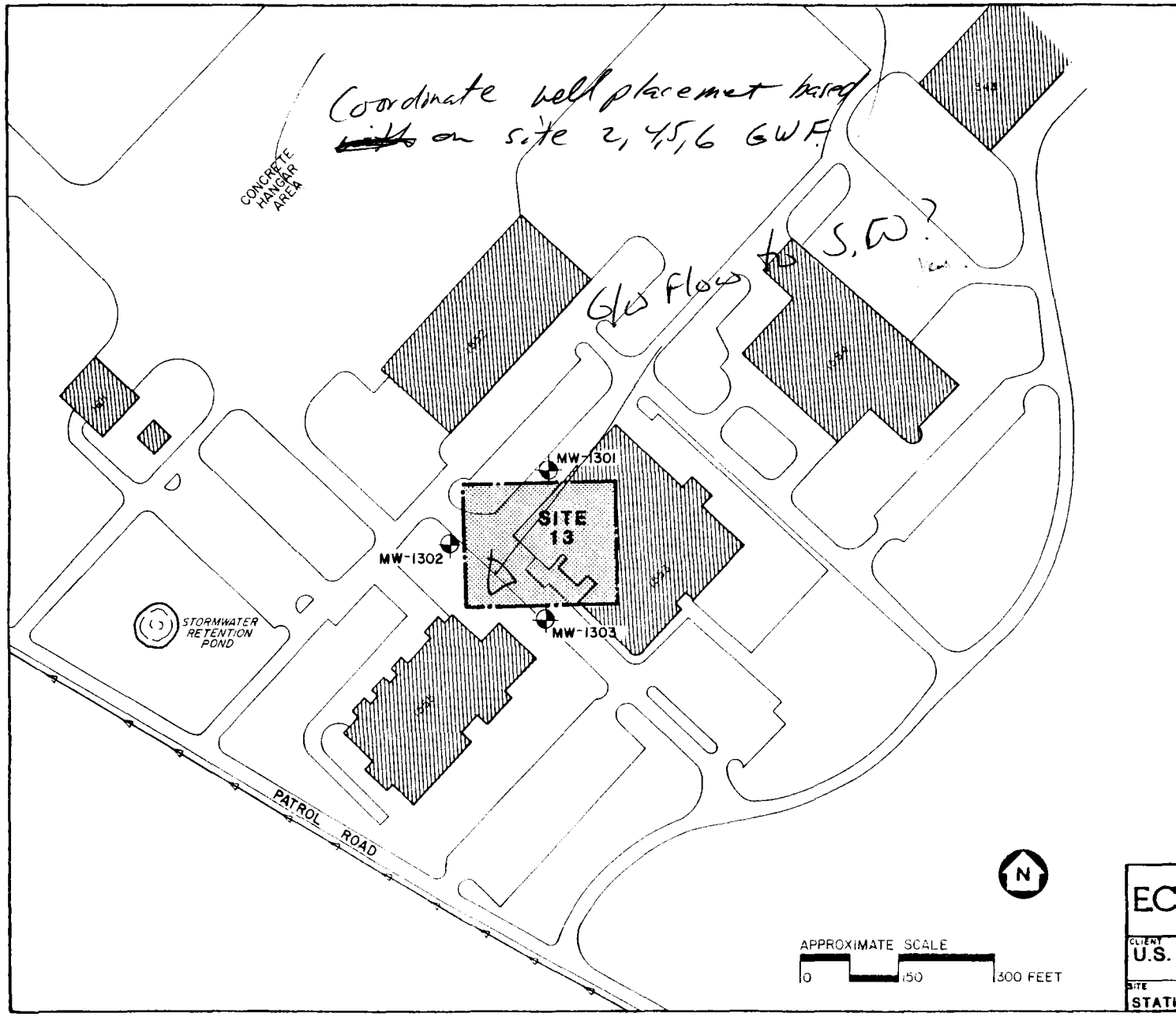
- MW-1301 will be a shallow monitoring well located north of Site 13 and is anticipated to be upgradient of Site 13.

  MW-1302 will be a shallow monitoring well located west of Site 13 and is anticipated to be downgradient of Site 13 and upgradient of the drainage ditch system and pond.

- MW-1303 will be a shallow monitoring well located south of Site 13 and is anticipated to be downgradient of Site 13 and upgradient of the drainage ditch system and ponds.

One soil sample will be collected from each soil boring in the unsaturated soils above the groundwater table and will be submitted for laboratory chemical analysis. Subsequent to monitoring well installation, a groundwater sample will be collected from each monitoring well and will be submitted for laboratory chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.

G/W flow direction anticipated to S.W.? check diagram at sits 24, 5, 6




## LEGEND

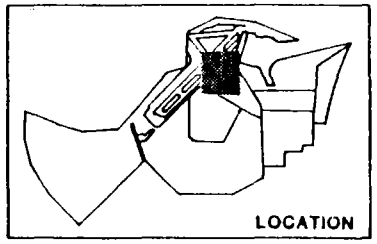
MW-1301 — PROPOSED MONITORING WELL LOCATION (MW-1301 THROUGH MW-1302).

SITE LOCATION AREA

STORM DRAINAGE DITCH INDICATING DIRECTION OF FLOW

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 13 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM PWD. DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'




| | |
|---|---|
| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 13 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 7 |

Water level readings observed in the monitoring wells coupled with aquifer testing will allow an assessment of the groundwater flow rate and direction beneath Site 13.

### 2.2.7 Site 14 - Mercury/Oily Waste Site

The exploration program at Site 14 will consist of two soil borings completed with monitoring well installations, two soil samples and two groundwater samples. The location of these explorations are presented in Figure 8 and the specific rationale for the boring/monitoring well locations are presented below.

- MW-1401 will be a shallow monitoring well located in the northeast corner of the site and is anticipated to be downgradient of the oil/water separator and upgradient of the storm drainage ditch and the St. Johns River.

upgradient side of this site?

- MW-1402 will be a shallow monitoring well located north of Site 14 and is anticipated to be downgradient of the fire training area and upgradient of the St. Johns River.

One soil sample will be collected from each soil boring in the unsaturated soils above the groundwater table and will be submitted for laboratory chemical analysis. Subsequent to monitoring well installation, a groundwater sample will be collected from each monitoring well and will be submitted for laboratory chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.

### 2.2.8 Site 16 - Transformer Storage Yard

The exploration program at Site 16 will consist of two surface soil samples which will be collected immediately to the west of the runway in the direction of surface runoff of precipitation. The location of soil samples is presented in Figure 5. The soil samples will be submitted for laboratory chemical analysis. Specific methods and parameters of analysis are discussed in Section 2.4.

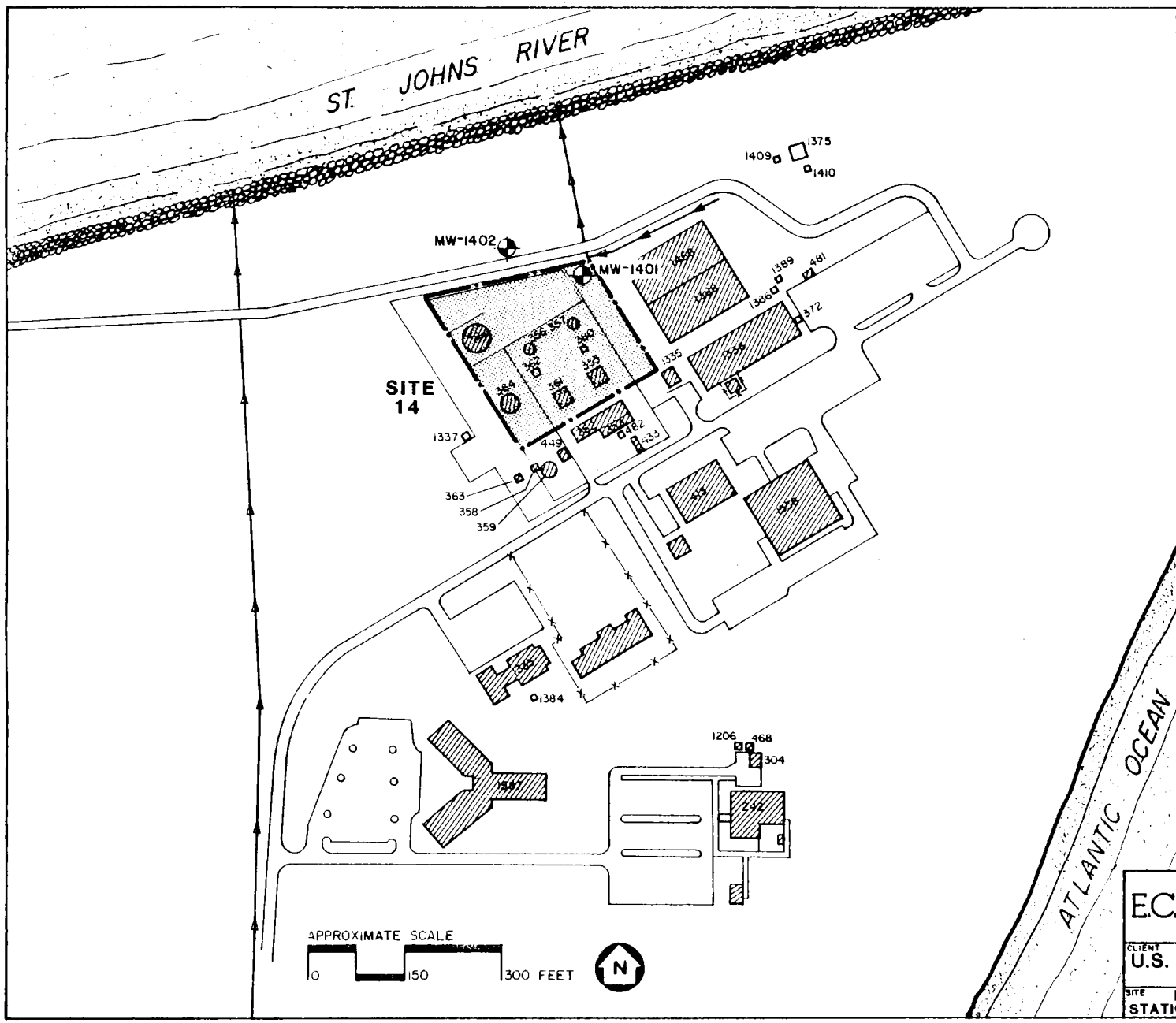
## 2.3 TASK 2 - SURVEY

The reg. survey Horz & Vert.

The location of completed monitoring wells, soil sampling points and surface water/sediment sampling points will be identified on available topographic maps of the sites which are to be provided by the Navy. The elevation of the wells and surface water sampling points will be surveyed to the nearest 0.01 feet and referenced to NAVSTA datum. The elevational survey is necessary to develop a map of the piezometric map of the water surface and to determine groundwater flow direction.

## 2.4 TASK 3 - ANALYTICAL PROGRAM

Samples of soil, sediment, surface water and groundwater selected for analytical testing will be chemically analyzed to identify and quantify the chemical contaminants detected for each analytical method. A summary of the




## LEGEND

MW-1401 — PROPOSED MONITORING WELL LOCATION (MW-1401 THROUGH MW-1402).

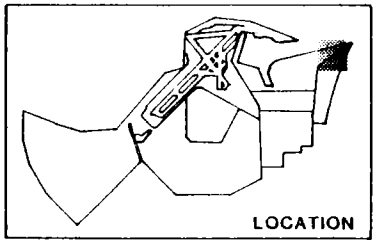
STORM DRAINAGE DITCH INDICATING DIRECTION OF FLOW.

x—x—x FENCE

SITE LOCATION AREA

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 14 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM PWD DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'

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|---|---|
| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 14 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 8 |

analytical program for the Verification Phase Study is presented in Table 2. The analyses specified for each sample type were chosen based on the type of waste reported to have been disposed at each site according to the IAS Study.

In selecting methods of analyses for each site an attempt was made to develop a consistent parameter data base across all sites to aid in an overall evaluation of the NAVSTA. This methodology will provide sufficient data to assess any potential contaminant relationship between sites. Analysis for specific chemical parameters will identify the presence of the primary hazardous materials suspected to be present on-site. The specific methods of analyses to be used are presented in Table 3.

Analyses for metals in soils and sediment samples will be performed by EPTOX and by Atomic Adsorption (AA) in water. EPTOX is proposed due to the established regulatory criteria for the analytical results of this method of analysis. EPTOX analyses measures the concentration of metals which are leachable from the soil by infiltrating precipitation having a pH of 4.5. This analysis is used by regulatory agencies to assess whether or not soil, sludge, or other solid waste should be considered a hazardous material. Analyses for metals in surface water and groundwater ~~will include chromium~~, cadmium, lead and mercury due to the suspected presence of paint sludges, plating wastes, mercury wastes, photo processing wastes, leaded fuels and battery acids, all of which may contain metal wastes. A background sample of surface water will be collected and analyzed. where? sample to be taken where?

Volatile organic priority pollutant analysis will identify the presence and concentration of contaminants which may have been present in solvents and fuels which were widely used at NAVSTA. Specific volatile organic priority pollutants suspected at NAVSTA include tetrachloroethylene (PCE), toluene and methylene chloride. These chemicals which are mobile in groundwater systems, were reportedly disposed of in large quantities at Mayport NAVSTA.

Analysis of PCB's and pesticides is included in EPTOX (Pest) and acid/base neutral extractables (Pest/PCB) and therefore will be analyzed at those sites where the IAS identified possible past disposal and/or storage of PCB contaminated transformer oils and pesticides or at sites where acid/base neutral compounds are suspected to be present. PCB will accumulate mainly on soil, so most PCB analyses will be performed on soil samples. However, water samples will also be tested because PCB's are soluble to a limited extent, and detection limits are much lower in the liquid phase.

The acid and base neutral priority pollutants comprise a broad range of hazardous organic compounds including phenolics, polyaromatics and phthalates. Review of available information suggest such compounds were disposed of to some extent at NAVSTA. To confirm the presence of these materials, acid and base neutral analyses will be conducted at the sites where wastes which may have contained these compounds are suspected to have been disposed.

