PHASE II/IV A
DRAFT WORK PLAN
PART A: TECHNICAL APPROACH

INSTALLATION RESTORATION PROGRAM

SUFFOLK COUNTY AIRPORT

FIRE TRAINING AREA
WESTHAMPTON BEACH, NEW YORK

OCTOBER 1986

356560

WORK PLAN
PHASE II/IV A
SITE CHARACTERIZATION/REMEDIAL ACTION PLAN/
DESIGNS AND SPECIFICATIONS

INSTALLATION RESTORATION PROGRAM FOR
FIRE TRAINING AREA AT
SUFFOLK COUNTY AIRPORT
WESTHAMPTON BEACH, NEW YORK

PART A: TECHNICAL APPROACH

OCTOBER 1986

SUBMITTED TO

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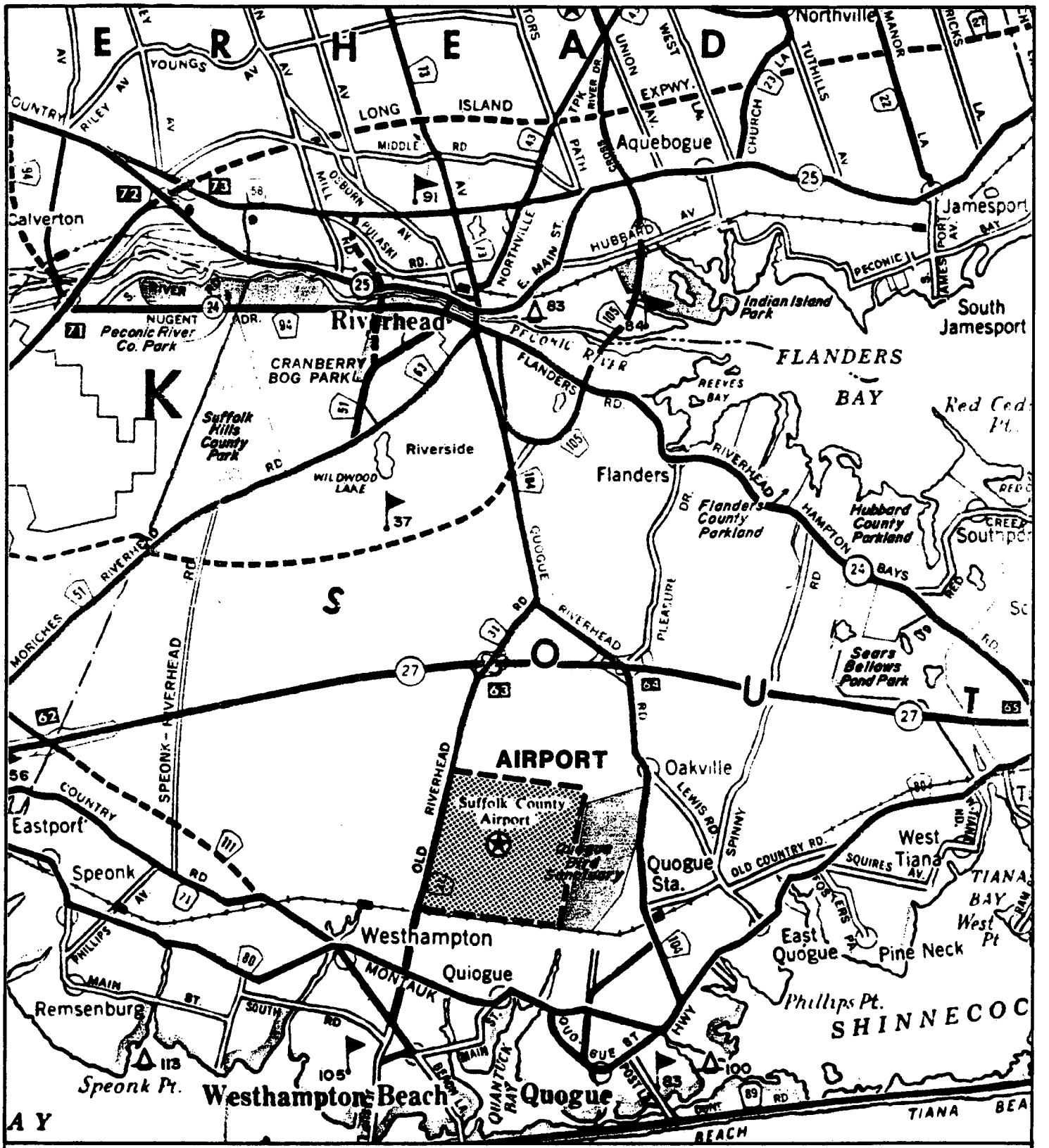
1.0 INTRODUCTION/OVERVIEW

The Department of Defense (DOD) has initiated a remedial investigation/feasibility study at the Suffolk County Airport Fire Training Area (FTA) on Long Island, New York in the Town of Westhampton Beach to identify and evaluate potential problems associated with the use of flammable materials at the FTA. The Suffolk County Airport was originally operated as the Suffolk County Air Force Base from 1943 until 1970 when the Base was retired and property and facilities were turned over to Suffolk County, New York. The County has leased portions of the Airport Facilities to public and private tenants. The New York Air National Guard (NYANG) is included among a number of lessors of property and facilities at the airport and has shared the use of the FTA with the Suffolk County Airport and local Fire Departments (with the assistance of the Air National Guard) from 1970 through August 1986. The FTA was used by the Air Force from about 1943 to 1970. The location of the Airport is shown on Figure 1-1 and the location of the FTA at the airport is shown on Figure 1-2. Preliminary investigations consisting of the installation and sampling of monitoring wells have indicated the presence of volatile organics at low concentrations in groundwater at the FTA. The distribution of the contamination was not defined and no formal complete report of these investigations exists. As a result of these findings, the Air National Guard Support Center (ANGSC) has determined that a Remedial Action Plan (RAP) shall be developed for the subject site characterization results.

As a subcontractor to Oak Ridge National Laboratory (ORNL), and based on information provided in a Statement of Work (SOW) dated June 30, 1986