TABLE 2
SUMMARY OF CHEMICAL ANALYSIS
VERIFICATION PHASE
NACIP CONFIRMATION STUDY
MAYPORT NAVY STATION

| SAMPLE SOURCE | MEDIA | 218 etc LEAD | MERCURY | CADMIUM | CHROMIUM | 624 VOA | EPTOX | 625 SEMI-VOA PEST/PCB |
|---|---|---|---|---|---|---|---|---|
| SITE 1 | SOIL (BORING) | — | — | — | — | 4 | 4 | 4 |
| | GROUNDWATER | 4 | 4 | 4 | 4 | 4 | — | 4 |
| SITES 2,4,5 AND 6 | SOIL (BORING) | — | — | — | — | 15 | 15 | 15 |
| | GROUNDWATER | 17 | 17 | 17 | 17 | 17 | — | 17 |
| | SEDIMENT | — | — | — | — | 3 | 3 | 3 |
| | SURFACE WATER | 3 | 3 | 3 | 3 | 3 | — | 3 |
| SITE 8 | SOIL (BORING) | — | — | — | — | 3 | 3 | 3 |
| | GROUNDWATER | 3 | 3 | 3 | 3 | 3 | — | 3 |
| SITE 9 | SOIL (BORING) | — | — | — | — | 3 | 3 | 3 |
| | GROUNDWATER | 3 | 3 | 3 | 3 | 3 | — | 3 |
| SITE 11 | SOIL (BORING) | — | — | — | — | 1 | 1 | 1 |
| | GROUNDWATER | 1 | 1 | 1 | 1 | 1 | — | 1 |
| SITE 13 | SOIL (BORING) | — | — | — | — | 3 | 3 | 3 |
| | GROUNDWATER | 3 | 3 | 3 | 3 | 3 | — | 3 |
| SITE 14 | SOIL (BORING) | — | — | — | — | 2 | 2 | 2 |
| | GROUNDWATER | 2 | 2 | 2 | 2 | 2 | — | 2 |
| SITE 16 | SOIL (BORING) | — | — | — | — | 2 | 2 | 2 |
| SUBTOTAL | SOIL/SEDIMENT | — | — | — | — | 36 | 36 | 36 |
| | WATER | 36 | 36 | 36 | 36 | 36 | — | 36 |
| DUPLICATES | SOIL/SEDIMENT | | | — | — | 4 | 4 | 4 |
| | WATER | 4 | 4 | 4 | 4 | 4 | | 4 |
| SAMPLER BLANKS | WATER | 1 | 1 | 1 | 1 | 1 | — | 1 |
| BACKGROUND | SURFACE WATER | 1 | 1 | 1 | 1 | 1 | — | 1 |
| TRIP BLANKS | WATER | 1 | 1 | 1 | 1 | 4 | — | — |
| TOTAL | SOIL/SEDIMENT | — | — | — | — | 40 | 40 | 40 |
| | WATER | 43 | 43 | 43 | 43 | 46 | — | 42 |

TABLE 3
LABORATORY ANALYTICAL PROCEDURES
NACIP CONFIRMATION STUDY
VERIFICATION PHASE
MAYPORT NAVAL STATION

| Media | Parameter | Method | Reference |
|---|---|---|---|
| Soils | Volatile Organic Priority Pollutants | Purge and Trap/ GC/MS | EPA Method 624[1] |
| | Eptox (Elements and Pesticide) | AA/GC | SW-846[2] |
| | Semivolatile Organic Priority Pollutants (Including PCB's) | GC/MS | EPA Method 625 |
| Surface Water Groundwater | Volatile Organic Priority Pollutants | GC/MS | EPA Method 624 |
| | Semivolatile Organic Priority Pollutants (including PCB's/ Pesticide) | GC/MS | EPA Method 625 EPA method 608 for PCB's |
| | Cr, Hg, Pb, Cd | AA | EPA Methods 218.1, 245.1 239.1 |
| | pH | Potentiometric | EPA Method 150.1 |
| | Specific Conductance | Conductance | EPA Method 120.1 |

1 Includes the following sample preparation: One gram of sample is placed in a 40-ml vial filled with water and spiked with surrogates. The vial is agitated for at least 16 hours at 4°C and the water is analyzed by the specified method. This protocol is described in more detail in "Development of Analytical Test Procedures for the Measurement of Organic Priority Pollutants in Sludge and Sediments," Midwest Research Institute, Final Report - EPA Contract No. 68-03-695, June 26, 1979.

2 Extraction by EPA Method 1310.

## 2.5 TASK 4 - EVALUATION AND DRAFT REPORT

To meet the objective of the Verification Phase of the NACIP Confirmation Study, Jordan will review the data developed during this investigation and will make an assessment of the presence and concentration of hazardous chemicals in the environment at Mayport NAVSTA. Contaminants, if identified, will be compared to State and Federal regulatory criteria to assess whether the concentrations detected are considered hazardous and whether they pose a potential threat to human health, safety and the environment. Further, based on the results and conclusions drawn from the evaluation described above, Jordan will make one of the following recommendations for each of the sites studies:

- o elimination from further study under the NACIP Confirmation Study;
- o additional investigation activity under the Verification Phase; or
- o proceed to Characterization Phase of study under the NACIP Confirmation Study.

## 2.6 TASK 5 - FINAL REPORT

Subsequent to the Navy's review of the Verification Phase draft report, a meeting will be held at Mayport Naval Station in Mayport, Florida, to discuss written comments provided by the Navy. The purpose of this meeting will be finalizing changes to the draft report. A final Verification Phase report will be completed by Jordan following this meeting.

## 2.7 TASK 6 - MEETINGS AND PRESENTATIONS

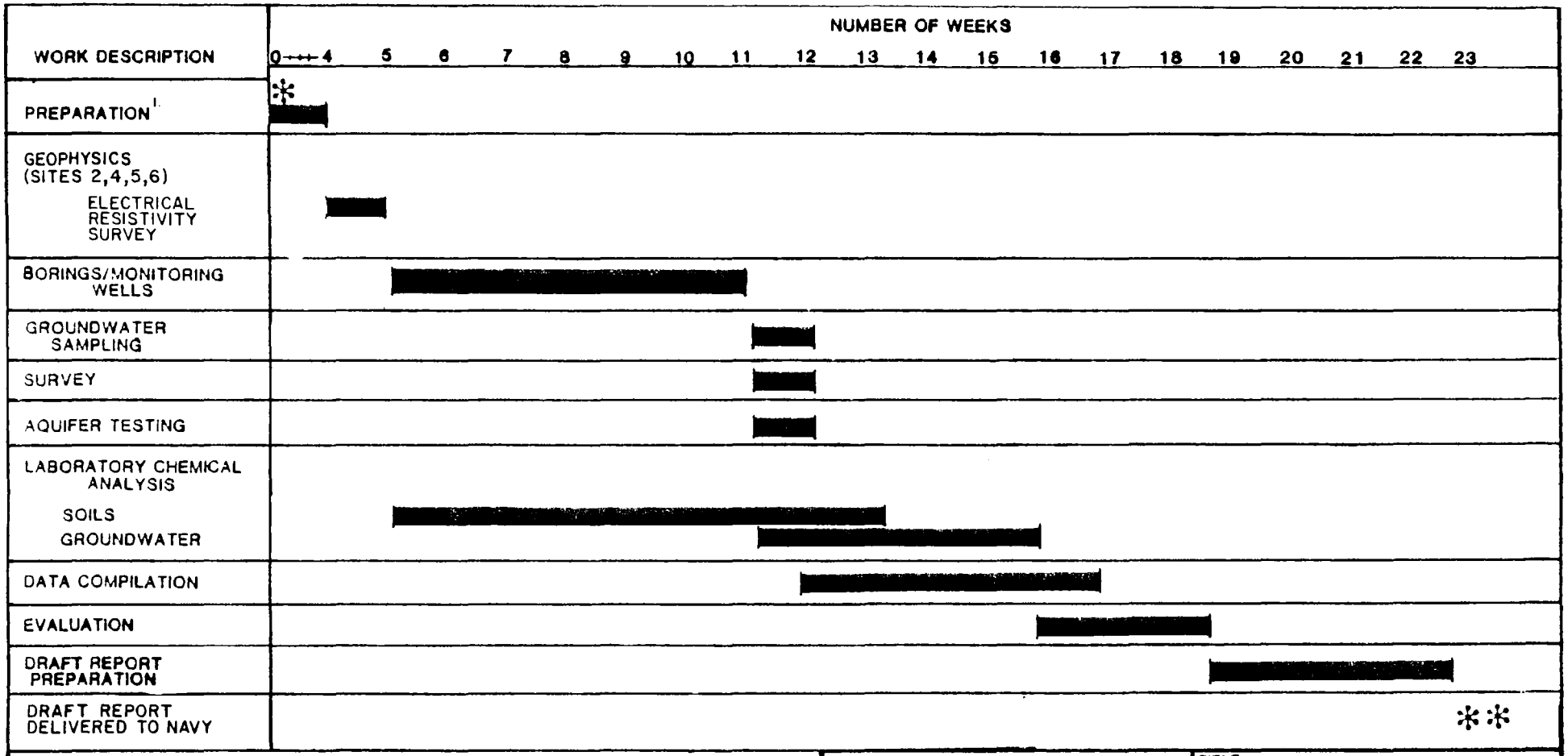
In addition to the meeting described above to discuss the Navy's comments to the Verification Phase draft report, two separate meetings will be held at Mayport NAVSTA at which a presentation of the draft final Verification Work Plan and the Verification Phase Report will be presented to the FDER and the USEPA.

Pursuant to discussions with Navy officials, and the Statement of Work dated September 9, 1986, no additional meetings other than those mentioned above will be required, therefore, none are included in the Scope of this Work Plan. Should such meetings be necessary, the Navy agrees to compensate Jordan for time and expenses to prepare for and attend such meetings in addition to the costs presented in this Work Plan.

## 3.0 SCHEDULE

The schedule for this work is presented in Figure 9 and is contingent with notification to proceed from the Navy. Notification to proceed should include a signed contract between Jordan and the Navy. The schedule illustrated in Figure 9 is approximate, assumes optimum field conditions and may be influenced by factors over which Jordan has no control. These factors would include the following:

- weather conditions during fieldwork;
- constraints on working hours due to NAVSTA security in restricted areas (Sites 2, 4, 5 and 6); and
- time necessary for review of draft documents by the Navy, NAVSTA and regulatory agencies.




NOTES:

✻ NOTIFICATION TO PROCEED

✻✻ DELIVERABLE DUE OUT

1. INCLUDES EQUIPMENT STAGING, DRILLING SUBCONTRACT NEGOTIATION, SECURITY ACCESS, AND MOBILIZATION.

E.C.JORDAN CO.
CONSULTING ENGINEERS

TITLE: SCHEDULE OF WORK

CLIENT: U.S. DEPARTMENT OF THE NAVY

VERIFICATION PHASE NACIP CONFIRMATION STUDY

SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA

JOB NO. 5097-00

FIGURE 9

## 4.0 COSTS

A summary of total costs associated with the Verification Phase Study described herein are presented in Table 4. A summary of direct labor costs and a summary of direct expenses are presented in Tables 5 and 6, respectively. A summary of analytical costs for the Verification Phase activities are presented in Table 7.

Although Jordan is currently going through the NACIP laboratory approval program, a determination is not expected until January or February of 1987. As a result, we propose and have obtained prices from Pioneer Laboratory, Inc. to perform the analytical program. Pioneer Laboratory is currently performing analtyical services in support of the NACIP program.

TABLE 4
SUMMARY OF TOTAL COSTS
VERIFICATION PHASE
NACIP CONFIRMATION STUDY
MAYPORT NAVAL STATION

| | | HOURS | ESTIMATED COST |
|---|---|---|---|
| A. | Direct Labor (Table 5) | | |
| | I | 152 | $ 3,925 |
| | II | 140 | $ 2,640 |
| | III | 855 | $ 12,338 |
| | IV | 770 | $ 7,869 |
| | Technical | 135 | $ 1,316 |
| | Clerical | 200 | $ 1,800 |
| | | 2,252 | $ 29,888 |
| B. | Labor Overhead<br>Total Direct Labor X .79 | | $ 23,612 |
| C. | Other Direct Costs (Table 6) | | $ 20,881 |
| D. | Drilling Sub-Contract (Table 6) | | $ 24,500 * 27,000 |
| E. | Laboratory Sub-Contract (Table 7) | | $ 60,016 |
| F. | Total Other Direct Costs<br>Sum of C. through G. | | $ 105,397 |
| G. | Total Direct Costs and Overhead<br>Sum of A., B. and F. | | $ 158,897 |
| H. | General and Administrative Expenses<br>(Total Direct Costs and Overhead<br>Multiplied by .20) | | $ 31,779 |
| I. | Total Estimated Cost<br>Sum of H. through I. | | $ 190,676 |
| J. | Fee<br>Total Estimated Cost X 10.0 % | | $ 19,068 |
| K. | Total Costs<br>Sum of I. and J. | | $ 209,744 |

We looking @ about $150,000

TABLE 5
SUMMARY OF DIRECT LABOR
VERIFICATION PHASE
NACIP CONFIRMATION STUDY
MAYPORT NAVAL STATION

this will be how it we need to contact out.

| LABOR TASK | LABOR MANHOURS I | II | III | IV | T[1] | C[2] | TOTAL HOURS | TOTAL ~~HOURS~~ $ |
|---|---|---|---|---|---|---|---|---|
| 1. EXPLORATION AND SAMPLING PROGRAM[3] | 40 | 60 | 390 | 355 | 15 | 40 | 900 | $11,926 |
| 2. SURVEY | -- | -- | 50 | -- | 50 | -- | 100 | $ 1,209 |
| 3. ANALYTICAL PROGRAM[4] | -- | -- | -- | -- | -- | -- | -- | -- |
| 4. EVALUATION AND DRAFT REPORT | 75 | 50 | 300 | 300 | 50 | 80 | 855 | $11,482 |
| 5. FINAL REPORT | 10 | 20 | 40 | 40 | 20 | 50 | 180 | $ 2,266 |
| 6. MEETING AND PRESENTATIONS | 27 | 10 | 75 | 75 | -- | 30 | 217 | $ 3,005 |
| TOTAL MANHOURS | 152 | 140 | 855 | 770 | 135 | 200 | 2,252 | |
| RATE (UNLOADED) | $25.82 | $18.86 | $14.43 | $10.22 | $9.75 | $9.00 | -- | |
| TOTAL COST | $3,925 | $2,640 | $12,338 | $7,869 | $1,316 | $1,800 | -- | $29,888 |

NOTES:

1 T denotes technical level personnel.
2 C denotes clerical personnel hours.
3 Exploration program labor costs include boring supervision, soil sampling, monitoring well installation and development, surface water sampling, groundwater sampling and aquifer testing.
4 Labor costs included in sampling costs.

TABLE 6
SUMMARY OF DIRECT EXPENSES
VERIFICATION PHASE
NACIP CONFIRMATION STUDY
MAYPORT NAVAL STATION

| TASK | HEALTH & SAFETY | TRAVEL | PHONE | WORD PROCESSING | OTHER DIRECT COSTS PRINTING & REPRO. | ANAL. BOTTLES | EQUIP. | SHIPPING | OTHER | TOTAL |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. EXPLORATION PROGRAM SITES 1 AND 3 STEP 1B CHARACTERIZATION | $2140 | $ 8670 | $275 | $ 320 | $ 125 | $576 | $875 | $ 800 | $500 | $14281 |
| 2. SURVEY | $ 300 | $ 900 | $ 20 | -- | -- | -- | $ 50 | -- | -- | $ 1270 |
| 3. ANALYTICAL PROGRAM | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4. EVALUATION AND DRAFT REPORT | -- | -- | $425 | $1920 | $ 700 | -- | -- | $ 240 | $100 | $ 3385 |
| 5. FINAL REPORT | -- | -- | $ 25 | $ 320 | $ 300 | -- | -- | $ 100 | -- | $ 745 |
| 6. MEETING AND PRESENTATIONS | -- | $ 900 | $100 | $ 50 | $ 100 | -- | -- | $ 50 | -- | $ 1200 |
| TOTAL COST[1] | $2440 | $10470 | $845 | $2610 | $1225 | $576 | $925 | $1190 | $600 | $20881 |

NOTES

1 Costs do not include profit

Need more explanation on costs? (breakdown)

TABLE 7
SUMMARY OF ANALYTICAL COSTS
SITES 1, 2, 4, 5, 6, 8, 9, 11, 13, 14 AND 16
VERIFICATION PHASE STUDY
NACIP CONFIRMATION STUDY
MAYPORT NAVAL STATION

| Site | Analysis | Medium | Number of Samples | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | Eptox Elem/Pest | Soil | 4 | $150 | $ 600 |
| | Metals[1] | Water | 4 | $ 52 | $ 208 |
| | VOA | Soil | 4 | $200 | $ 800 |
| | | Water | 4 | $180 | $ 720 |
| | SVOA Pest/PCB | Soil | 4 | $440 | $ 1,760 |
| | | Water | 4 | $400 | $ 1,600 |
| | | | | | $ 5,688 |
| 2,4, 5,6 | Eptox Elem/Pest | Soil | 18 | $250 | $ 4,500 |
| | Metals | Water | 20 | $ 52 | $ 1,040 |
| | VOA | Soil | 18 | $200 | $ 3,600 |
| | | Water | 20 | $180 | $ 3,600 |
| | SVOA Pest/PCB | Soil | 18 | $440 | $ 7,920 |
| | | Water | 20 | $400 | $ 8,000 |
| | | | | | $28,660 |
| 8 | Eptox Elem/Pest | Soil | 3 | $150 | $ 450 |
| | Metals | Water | 3 | $ 52 | $ 156 |
| | VOA | Soil | 3 | $200 | $ 600 |
| | | Water | 3 | $180 | $ 540 |
| | SVOA Pest/PCB | Soil | 3 | $440 | $ 1,320 |
| | | Water | 3 | $400 | $ 1,200 |
| | | | | | $ 4,266 |
| 9 | Eptox Elem/Pest | Soil | 3 | $150 | $ 450 |
| | Metals | Water | 3 | $ 52 | $ 156 |
| | VOA | Soil | 3 | $200 | $ 600 |
| | | Water | 3 | $180 | $ 540 |
| | SVOA Pest/PCB | Soil | 3 | $440 | $ 1,320 |
| | | Water | 3 | $400 | $ 1,200 |
| | | | | | $ 4,266 |
| 11 | Eptox Elem/Pest | Soil | 1 | $150 | $ 150 |
| | Metals | Water | 1 | $ 52 | $ 52 |
| | VOA | Soil | 1 | $200 | $ 200 |
| | | Water | 1 | $180 | $ 180 |
| | SVOA Pest/PCB | Soil | 1 | $440 | $ 440 |
| | | Water | 1 | $400 | $ 400 |
| | | | | | $ 1,422 |

TABLE 7 (Continued)
SUMMARY OF ANALYTICAL COSTS

| Site | Analysis | Medium | Number of Samples | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 13 | Eptox Elem/Pest | Soil | 3 | $150 | $ 450 |
| | Metals | Water | 3 | $ 52 | $ 156 |
| | VOA | Soil | 3 | $200 | $ 600 |
| | | Water | 3 | $180 | $ 540 |
| | SVOA Pest/PCB | Soil | 3 | $440 | $ 1,320 |
| | | Water | 3 | $400 | $ 1,200 |
| | | | | | $ 4,266 |
| 14 | Eptox Elem/Pest | Soil | 2 | $150 | $ 300 |
| | Metals | Water | 2 | $ 52 | $ 104 |
| | VOA | Soil | 2 | $200 | $ 400 |
| | | Water | 2 | $180 | $ 360 |
| | SVOA PCB | Soil | 2 | $440 | $ 880 |
| | | Water | 2 | $400 | $ 800 |
| | | | | | $ 2,844 |
| 16 | SVOA Pest/PCB | Soil | 2 | $440 | $ 880 |
| | | | | | $ 880 |
| DUP | Eptox Elem/Pest | Soil | 4 | $150 | $ 600 |
| BLANKS | Metals | Water | 7 | $ 52 | $ 364 |
| AND | VOA | Soil | 4 | $200 | $ 800 |
| BACK- | | Water | 10 | $180 | $ 1,800 |
| GROUND | SVOA Pest/PCB | Soil | 4 | $440 | $ 1,760 |
| | | Water | 6 | $400 | $ 2,400 |
| | | | | | $ 7,724 |

1 Lead, chromium, cadmium, and mercury

U.S. DEPARTMENT OF THE NAVY
MAYPORT NAVAL STATION
MAYPORT, FLORIDA

# WORK PLAN

NACIP
CONFIRMATION STUDY
VERIFICATION PHASE

CONTRACT: N62467-86-C-0174

E.C. JORDAN PROJECT NO. 5097-00

PREPARED BY E.C. JORDAN CO.

NOVEMBER 1986

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## 1.0 INTRODUCTION

### 1.1 THE NACIP PROGRAM AND MAYPORT NAVAL STATION

Mayport Naval Station (NAVSTA) is included in the Navy Assessment and Control of Installation Pollutants (NACIP) program. The NACIP program was established to identify the presence of any suspected contamination at Navy and Marine Corps lands resulting from past operations, and if needed, to institute corrective remedial measures. The NACIP program is implemented in three parts:

1. Initial Assessment Study (IAS). The study consists of records searches and personnel interviews to collect and evaluate evidence supporting the existence of any potential contamination problems at NAVSTA.

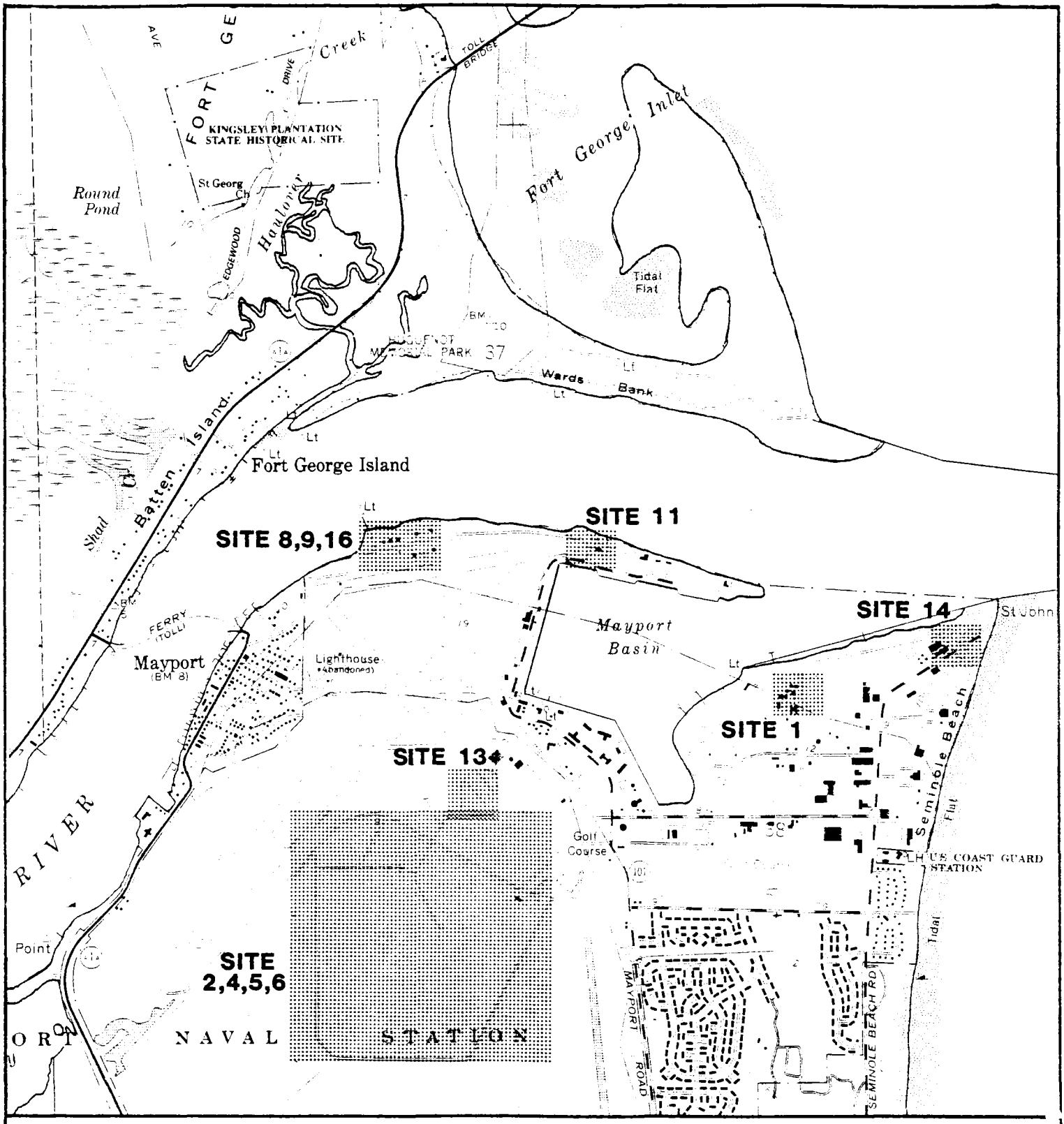
2. Confirmation Study. The study consists of on site investigations including physical and chemical analyses to confirm or deny the existence of contamination, to quantify the extent of the problem, and to recommend necessary corrective measures if contamination is present.

3. Remedial Measures. The study identifies corrective actions to control and mitigate contamination.

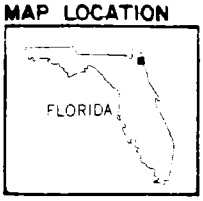
The IAS was completed for NAVSTA by Environmental Science and Engineering Inc. (ESE) and a report submitted to the Navy in May 1986. The IAS contains background information on the chemicals which were used at the Navy Facility and on specific sites where chemical wastes were known to have been stored or disposed or where such activity was suspected to have occurred. Sixteen sites were identified in the IAS report. The IAS provides a ranking of these sites based on the available information and any potential hazard to human health and the environment. On the basis of this ranking and a review of the IAS by the Florida Department of Environmental Regulation (FDER) and the U.S. Environmental Protection Agency (EPA), eleven sites were selected by the Navy for the Confirmation Study (Figure 1). The Confirmation Study is divided into four steps. The steps are described below:

CONFIRMATION STUDY PHASE

| Phase | Description |
|---|---|
| 1 | Verification of existence of contamination. |
| 2 | Characterization of extent and rate of migration of contaminants, hydrogeological and other factors. |
| 3 | Evaluation of alternatives to achieve compliance, preparation of cost estimates and project effectiveness of alternatives. |
| 4 | Preparation of site operation and government project documentation with cost estimate satisfactory for project funding requests for remedial measures. |




MAP LOCATION




N

SCALE

0 2000 4000

| | |
|---|---|
| E.C.JORDAN CO. CONSULTING ENGINEERS | TITLE: SITE LOCATION MAP |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 1 |

On September 9, 1986, E.C. Jordan Co. (Jordan) was contracted by the U.S. Department of the Navy to complete the 90 percent Verification Phase of study for the eleven sites selected at NAVSTA. The eleven sites are grouped into the eight areas noted below.

| AREA | NAVSTA IDENTIFICATION |
|---|---|
| Site 1 | Landfill A |
| Sites 2,4,5,6 | Landfills B, D, E, F |
| Site 8 | Waste Oil Pit |
| Site 9 | Fuel Spill Area |
| Site 11 | Neutralization Basin |
| Site 13 | Old Fire Training Area |
| Site 14 | Mercury/Oily Waste Spill Site |
| Site 16 | Transformer Storage Area |

Sites 2, 4, 5 and 6 have been grouped into one area because they are all landfills with similar wastes and their geographic proximity to each other lends these sites to a group investigation. Grouping these sites together will allow design of a more cost- effective investigation. It will however, be the intent of this study to identify individual landfills in this area for further study under the characterization phase if warranted.

## 1.2 WORK PROGRAM OVERVIEW

The Verification Phase Study work program consists of preparation of a Work Plan, Quality Assurance Project Plan and a Health and Safety Plan. Each of the three plans are a separate document which describes a different aspect of the Verification Phase of the NACIP Confirmation Study. These three major components of the work program are described briefly in the following overview.

### 1.2.1 Work Plan

This work plan document describes the scope of work, methodology and costs to conduct the Verification Phase studies. The major sections of this work plan include six tasks which are briefly reviewed in the following sections.

Task 1 - Exploration Program. The exploration program for the Verification Study will include:

- electrical resistivity survey;
- borings and soil sampling;
- monitoring well installation;
- groundwater sampling; and
- surface water sampling.

Task 2 - Elevation Survey. This task will describe the scope of the survey program required for piezometric surface mapping and assessment of groundwater flow direction.

Task 3 - Analytical Program. Parameters and analytical methods to be used for analysis of samples of each media will be identified in this work plan. Further, the work plan will review the rationale for selection of parameters for each media sampled.

Task 4 - Evaluation and Draft Report. The work plan will describe the characteristics of each site evaluated. These characteristics include:

- site geology;
- site hydrogeology;
- site hydrology;
- presence and concentration of contaminants;
- evaluation of contaminant concentrations relative to state and federal regulatory criteria;
- impact assessment; and
- recommendations.

Task 5 - Final Report. The work plan presents the process for review of the draft report and preparation of the final report. This process includes meetings with the Navy and/or regulatory agencies and preparation of the Final Draft Report and Final Report.

Task 6 - Meetings and Presentations. Project meetings with the Navy will be required and may take place in Tallahassee, Charleston, or Mayport. A recommendation for the number and location of meetings/presentations is provided in Section 1.7 of the work plan.

### 1.2.2 Quality Assurance Project Plan

The Quality Assurance Project Plan (QAPP) will provide methods, criteria and guidelines by which the work is to be conducted. The plan establishes the methods for quality assurance/quality control (QA/QC) for sampling and laboratory analysis. The QAPP is a separate document which will be produced and approved concurrent with the Work Plan and the Health and Safety Plan.

### 1.2.3 Health and Safety Plan

The Health and Safety Plan (HASP) will describe Jordan's health monitoring and safety training program and the site specific health and safety requirements for conducting the field operations of the Verification Study. The HASP will also include a presentation of the training experience for all personnel scheduled to work at NAVSTA. The HASP, like the QAPP is a separate document which will be concurrently produced and approved with the work plan.

## 1.3 PROJECT LOGISTICS

This section is devoted to the logistics of on-site field work to be carried out at the NAVSTA. Sites 4 and 5 are located adjacent to a highly restricted magazine area and to insure proper security arrangements for access and operations in this area and the base in general, a meeting was held on October 10, 1986, at NAVSTA with representatives from weapons, security, public works, engineering, safety and the NAVSTA fire department. The

following sections address the logistics of security arrangements, communications, field operations, decontamination facilities and disposal of wastes result of the October 10, 1986 meeting with base personnel.

### 1.3.1 Security Arrangements

Jordan personnel while on the base will use telephones to communicate with off-base parties and will have a list of emergency phone numbers available at all times. Personnel conducting on-site work in one area of the NAVSTA will use two-way radios with frequencies approved by the Navy to maintain a communication link with personnel working in other areas. Daily communications for access needs and scheduling site operations will be coordinated with one representative from the Naval Station and one representative from the Naval Air Station. As of this writing, the representative from the Naval Station will be Jose Negron from the Environmental Branch of Civil Engineering. The representative from the Naval Air Station has not been named by the Commanding Officer of Mayport NAVSTA.

### 1.3.2 Communications

Access to the base in general and to the restricted area will be with one security pass. The pass will be a picture identification contractor pass and one pass will be adequate for the entire field program. All information on Jordan personnel involved in the project and a copy of the contract for the project will be provided to security at least 2 weeks before the field work begins.

### 1.3.3 Field Operations

The geophysical portion of the field investigation will require the use of a an EM-31 electrical resistivity meter near the restricted magazine and airfield areas. The locations of all geophysical survey lines will be checked during a site reconnaissance, after the lines have been staked out in the field, by representatives from Weapons, Public Works, Ground Electronics and the Naval Airfield Operations.

Drill rigs and backhoes left in the restricted area overnight will be disabled each night before on-site personnel leave the restricted area. Final approval for boring locations will be given during the same site reconnaissance for geophysical explorations prior to the beginning of the field work. Potable water, which is necessary for drilling and decontamination procedures will be obtained at fire hydrant locations specified by Public Works; this will be arranged by engineering.

### 1.3.4 Decontamination Facilities

The field work at the NAVSTA sites will require mobilization nd field support by subcontractors, sampling crews and survey crews. Staging and decontamination facilities will be needed to conduct these operations. Staging of the field operations will be done from vehicles used by Jordan personnel. These vehicles will be parked in uncontaminated areas identified at each site and will not require decontamination.

Decontamination zones for personnel and equipment during the reconnaissance will be established at locations to be determined for each site. All contaminated materials and protective gear will either be disposed of or decontaminated in these areas before site personnel proceed into the clean zone. The specific decontamination procedures to be employed are outlined in the Health and Safety Plan.

A heavy equipment decontamination zone will be designated at each site. Drill rigs, casing, rods and associated equipment will be decontaminated and steam cleaned prior to setting up at each boring or monitoring well location. Sampling tools will be decontaminated more frequently as required by the sampling protocol provided in the Quality Assurance Project Plan.

### 1.3.5 Disposal of Wastes

All fluids generated by personnel and equipment decontamination will be disposed of on-site, inside of the contamination reduction area. Contaminated items such as disposable safety and sampling equipment will be placed in doubled plastic bags which will be collected daily and stored in 55-gallon drums with locking ring lids. The drums will be supplied by Mayport NAVSTA Engineering and left on-site for future transportation by the Department of the Navy to a suitable disposal facility.

Drill fluids, drill cuttings and water resulting from monitoring well and piezometer installation and development will be monitored for contamination using a portable photoionization meter. There is no plan to collect or store any of these materials. Those materials will remain on-site at the location where they are generated. Soil cuttings will be buried and drilling fluids will be allowed to infiltrate into the soil.

## 2.0 WORK PROGRAM

The Work Plan for the NAVSTA Verification Phase of the NACIP Confirmation Study has been developed based on Jordan's review of the Initial Assessment Study (IAS) for Mayport NAVSTA; a review of available information from previous studies; USEPA comments; FDER comments; a site reconnaissance conducted by Jordan on October 9 and 10, 1986; and discussions with U.S. Navy officials. The Work Plan for the Verification Phase investigation consists of tasks which were identified in Attachment A, Statement of Work - Confirmation Study received from the Department of Navy and dated November 20, 1985; and on the basis of negotiations with the Department of the Navy conducted on September 9, 1986.

The objective of this Verification Study will be to assess whether specific toxic and hazardous materials identified in the IAS, and possibly other contaminants, are present in concentrations considered to be hazardous to human health and the environment. The result of this phase of the confirmation study will be a general evaluation of contamination found, including hydrogeological, health, safety, and regulator aspects and a recommendation as to whether or not to proceed with the characterization phase of the NACIP Confirmation Study.

The Characterization Phase, if required, shall be a quantitative assessment of the distribution of contamination, sources, and contaminant migration pathways. The data developed during this phase of study will be sufficient to permit an evaluation of the levels and distribution of contamination, both vertical and horizontal around the site. It will also evaluate the specifics of the site hydrogeology and specifics of groundwater movement and/or surface water movement. This phase will also provide the data necessary to perform a risk assessment or critical habitat assessment, if warranted.

## 2.1 METHODS OF EXPLORATION

Soil borings, monitoring well installation and aquifer testing will be performed at most of the sites being investigated at Mayport NAVSTA. This section will describe the methods to be employed for these activities to avoid repeating the descriptions in each site specific exploration and sampling program section.

### 2.1.1 Soil Borings

Soil Borings will be advanced using a hollow stem auger technique to a depth of approximately 10 feet below the groundwater table. Geological characteristics of the site will be determined from soil samples collected at the ground surface and at 5-foot intervals to the completion depth using a split spoon sampler advanced by standard penetration methods. One soil sample from each boring location will be submitted for laboratory chemical analysis. Because of shallow groundwater conditions throughout the base, only one soil borings for laboratory analysis will be collected at each boring location.

This will be collected between the ground surface and the shallow groundwater table. The purpose for this soil sample will be to assess the presence and concentration of contamination in the unsaturated zone which may be acting as a source of contaminants groundwater. The laboratory methods and parameters to be analyzed for are presented in Section 2.4 and all sampling methods, sampling protocol and laboratory protocol to be followed are included in the Quality Assurance Project Plan.

### 2.1.2 Monitoring Well Installation

Monitoring wells will be installed in each of the completed soil borings for the purpose of monitoring groundwater quality and assessing the direction and rate of groundwater flow in the shallow aquifer. The total depth of soil drilling is estimated at 665 lineal feet and the depths, number of analytical samples and quantities of materials for monitoring well installation are presented in Table 1. The installation of monitoring wells will comply with the following:

- 40 CFR and 265 Subpart F;
- "Groundwater Monitoring Guide," NEESA 20.2-013A;
- NACIP Technical Note, No. 4, Materials for Monitoring Well Construction." October 1984; and
- applicable FDER monitoring well construction guidance.

TABLE 1
SUMMARY OF ESTIMATED QUANTITIES FOR
MONITORING WELL INSTALLATION
VERIFICATION PHASE NACIP CONFIRMATION STUDY
MAYPORT NAVAL AIR STATION

| SITE NO. | MONITORING WELL NO. | ESTIMATED DEPTH (FT)[1] | NUMBER OF ANALYTICAL SOIL SAMPLES | WELL MATERIALS 2" PVC SCREEN (FT) | WELL MATERIALS 2" PVC RISER (FT) |
|---|---|---|---|---|---|
| SITE 1 | MW-101 | 15 | 1 | 10 | 5 |
| | MW-102 | 15 | 1 | 10 | 5 |
| | MW-103 | 15 | 1 | 10 | 5 |
| | MW-104 | 15 | 1 | 10 | 5 |
| SITE 2, 4,5,6 | MW-201 | 45 | 1 | 10 | 35 |
| | MW-202 | 45 | 1 | 10 | 35 |
| | MW-203 | 15 | 1 | 10 | 5 |
| | MW-204 | 15 | 1 | 10 | 5 |
| | MW-205 | 15 | 1 | 10 | 5 |
| | MW-206 | 15 | 1 | 10 | 5 |
| | MW-207 | 45 | 1 | 10 | 35 |
| | MW-208 | 15 | 1 | 10 | 5 |
| | MW-209 | 15 | 1 | 10 | 5 |
| | MW-210 | 15 | 1 | 10 | 5 |
| | MW-211 | 45 | 1 | 10 | 35 |
| | MW-212 | 45 | 1 | 10 | 35 |
| | MW-213 | 15 | 1 | 10 | 5 |
| | MW-214 | 15 | 1 | 10 | 5 |
| | MW-215 | 15 | 1 | 10 | 5 |
| SITE 8 | MW-801 | 25 | 1 | 10 | 15 |
| | MW-802 | 25 | 1 | 10 | 15 |
| | MW-803 | 25 | 1 | 10 | 15 |
| SITE 9 | MW-901 | 20 | 1 | 10 | 10 |
| | MW-902 | 20 | 1 | 10 | 10 |
| | MW-903 | 20 | 1 | 10 | 10 |
| SITE 11 | MW-1101 | 20 | 1 | 10 | 10 |

TABLE 1 (Continued)

| SITE NO. | MONITORING WELL NO. | ESTIMATED DEPTH (FT)[1] | NUMBER OF ANALYTICAL SOIL SAMPLES | WELL MATERIALS 2" PVC SCREEN (FT) | WELL MATERIALS 2" PVC RISER (FT) |
|---|---|---|---|---|---|
| SITE 13 | MW-1301 | 15 | 1 | 10 | 5 |
| | MW-1302 | 15 | 1 | 10 | 5 |
| | MW-1303 | 15 | 1 | 10 | 5 |
| SITE 14 | MW-1401 | 15 | 1 | 10 | 5 |
| | MW-1402 | 15 | 1 | 10 | 5 |
| | TOTAL | 665 | 31 | 310 | 355 |

NOTE: [1] Estimated depths are from ground surface. Borings used as 45 feet deep are in the dredge spoil area.

Monitoring well installation details are presented in Figure 2. Well screens for shallow monitorign wells will be placed to extend from approximately 2 feet above the water table to approximately 8 feet in depth below the water table to allow for the estimated annual or diurnal fluctuations in the groundwater table surface. The monitoring wells will be developed by pumping and/or surge block techniques to insure a good hydraulic connection between the well and the aquifer.

### 2.1.3 Aquifer Testing

Subsequent to the completion of monitoring well installation and well development, aquifer testing will be conducted in monitoring wells using a rising head test method. This data will develop information on hydraulic conductivity of the aquifer tested. Water level observations surveyed to a known datum will provide hydraulic gradient and this information combined with the aquifer testing data will allow an assessment of groundwater flow direction and rate.

## 2.2 TASK 1 - EXPLORATION AND SAMPLING PROGRAM

The following sections describe the specific number, location and rationale for the exploration and sampling program to be conducted at each site at Mayport NAVSTA. Background information and history of operations for each site may be found in the IAS (NEESA Doc. 13-104), dated May 1986.

### 2.2.1 Site 1 - Landfill A

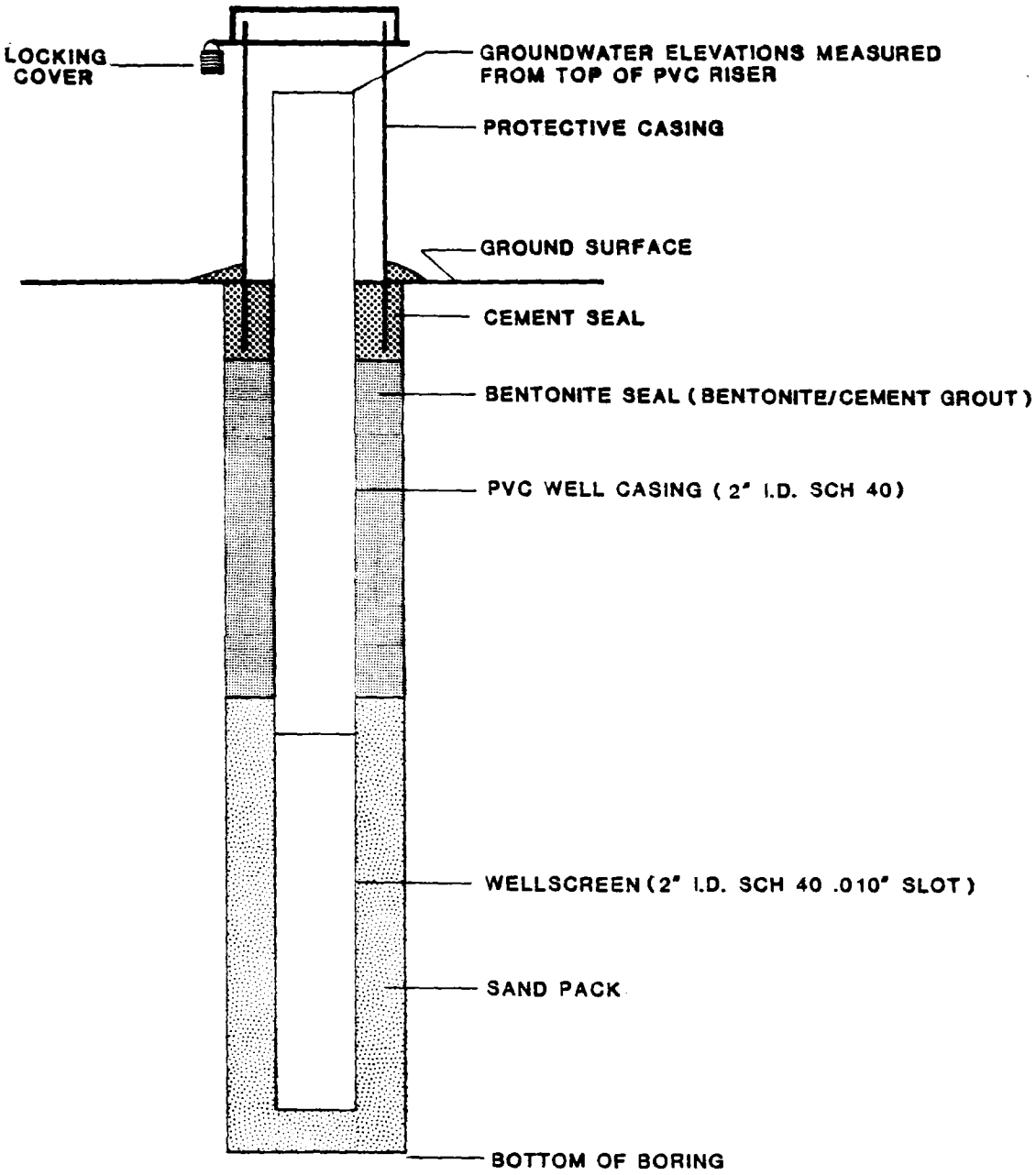
The exploration program at Site 1 will consist of four soil borings completed with monitoring well installation, four soil samples and four groundwater samples. The location of these explorations is presented in Figure 3 and the specific rationale for each boring/monitoring well location is presented below.

- MW-101 will be a shallow monitoring well located south of Site 1 and is anticipated to be upgradient of Site 1.

- MW-102 will be a shallow monitoring well located west of Site 1 and is anticipated to be downgradient of the landfill if the major component of groundwater flow is to the northwest towards the St. Johns River. Should groundwater flow direction be to the northeast, then this monitoring well location is anticipated to be upgradient of Site 1.

- MW-103 will be a shallow monitoring well located north of Site 1 and is anticipated to be downgradient of the landfill assuming groundwater flow direction is towards the St. Johns River.

- MW-104 will be a shallow monitoring well located east of Site 1 and is anticipated to be downgradient of the landfill if the groundwater flow direction is northeast to the St. Johns River. If groundwater flow direction is northwest towards the St. Johns River, however, then this monitoring well location is anticipated to be upgradient of Site 1.




NOT TO SCALE

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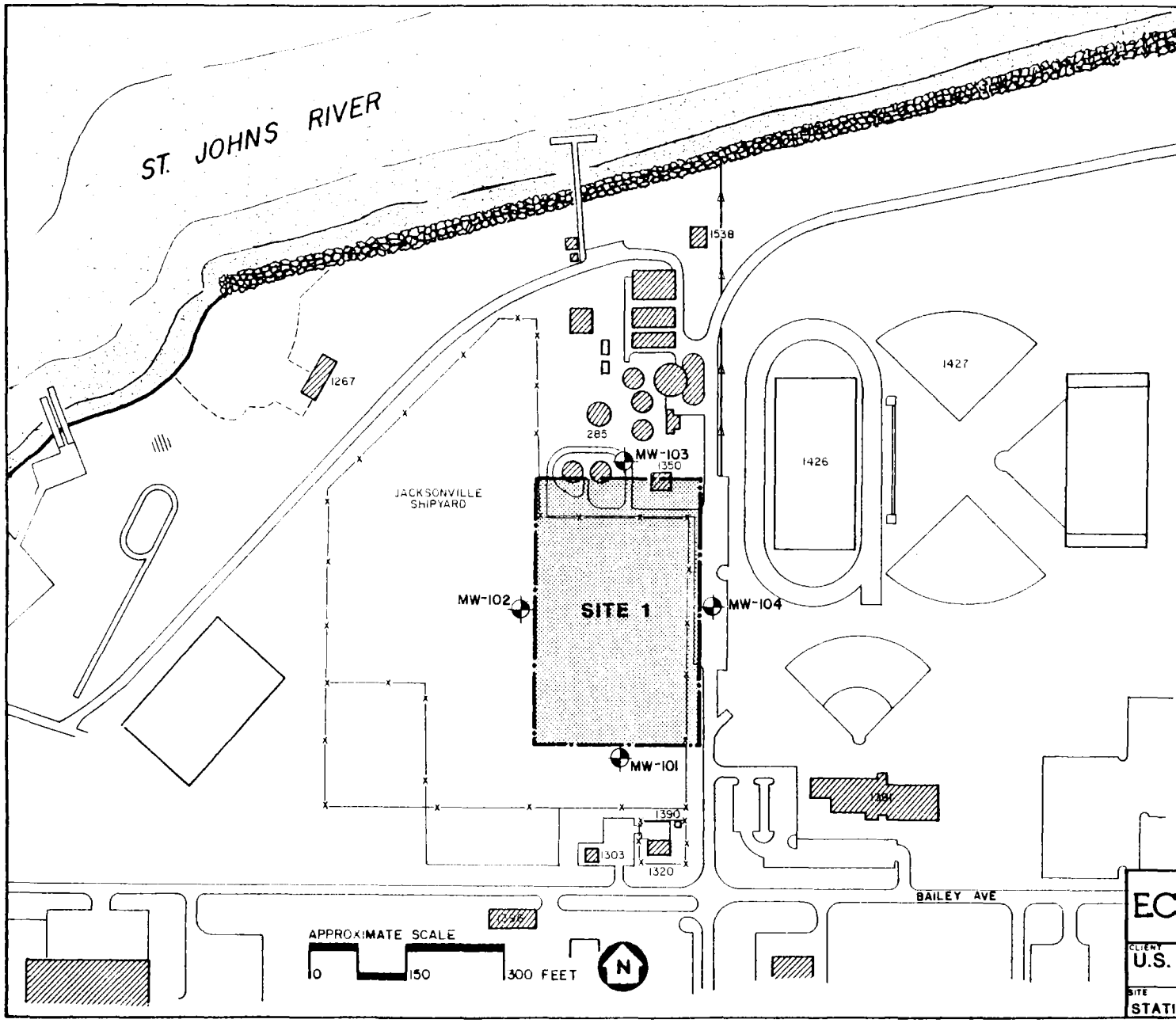
|---|---|
| E.C.JORDAN CO. CONSULTING ENGINEERS | TITLE: MONITORING WELL INSTALLATION DETAIL |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 2 |




## LEGEND

MW-101 — PROPOSED MONITORING WELL LOCATION (MW-101 THROUGH MW-104).

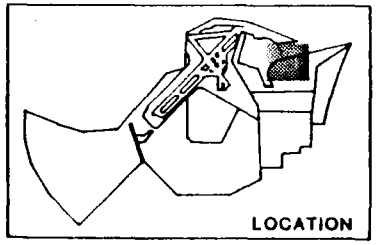
x—x—x — FENCE

SITE LOCATION AREA

STORM DRAINAGE DITCH INDICATING DIRECTION OF FLOW

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 1 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM PWD. DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'




E.C. JORDAN CO.
CONSULTING ENGINEERS

CLIENT: U.S. DEPARTMENT OF THE NAVY

SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA

TITLE: LOCATIONS OF EXPLORATIONS SITE 1

VERIFICATION PHASE NACIP CONFIRMATION STUDY

JOB NO 5097-00

FIGURE 3

One soil sample will be collected from each boring for laboratory chemical analysis. The samples will be collected from the unsaturated soils between the ground surface and the groundwater table in each boring. Subsequent to monitoring well installation, a groundwater sample will be collected from each of the four monitoring wells for laboratory chemical analysis. The specific methods and parameters of analyses to be performed on the soil and groundwater samples collected at this site are presented in Section 2.4.

Water level measurements observed in these well locations described above, coupled with aquifer testing will allow an assessment of groundwater flow rate and direction.

### 2.2.2 Sites 2, 4, 5 and 6 - Landfills B, D, E and F

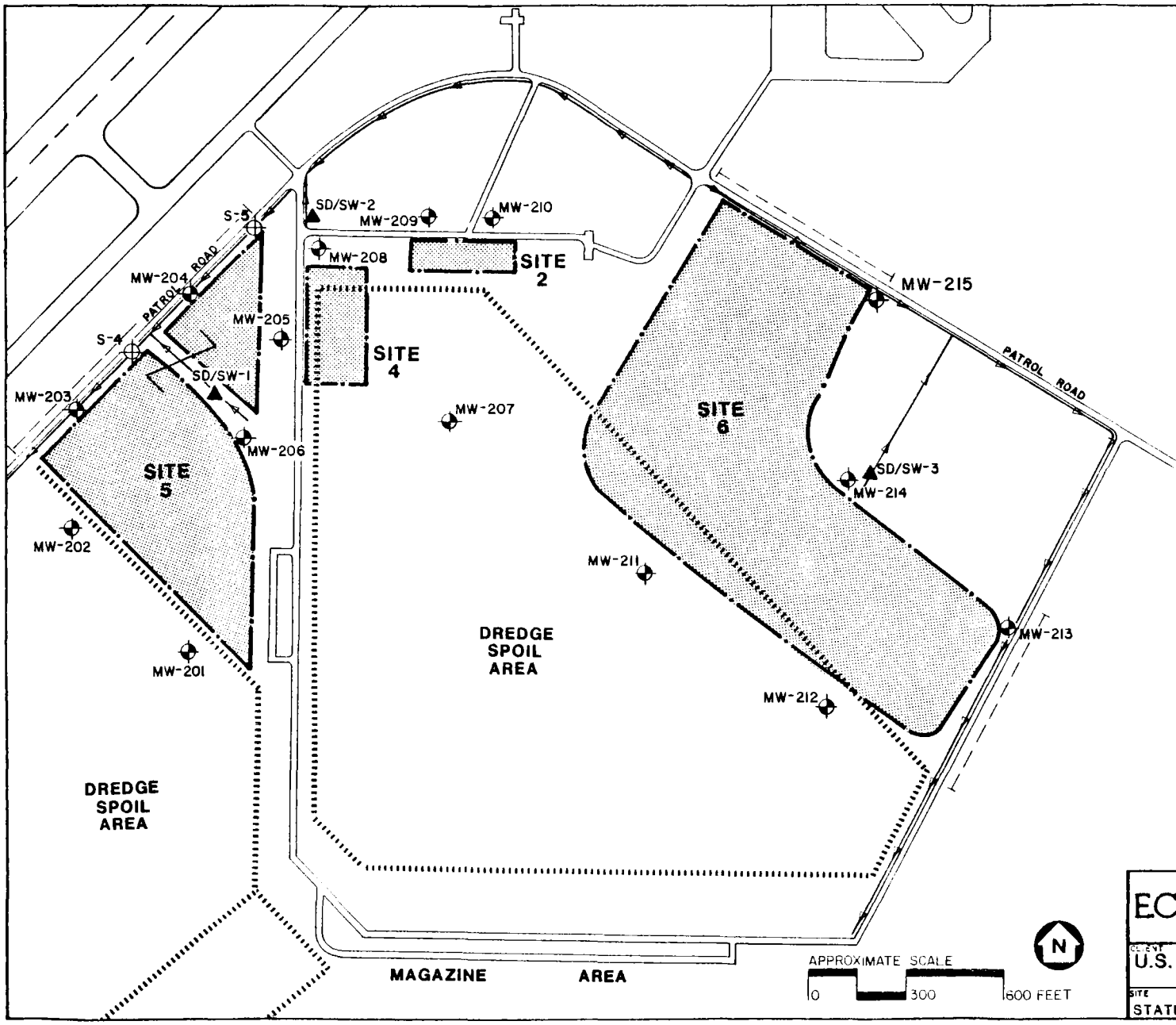
The exploration program at Sites 2, 4, 5 and 6 will consist of a geophysical survey, 15 shallow soil borings completed with monitoring well installation, 15 soil samples, 15 groundwater samples and 3 surface water/sediment samples.

The rationale for each of the above explorations is described in detail in the following sections.

Geophysical Survey - An electrical resistivity survey is recommended on the airfield side of the drainage ditch for Sites 5 and 6 to assess whether the shallow aquifer, which may contain leachate contamination from the landfills, is being intercepted by the drainage ditch located between the landfills and the airstrip. Electrical resistivity will detect a leachate plume in groundwater due to its high specific conductivity in comparison with background groundwater quality. If the drainage ditch is intercepting all of the leachate emanating from the landfills bordering along the drainage ditches, then no leachate plume will be detected by an electrical resistivity survey on the opposite side of the drainage ditches from the landfill. If the shallow aquifer, however, is not discharging to the drainage ditches then leachate plumes will be detected during the electrical resistivity survey.

Approximately 2,000 feet of electrical survey are recommended at Sites 5 and 6. The location of the survey lines is presented in Figure 4. Depending on the results of the geophysical survey these lines may be extended to complete mapping of the plume providing this additional exploration is possible within the budget. This survey will aid in final determination of soil boring/monitoring well installation locations for the Verification Phase investigation and subsequent Characterization Phase study, if necessary. This survey will be conducted by Jordan personnel using a Bison Instruments Earth Resistivity Meter, Model 2350B.

Soil Borings/Monitoring Well Installation - The exploration program at Sites 2, 4, 5 and 6 will consist of 15 shallow soil borings completed with monitoring well installations. The location of these boring/monitoring wells is presented in Figure 4 and the specific rationale for each location is presented below.

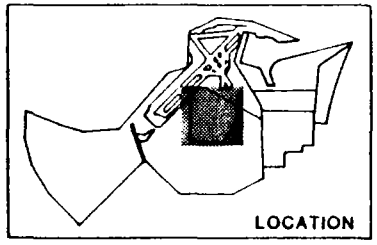



## LEGEND

| | |
|---|---|
| MW-201 | PROPOSED MONITORING WELL LOCATION (MW-201 THROUGH MW-215). |
| S-4 | EXISTING MONITORING WELL LOCATIONS. S-4 AND S-5 |
| SD/SW-1 | SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS. SD/SW-1 THROUGH SD/SW-3 |
| | STORM DRAINAGE DITCH INDICATING DIRECTION OF FLOW. |
| | BERMED SOIL 25' ABOVE GROUND SURFACE CONTAINING DREDGE SOIL. |
| | ELECTRICAL RESISTIVITY SURVEY LINE LOCATION. |
| | SITE LOCATION AREA |

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 2,4,5, & 6 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM P.W.D. DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'

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|---|---|
| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 2,4,5, & 6 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 4 |

- MW-201 will be a shallow monitoring well located south of Site 5 on the edge of the dredge spoil area and is anticipated to be upgradient of Site 5.

- MW-202 will be a shallow monitoring well located southwest of Site 5 on the edge of the dredge spoil area and is anticipated to be upgradient of Site 5.

- MW-203 will be a shallow monitoring well located northwest of the south cell of the landfill, between the landfill and the drainage ditch and is anticipated to be downgradient of the site and upgradient of the drainage ditch.

- MW-204 will be a shallow monitoring well located northwest of the north cell of the landfill between the landfill and the drainage ditch and is anticipated to be downgradient of the site and upgradient of the drainage ditch.

- MW-205 will be a shallow monitoring well located east of the north cell of the Site 5 landfill and is anticipated to be upgradient of Site 5 and downgradient of Site 4.

- MW-206 will be a shallow monitoring well located north of the south cell of Site 5 and is anticipated to be downgradient of Site 5 and upgradient of the drainage ditch which separates the south cell from the north cell of Site 5.

- MW-207 will be a shallow monitoring well located in the dredge spoil area northwest of Site 6 and southeast of Site 4. This location is anticipated to be upgradient of Sites 2, 4 and 6.

- MW-208 will be a shallow monitoring well located north of Site 4 and west of Site 2 and is anticipated to be downgradient of Site 4 and upgradient of the drainage ditch system.

- MW-209 will be a shallow monitoring well located north of Site 2 and is anticipated to be downgradient of Site 2 and upgradient of the drainage ditch system.

- MW-210 will be a shallow monitoring well located north of Site 2 and is anticipated to be downgradient of Site 2 and upgradient of the drainage ditch system.

- MW-211 will be a shallow monitoring well located southwest of Site 6 in the dredge spoil area and is anticipated to be upgradient of Site 6.

- MW-212 will be a shallow monitoring well located southwest of Site 6 in the dredge spoil area and is anticipated to be upgradient of Site 6.

- MW-213 will be a shallow monitoring well located east of Site 5 and is anticipated to be downgradient of Site 6 and upgradient of the drainage ditch.

- MW-214 will be a shallow monitoring well located northeast of Site 6 and is anticipated to be downgradient of Site 6 and upgradient of the drainage ditch system.

- MW-215 will be a shallow monitoring well located east of Site 6 and is anticipated to be downgradient of Site 6 and upgradient of the drainage ditch.

The current theory for groundwater flow direction at these sites is that the dredge spoil areas, because they capture and contain large amounts of precipitation, are acting as recharge areas to shallow groundwater. Groundwater flow direction in the shallow aquifer, then would be radially from these dredge spoil areas to the drainage ditch surrounding these sites. There is another potential theory for groundwater flow at these sites which is as follows. The dredge spoil areas may contain fine-grain sediments which may act as confining beds thereby preventing recharge to groundwater. Should this theory be the case, then shallow groundwater may flow south towards Sherman Creek. Monitoring wells MW-201, MW-202, MW-207, MW-211 and MW-212 are all background or upgradient monitoring wells if the current theory is correct. This may seem like a lot of background monitoring wells, however, if the second theory is correct then these five wells become the only downgradient monitoring wells. Jordan will phase the installation of these five wells and if the current theory is correct, eliminate monitoring wells MW-202 and MW-212.

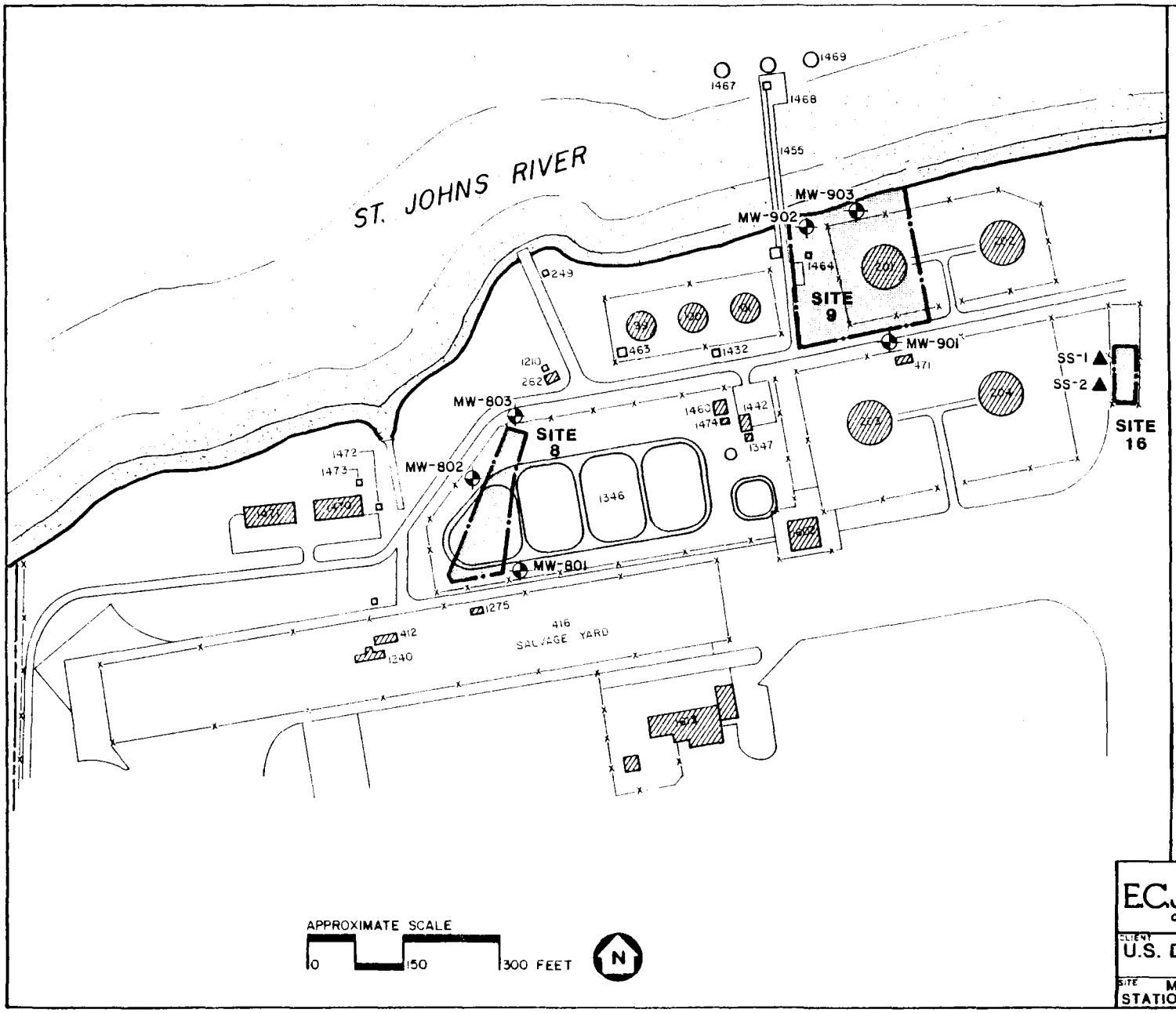
Water level readings observed in these well locations described above coupled with aquifer testing will allow an assessment of the groundwater flow rate and direction.

Soil, Groundwater, Surface Water and Sediment Sampling

The sampling program at Sites 2, 4, 5 and 6 will consist of 15 soil samples, 17 groundwater samples and 3 sediment and surface water samples. One soil sample will be collected from each boring for laboratory chemical analysis. The soil sample will be collected from the unsaturated soils between the ground surface and the groundwater table. Subsequent to monitoring well installation, a groundwater sample will be collected from each existing monitoring well and the two existing monitoring wells S-4 and S-5 and submitted for laboratory chemical analysis. The sediment and surface water sampling locations are presented on Figure 4. The purpose of these samples will be to assess the impact of these sites on the drainage ditches. The specific methods and parameters of analysis are discussed in Section 2.4.

### 2.2.3 Site 8 - Waste Oil Pit

The exploration program at Site 8 will consist of three soil borings completed with monitoring well installations, three soil samples and three groundwater samples. The location of these explorations is presented in Figure 5 and the

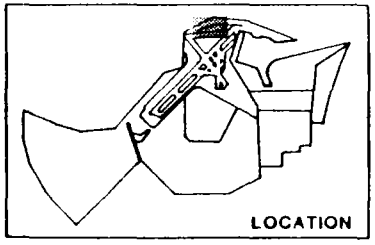



## LEGEND

| | |
|---|---|
| MW-801 | PROPOSED MONITORING WELL LOCATION (MW-801 THROUGH MW-803 AND MW-901 THROUGH MW-903) |
| SS-1 | PROPOSED SOIL SAMPLING LOCATION (SS-1 THROUGH SS-2) |
| | SITE LOCATION AREA |
| x——x——x | FENCE |

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 8, 9, & 16 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM PWD. DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'

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|---|---|
| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 8, 9, & 16 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 5 |

specific rationale for each boring/monitoring well location is presented below.

- MW-801 will be a shallow monitoring well located southeast of Site 8 and is anticipated to be upgradient of Site 8 and downgradient of the abandoned runway presently used by Defense Reutilization and Marketing Operation which was Site 10 as identified by the IAS Study.

- MW-802 will be a shallow monitoring well located northwest of Site 8 and is anticipated to be downgradient of Site 8 and upgradient of the St. Johns River.

- MW-803 will be a shallow monitoring well located north of Site 8 and is anticipated to be downgradient of Site 8 and upgradient of St. Johns River.

One soil sample will be collected from each boring for laboratory chemical analysis. The soil sample will be collected from the unsaturated soils between the ground surface and the groundwater table. Subsequent to monitoring well installation, a groundwater sample will be collected from each monitoring well and submitted for laboratory chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.

Water level readings observed in these well locations described above, coupled with aquifer testing will allow an assessment of the groundwater flow rate and direction.

### 2.2.4 Site 9 - Fuel Spill Area

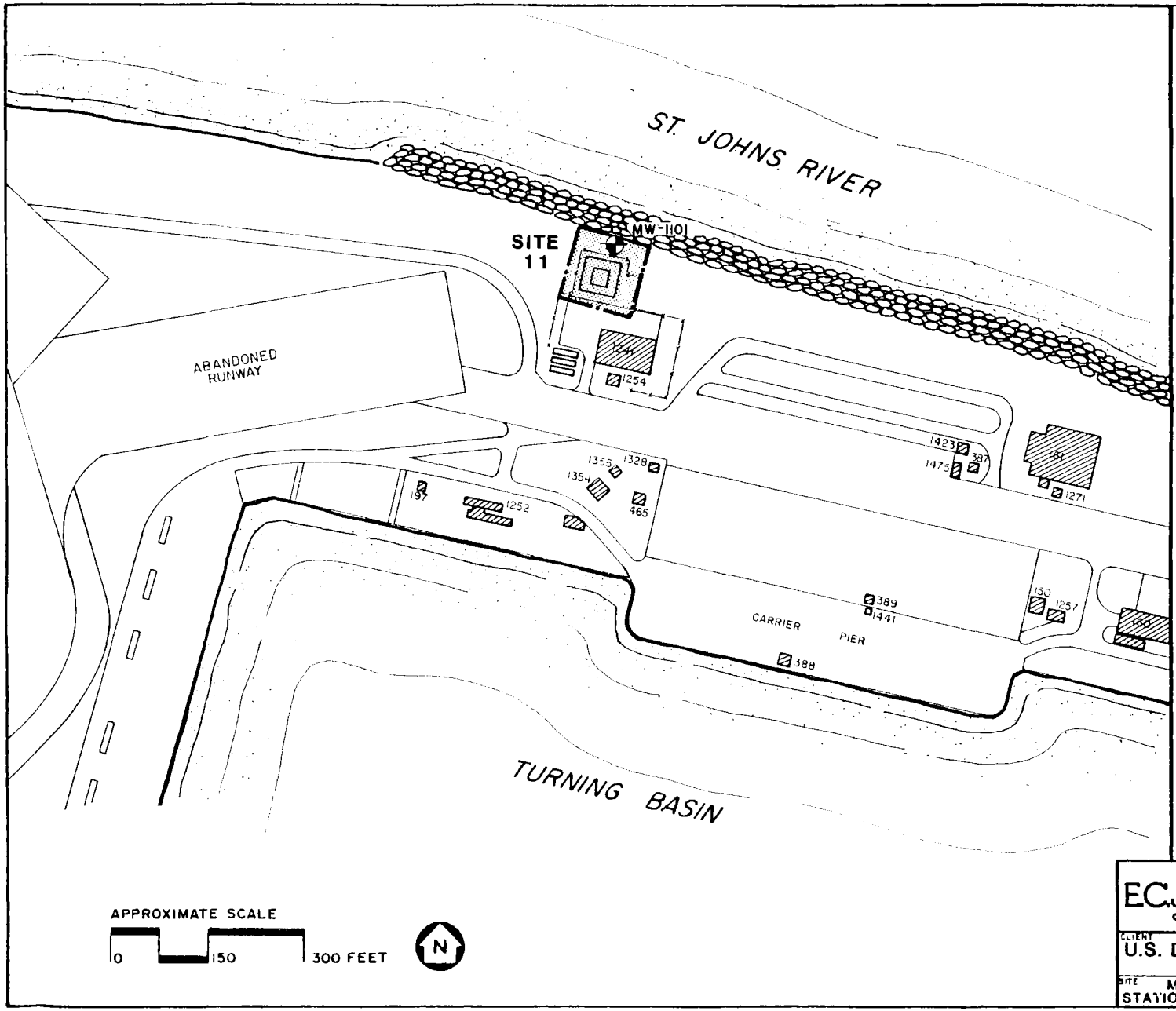
The exploration program for Site 9 will consist of three soil borings completed with monitoring well installations, three soil samples and three groundwater samples. The location of these explorations is presented in Figure 6 and the specific rationale for each boring/monitoring well location is presented below.

- MW-901 will be a shallow monitoring well located northeast of tank #203 and southwest of tank #201 and is anticipated to be upgradient of the suspected spill area and downgradient of tanks #202 and #204.

- MW-902 will be a shallow monitoring well located northwest of tank #201 and is anticipated to be downgradient of the fuel spill area and upgradient of the St. Johns River.

- MW-903 will be a shallow monitoring well located north of tank #201 and is anticipated to be downgradient of the fuel spill area and upgradient of the St. Johns River.

One soil sample will be collected from each boring in the unsaturated soils above the groundwater table and will be submitted for laboratory chemical analysis. Subsequent to monitoring well installation, a groundwater sample will be collected from each monitoring well and submitted for laboratory




## LEGEND

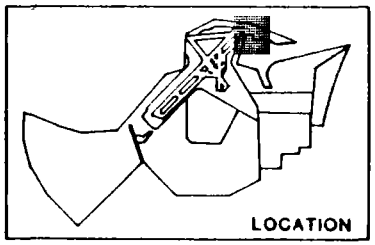
MW-1101 — PROPOSED MONITORING WELL LOCATION

SITE LOCATION AREA

x——x——x FENCE

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 11 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM RWD. DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'

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| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 11 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 6 |

chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.

Water level measurements observed in these well locations, coupled with aquifer testing will allow an assessment of groundwater flow rate and direction beneath the site.

### 2.2.5 Site 11 - Neutralization Basin

The exploration program for Site 11 will consist of one soil boring completed with a monitoring well installation, one soil sample and one groundwater sample. The location of these explorations is presented in Figure 6 and the specific rationale for the boring/monitoring well location is presented below.

- MW-1101 will be a shallow monitoring well located north of the Neutralization Basin and is anticipated to be downgradient of Site 11 and upgradient of the St. Johns River.

One soil sample will be collected from the soil boring in the unsaturated soils above the groundwater table and will be submitted for laboratory chemical analysis. Subsequent to monitoring well installation, a groundwater sample will be collected from the monitoring well and will be submitted for laboratory chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.

### 2.2.6 Site 13 - Old Fire Training Area

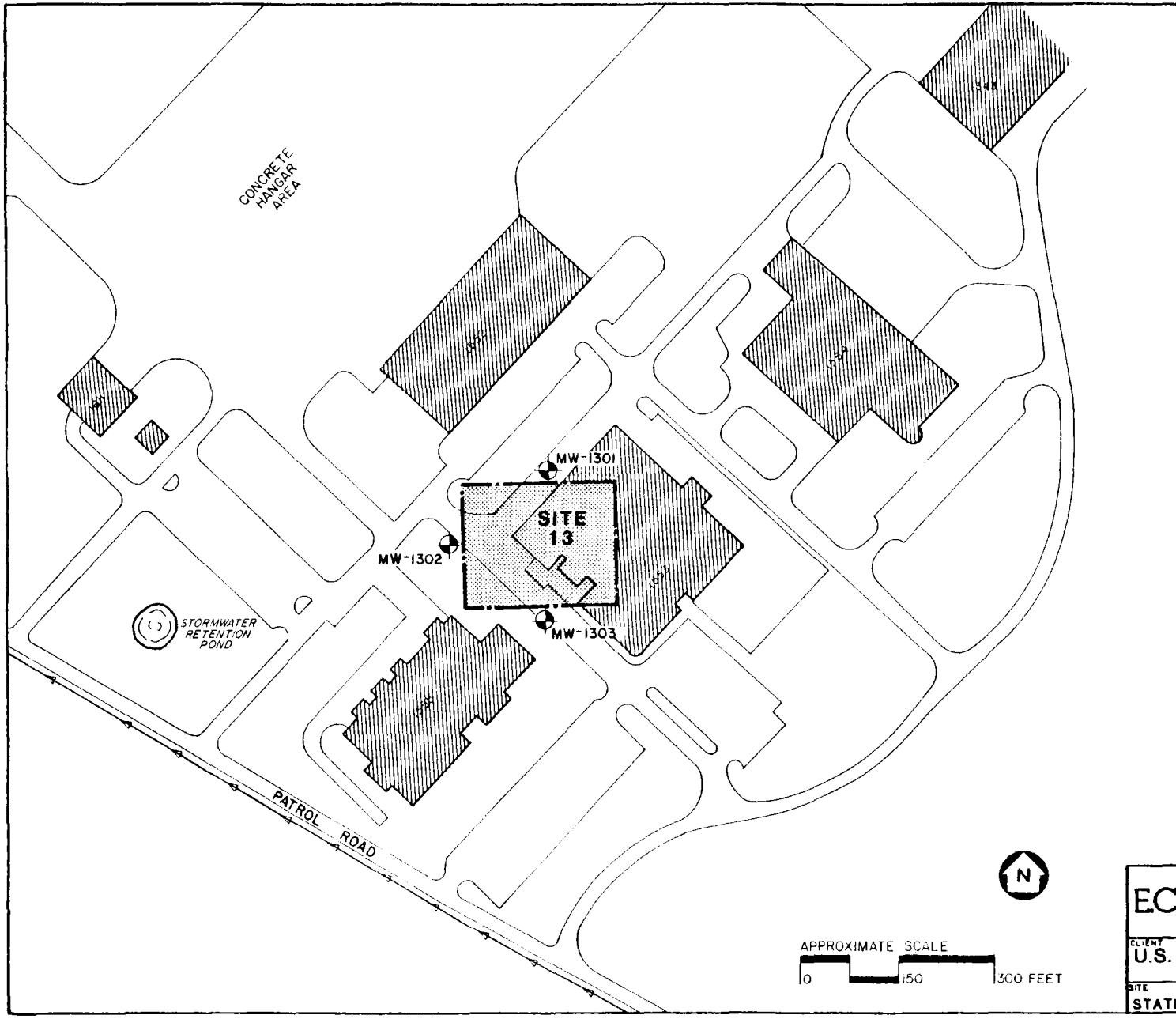
The exploration program at Site 13 will consist of three soil borings completed with monitoring well installations, three soil samples and three groundwater samples. The location of these explorations is presented on Figure 7 and the specific rationale for each boring/monitoring well location is presented below.

- MW-1301 will be a shallow monitoring well located north of Site 13 and is anticipated to be upgradient of Site 13.

- MW-1302 will be a shallow monitoring well located west of Site 13 and is anticipated to be downgradient of Site 13 and upgradient of the drainage ditch system and pond.

- MW-1303 will be a shallow monitoring well located south of Site 13 and is anticipated to be downgradient of Site 13 and upgradient of the drainage ditch system and ponds.

One soil sample will be collected from each soil boring in the unsaturated soils above the groundwater table and will be submitted for laboratory chemical analysis. Subsequent to monitoring well installation, a groundwater sample will be collected from each monitoring well and will be submitted for laboratory chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.




## LEGEND

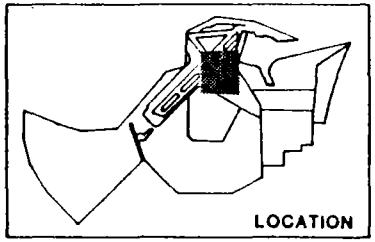
MW-1301 — PROPOSED MONITORING WELL LOCATION (MW-1301 THROUGH MW-1302).

SITE LOCATION AREA

STORM DRAINAGE DITCH INDICATING DIRECTION OF FLOW

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 13 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM PWD. DRAWING NO. 2117 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'

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|---|---|
| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 13 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 7 |

Water level readings observed in the monitoring wells coupled with aquifer testing will allow an assessment of the groundwater flow rate and direction beneath Site 13.

### 2.2.7 Site 14 - Mercury/Oily Waste Site

The exploration program at Site 14 will consist of two soil borings completed with monitoring well installations, two soil samples and two groundwater samples. The location of these explorations are presented in Figure 8 and the specific rationale for the boring/monitoring well locations are presented below.

- MW-1401 will be a shallow monitoring well located in the northeast corner of the site and is anticipated to be downgradient of the oil/water separator and upgradient of the storm drainage ditch and the St. Johns River.

- MW-1402 will be a shallow monitoring well located north of Site 14 and is anticipated to be downgradient of the fire training area and upgradient of the St. Johns River.

One soil sample will be collected from each soil boring in the unsaturated soils above the groundwater table and will be submitted for laboratory chemical analysis. Subsequent to monitoring well installation, a groundwater sample will be collected from each monitoring well and will be submitted for laboratory chemical analysis. The specific methods and parameters of analysis are discussed in Section 2.4.

### 2.2.8 Site 16 - Transformer Storage Yard

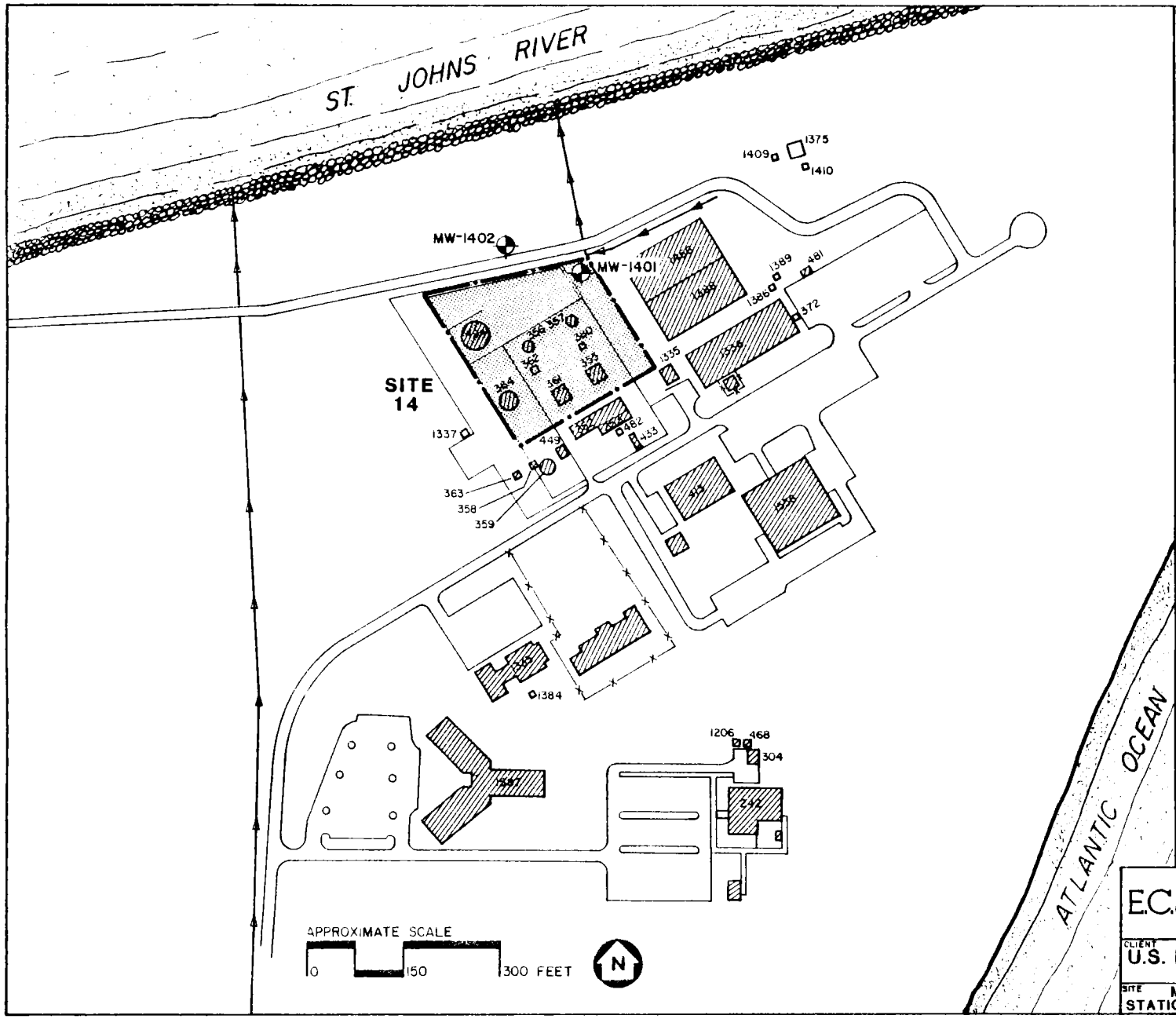
The exploration program at Site 16 will consist of two surface soil samples which will be collected immediately to the west of the runway in the direction of surface runoff of precipitation. The location of soil samples is presented in Figure 5. The soil samples will be submitted for laboratory chemical analysis. Specific methods and parameters of analysis are discussed in Section 2.4.

## 2.3 TASK 2 - SURVEY

The location of completed monitoring wells, soil sampling points and surface water/sediment sampling points will be identified on available topographic maps of the sites which are to be provided by the Navy. The elevation of the wells and surface water sampling points will be surveyed to the nearest 0.01 feet and referenced to NAVSTA datum. The elevational survey is necessary to develop a map of the piezometric map of the water surface and to determine groundwater flow direction.

## 2.4 TASK 3 - ANALYTICAL PROGRAM

Samples of soil, sediment, surface water and groundwater selected for analytical testing will be chemically analyzed to identify and quantify the chemical contaminants detected for each analytical method. A summary of the




## LEGEND

MW-1401 — PROPOSED MONITORING WELL LOCATION (MW-1401 THROUGH MW-1402).

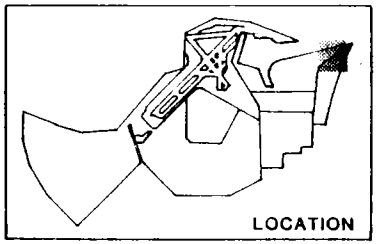
STORM DRAINAGE DITCH INDICATING DIRECTION OF FLOW.

x—x—x FENCE

SITE LOCATION AREA

NOTES:

1. THE LOCATIONS AND BOUNDARIES OF SITE 14 SHOWN ON THIS FIGURE ARE APPROXIMATE.
2. BASE MAP PREPARED FROM PWD. DRAWING NO. 217 TITLED "SITE PLAN U.S. NAVAL STATION MAYPORT, FLORIDA" COMPILED BY THE NAVAL FACILITIES ENGINEERING COMMAND, 22 MAY, 1979 AND REVISED 24 MARCH, 1980, SCALE 1"=500'

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| E.C. JORDAN CO. CONSULTING ENGINEERS | TITLE: LOCATIONS OF EXPLORATIONS SITE 14 |
| CLIENT: U.S. DEPARTMENT OF THE NAVY | VERIFICATION PHASE NACIP CONFIRMATION STUDY |
| SITE: MAYPORT NAVAL STATION MAYPORT, FLORIDA | JOB NO. 5097-00 FIGURE 8 |

analytical program for the Verification Phase Study is presented in Table 2. The analyses specified for each sample type were chosen based on the type of waste reported to have been disposed at each site according to the IAS Study.

In selecting methods of analyses for each site an attempt was made to develop a consistent parameter data base across all sites to aid in an overall evaluation of the NAVSTA. This methodology will provide sufficient data to assess any potential contaminant relationship between sites. Analysis for specific chemical parameters will identify the presence of the primary hazardous materials suspected to be present on-site. The specific methods of analyses to be used are presented in Table 3.

Analyses for metals in soils and sediment samples will be performed by EPTOX and by Atomic Adsorption (AA) in water. EPTOX is proposed due to the established regulatory criteria for the analytical results of this method of analysis. EPTOX analyses measures the concentration of metals which are leachable from the soil by infiltrating precipitation having a pH of 4.5. This analysis is used by regulatory agencies to assess whether or not soil, sludge, or other solid waste should be considered a hazardous material. Analyses for metals in surface water and groundwater will include chromium, cadmium, lead and mercury due to the suspected presence of paint sludges, plating wastes, mercury wastes, photo processing wastes, leaded fuels and battery acids, all of which may contain metal wastes. A background sample of surface water will be collected and analyzed.

Volatile organic priority pollutant analysis will identify the presence and concentration of contaminants which may have been present in solvents and fuels which were widely used at NAVSTA. Specific volatile organic priority pollutants suspected at NAVSTA include tetrachloroethylene (PCE), toluene and methylene chloride. These chemicals which are mobile in groundwater systems, were reportedly disposed of in large quantities at Mayport NAVSTA.

Analysis of PCB's and pesticides is included in EPTOX (Pest) and acid/base neutral extractables (Pest/PCB) and therefore will be analyzed at those sites where the IAS identified possible past disposal and/or storage of PCB contaminated transformer oils and pesticides or at sites where acid/base neutral compounds are suspected to be present. PCB will accumulate mainly on soil, so most PCB analyses will be performed on soil samples. However, water samples will also be tested because PCB's are soluble to a limited extent, and detection limits are much lower in the liquid phase.

The acid and base neutral priority pollutants comprise a broad range of hazardous organic compounds including phenolics, polyaromatics and phthalates. Review of available information suggest such compounds were disposed of to some extent at NAVSTA. To confirm the presence of these materials, acid and base neutral analyses will be conducted at the sites where wastes which may have contained these compounds are suspected to have been disposed.

TABLE 2
SUMMARY OF CHEMICAL ANALYSIS
VERIFICATION PHASE
NACIP CONFIRMATION STUDY
MAYPORT NAVY STATION

| SAMPLE SOURCE | MEDIA | LEAD | MERCURY | CADMIUM | CHROMIUM | VOA | EPTOX | SEMI-VOA PEST/PCB |
|---|---|---|---|---|---|---|---|---|
| SITE 1 | SOIL (BORING) | — | — | — | — | 4 | 4 | 4 |
| | GROUNDWATER | 4 | 4 | 4 | 4 | 4 | — | 4 |
| SITES 2,4,5 AND 6 | SOIL (BORING) | — | — | — | — | 15 | 15 | 15 |
| | GROUNDWATER | 17 | 17 | 17 | 17 | 17 | — | 17 |
| | SEDIMENT | — | — | — | — | 3 | 3 | 3 |
| | SURFACE WATER | 3 | 3 | 3 | 3 | 3 | — | 3 |
| SITE 8 | SOIL (BORING) | — | — | — | — | 3 | 3 | 3 |
| | GROUNDWATER | 3 | 3 | 3 | 3 | 3 | — | 3 |
| SITE 9 | SOIL (BORING) | — | — | — | — | 3 | 3 | 3 |
| | GROUNDWATER | 3 | 3 | 3 | 3 | 3 | — | 3 |
| SITE 11 | SOIL (BORING) | — | — | — | — | 1 | 1 | 1 |
| | GROUNDWATER | 1 | 1 | 1 | 1 | 1 | — | 1 |
| SITE 13 | SOIL (BORING) | — | — | — | — | 3 | 3 | 3 |
| | GROUNDWATER | 3 | 3 | 3 | 3 | 3 | — | 3 |
| SITE 14 | SOIL (BORING) | — | — | — | — | 2 | 2 | 2 |
| | GROUNDWATER | 2 | 2 | 2 | 2 | 2 | — | 2 |
| SITE 16 | SOIL (BORING) | — | — | — | — | 2 | 2 | 2 |
| SUBTOTAL | SOIL/SEDIMENT | — | — | — | — | 36 | 36 | 36 |
| | WATER | 36 | 36 | 36 | 36 | 36 | — | 36 |
| DUPLICATES | SOIL/SEDIMENT | | | — | — | 4 | 4 | 4 |
| | WATER | 4 | 4 | 4 | 4 | 4 | | 4 |
| SAMPLER BLANKS | WATER | 1 | 1 | 1 | 1 | 1 | — | 1 |
| BACKGROUND | SURFACE WATER | 1 | 1 | 1 | 1 | 1 | — | 1 |
| TRIP BLANKS | WATER | 1 | 1 | 1 | 1 | 4 | — | — |
| TOTAL | SOIL/SEDIMENT | — | — | — | — | 40 | 40 | 40 |
| | WATER | 43 | 43 | 43 | 43 | 46 | — | 42 |

TABLE 3
LABORATORY ANALYTICAL PROCEDURES
NACIP CONFIRMATION STUDY
VERIFICATION PHASE
MAYPORT NAVAL STATION

| Media | Parameter | Method | Reference |
|---|---|---|---|
| Soils | Volatile Organic Priority Pollutants | Purge and Trap/ GC/MS | EPA Method 624[1] |
| | Eptox (Elements and Pesticide) | AA/GC | SW-846[2] |
| | Semivolatile Organic Priority Pollutants (Including PCB's) | GC/MS | EPA Method 625 |
| Surface Water Groundwater | Volatile Organic Priority Pollutants | GC/MS | EPA Method 624 |
| | Semivolatile Organic Priority Pollutants (including PCB's/ Pesticide) | GC/MS | EPA Method 625 |
| | Cr, Hg, Pb, Cd | AA | EPA Methods 218.1, 245.1 239.1 |
| | pH | Potentiometric | EPA Method 150.1 |
| | Specific Conductance | Conductance | EPA Method 120.1 |

1 Includes the following sample preparation: One gram of sample is placed in a 40-ml vial filled with water and spiked with surrogates. The vial is agitated for at least 16 hours at 4°C and the water is analyzed by the specified method. This protocol is described in more detail in "Development of Analytical Test Procedures for the Measurement of Organic Priority Pollutants in Sludge and Sediments," Midwest Research Institute, Final Report - EPA Contract No. 68-03-695, June 26, 1979.

2 Extraction by EPA Method 1310.

## 2.5 TASK 4 - EVALUATION AND DRAFT REPORT

To meet the objective of the Verification Phase of the NACIP Confirmation Study, Jordan will review the data developed during this investigation and will make an assessment of the presence and concentration of hazardous chemicals in the environment at Mayport NAVSTA. Contaminants, if identified, will be compared to State and Federal regulatory criteria to assess whether the concentrations detected are considered hazardous and whether they pose a potential threat to human health, safety and the environment. Further, based on the results and conclusions drawn from the evaluation described above, Jordan will make one of the following recommendations for each of the sites studies:

- elimination from further study under the NACIP Confirmation Study;
- additional investigation activity under the Verification Phase; or
- proceed to Characterization Phase of study under the NACIP Confirmation Study.

## 2.6 TASK 5 - FINAL REPORT

Subsequent to the Navy's review of the Verification Phase draft report, a meeting will be held at Mayport Naval Station in Mayport, Florida, to discuss written comments provided by the Navy. The purpose of this meeting will be finalizing changes to the draft report. A final Verification Phase report will be completed by Jordan following this meeting.

## 2.7 TASK 6 - MEETINGS AND PRESENTATIONS

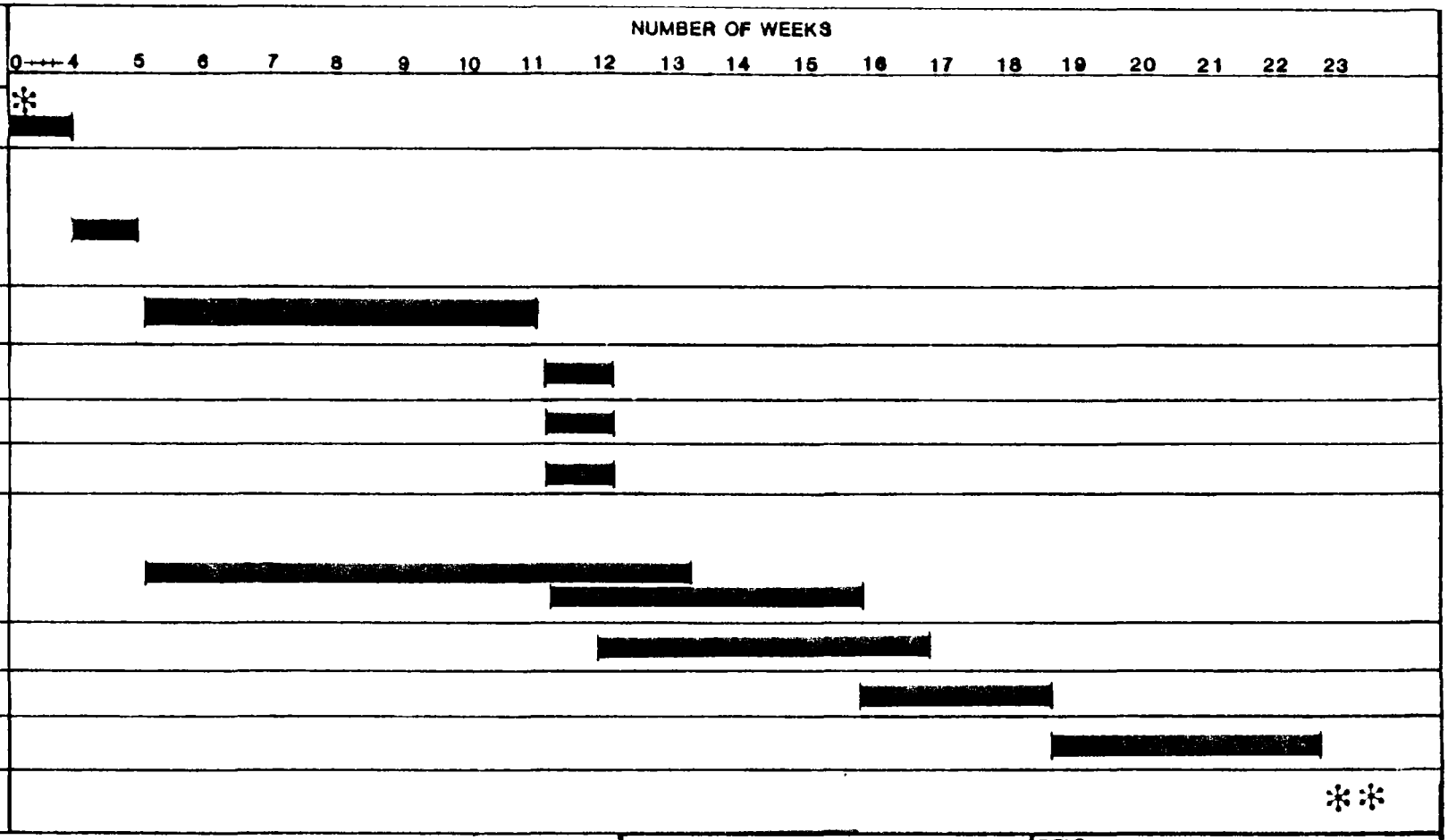
In addition to the meeting described above to discuss the Navy's comments to the Verification Phase draft report, two separate meetings will be held at Mayport NAVSTA at which a presentation of the draft final Verification Work Plan and the Verification Phase Report will be presented to the FDER and the USEPA.

Pursuant to discussions with Navy officials, and the Statement of Work dated September 9, 1986, no additional meetings other than those mentioned above will be required, therefore, none are included in the Scope of this Work Plan. Should such meetings be necessary, the Navy agrees to compensate Jordan for time and expenses to prepare for and attend such meetings in addition to the costs presented in this Work Plan.

## 3.0 SCHEDULE

The schedule for this work is presented in Figure 9 and is contingent with notification to proceed from the Navy. Notification to proceed should include a signed contract between Jordan and the Navy. The schedule illustrated in Figure 9 is approximate, assumes optimum field conditions and may be influenced by factors over which Jordan has no control. These factors would include the following:

- weather conditions during fieldwork;
- constraints on working hours due to NAVSTA security in restricted areas (Sites 2, 4, 5 and 6); and
- time necessary for review of draft documents by the Navy, NAVSTA and regulatory agencies.




NOTES:

✻ NOTIFICATION TO PROCEED

✻✻ DELIVERABLE DUE OUT

1. INCLUDES EQUIPMENT STAGING, DRILLING SUBCONTRACT NEGOTIATION, SECURITY ACCESS, AND MOBILIZATION.

E.C. JORDAN CO.
CONSULTING ENGINEERS

CLIENT
U.S. DEPARTMENT OF THE NAVY

SITE
MAYPORT NAVAL STATION MAYPORT, FLORIDA

TITLE
SCHEDULE OF WORK

VERIFICATION PHASE
NACIP
CONFIRMATION STUDY

JOB NO. 5097-00

FIGURE 9

## 4.0 COSTS

A summary of total costs associated with the Verification Phase Study described herein are presented in Table 4. A summary of direct labor costs and a summary of direct expenses are presented in Tables 5 and 6, respectively. A summary of analytical costs for the Verification Phase activities are presented in Table 7.

Although Jordan is currently going through the NACIP laboratory approval program, a determination is not expected until January or February of 1987. As a result, we propose and have obtained prices from Pioneer Laboratory, Inc. to perform the analytical program. Pioneer Laboratory is currently performing analtyical services in support of the NACIP program.

TABLE 4
SUMMARY OF TOTAL COSTS
VERIFICATION PHASE
NACIP CONFIRMATION STUDY
MAYPORT NAVAL STATION

| | | HOURS | ESTIMATED COST |
|---|---|---|---|
| A. | Direct Labor (Table 5) | | |
| | I | 152 | $ 3,925 |
| | II | 140 | $ 2,640 |
| | III | 855 | $ 12,338 |
| | IV | 770 | $ 7,869 |
| | Technical | 135 | $ 1,316 |
| | Clerical | 200 | $ 1,800 |
| | | 2,252 | $ 29,888 |
| B. | Labor Overhead<br>Total Direct Labor X .79 | | $ 23,612 |
| C. | Other Direct Costs (Table 6) | | $ 20,881 |
| D. | Drilling Sub-Contract (Table 6) | | $ 24,500 |
| E. | Laboratory Sub-Contract (Table 7) | | $ 60,016 |
| F. | Total Other Direct Costs<br>Sum of C. through G. | | $ 105,397 |
| G. | Total Direct Costs and Overhead<br>Sum of A., B. and F. | | $ 158,897 |
| H. | General and Administrative Expenses<br>(Total Direct Costs and Overhead<br>Multiplied by .20) | | $ 31,779 |
| I. | Total Estimated Cost<br>Sum of H. through I. | | $ 190,676 |
| J. | Fee<br>Total Estimated Cost X 10.0 % | | $ 19,068 |
| K. | Total Costs<br>Sum of I. and J. | | $ 209,744 |

TABLE 5
SUMMARY OF DIRECT LABOR
VERIFICATION PHASE
NACIP CONFIRMATION STUDY
MAYPORT NAVAL STATION

| LABOR TASK | LABOR MANHOURS I | II | III | IV | T[1] | C[2] | TOTAL HOURS | TOTAL HOURS |
|---|---|---|---|---|---|---|---|---|
| 1. EXPLORATION AND SAMPLING PROGRAM[3] | 40 | 60 | 390 | 355 | 15 | 40 | 900 | $11,926 |
| 2. SURVEY | -- | -- | 50 | -- | 50 | -- | 100 | $ 1,209 |
| 3. ANALYTICAL PROGRAM[4] | -- | -- | -- | -- | -- | -- | -- | -- |
| 4. EVALUATION AND DRAFT REPORT | 75 | 50 | 300 | 300 | 50 | 80 | 855 | $11,482 |
| 5. FINAL REPORT | 10 | 20 | 40 | 40 | 20 | 50 | 180 | $ 2,266 |
| 6. MEETING AND PRESENTATIONS | 27 | 10 | 75 | 75 | -- | 30 | 217 | $ 3,005 |
| TOTAL MANHOURS | 152 | 140 | 855 | 770 | 135 | 200 | 2,252 | |
| RATE (UNLOADED) | $25.82 | $18.86 | $14.43 | $10.22 | $9.75 | $9.00 | -- | |
| TOTAL COST | $3,925 | $2,640 | $12,338 | $7,869 | $1,316 | $1,800 | -- | $29,888 |

NOTES:

1 T denotes technical level personnel.
2 C denotes clerical personnel hours.
3 Exploration program labor costs include boring supervision, soil sampling, monitoring well installation and development, surface water sampling, groundwater sampling and aquifer testing.
4 Labor costs included in sampling costs.

TABLE 6
SUMMARY OF DIRECT EXPENSES
VERIFICATION PHASE
NACIP CONFIRMATION STUDY
MAYPORT NAVAL STATION

| | OTHER DIRECT COSTS | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| TASK | HEALTH & SAFETY | TRAVEL | PHONE | WORD PROCESSING | PRINTING & REPRO. | ANAL. BOTTLES | EQUIP. | SHIPPING | OTHER | TOTAL |
| 1. EXPLORATION PROGRAM SITES 1 AND 3 STEP 1B CHARACTERIZATION | $2140 | $ 8670 | $275 | $ 320 | $ 125 | $576 | $875 | $ 800 | $500 | $14281 |
| 2. SURVEY | $ 300 | $ 900 | $ 20 | -- | -- | -- | $ 50 | -- | -- | $ 1270 |
| 3. ANALYTICAL PROGRAM | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4. EVALUATION AND DRAFT REPORT | -- | -- | $425 | $1920 | $ 700 | -- | -- | $ 240 | $100 | $ 3385 |
| 5. FINAL REPORT | -- | -- | $ 25 | $ 320 | $ 300 | -- | -- | $ 100 | -- | $ 745 |
| 6. MEETING AND PRESENTATIONS | -- | $ 900 | $100 | $ 50 | $ 100 | -- | -- | $ 50 | -- | $ 1200 |
| TOTAL COST[1] | $2440 | $10470 | $845 | $2610 | $1225 | $576 | $925 | $1190 | $600 | $20881 |

NOTES

1 Costs do not include profit

TABLE 7
SUMMARY OF ANALYTICAL COSTS
SITES 1, 2, 4, 5, 6, 8, 9, 11, 13, 14 AND 16
VERIFICATION PHASE STUDY
NACIP CONFIRMATION STUDY
MAYPORT NAVAL STATION

| Site | Analysis | Medium | Number of Samples | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 1 | Eptox Elem/Pest | Soil | 4 | $150 | $ 600 |
| | Metals[1] | Water | 4 | $ 52 | $ 208 |
| | VOA | Soil | 4 | $200 | $ 800 |
| | | Water | 4 | $180 | $ 720 |
| | SVOA Pest/PCB | Soil | 4 | $440 | $ 1,760 |
| | | Water | 4 | $400 | $ 1,600 |
| | | | | | $ 5,688 |
| 2,4, 5,6 | Eptox Elem/Pest | Soil | 18 | $250 | $ 4,500 |
| | Metals | Water | 20 | $ 52 | $ 1,040 |
| | VOA | Soil | 18 | $200 | $ 3,600 |
| | | Water | 20 | $180 | $ 3,600 |
| | SVOA Pest/PCB | Soil | 18 | $440 | $ 7,920 |
| | | Water | 20 | $400 | $ 8,000 |
| | | | | | $28,660 |
| 8 | Eptox Elem/Pest | Soil | 3 | $150 | $ 450 |
| | Metals | Water | 3 | $ 52 | $ 156 |
| | VOA | Soil | 3 | $200 | $ 600 |
| | | Water | 3 | $180 | $ 540 |
| | SVOA Pest/PCB | Soil | 3 | $440 | $ 1,320 |
| | | Water | 3 | $400 | $ 1,200 |
| | | | | | $ 4,266 |
| 9 | Eptox Elem/Pest | Soil | 3 | $150 | $ 450 |
| | Metals | Water | 3 | $ 52 | $ 156 |
| | VOA | Soil | 3 | $200 | $ 600 |
| | | Water | 3 | $180 | $ 540 |
| | SVOA Pest/PCB | Soil | 3 | $440 | $ 1,320 |
| | | Water | 3 | $400 | $ 1,200 |
| | | | | | $ 4,266 |
| 11 | Eptox Elem/Pest | Soil | 1 | $150 | $ 150 |
| | Metals | Water | 1 | $ 52 | $ 52 |
| | VOA | Soil | 1 | $200 | $ 200 |
| | | Water | 1 | $180 | $ 180 |
| | SVOA Pest/PCB | Soil | 1 | $440 | $ 440 |
| | | Water | 1 | $400 | $ 400 |
| | | | | | $ 1,422 |

TABLE 7 (Continued)
SUMMARY OF ANALYTICAL COSTS

| Site | Analysis | Medium | Number of Samples | Unit Cost | Total Cost |
|---|---|---|---|---|---|
| 13 | Eptox Elem/Pest | Soil | 3 | $150 | $ 450 |
| | Metals | Water | 3 | $ 52 | $ 156 |
| | VOA | Soil | 3 | $200 | $ 600 |
| | | Water | 3 | $180 | $ 540 |
| | SVOA Pest/PCB | Soil | 3 | $440 | $ 1,320 |
| | | Water | 3 | $400 | $ 1,200 |
| | | | | | $ 4,266 |
| 14 | Eptox Elem/Pest | Soil | 2 | $150 | $ 300 |
| | Metals | Water | 2 | $ 52 | $ 104 |
| | VOA | Soil | 2 | $200 | $ 400 |
| | | Water | 2 | $180 | $ 360 |
| | SVOA PCB | Soil | 2 | $440 | $ 880 |
| | | Water | 2 | $400 | $ 800 |
| | | | | | $ 2,844 |
| 16 | SVOA Pest/PCB | Soil | 2 | $440 | $ 880 |
| | | | | | $ 880 |
| DUP | Eptox Elem/Pest | Soil | 4 | $150 | $ 600 |
| BLANKS | Metals | Water | 7 | $ 52 | $ 364 |
| AND | VOA | Soil | 4 | $200 | $ 800 |
| BACK- | | Water | 10 | $180 | $ 1,800 |
| GROUND | SVOA Pest/PCB | Soil | 4 | $440 | $ 1,760 |
| | | Water | 6 | $400 | $ 2,400 |
| | | | | | $ 7,724 |

1 Lead, chromium, cadmium, and mercury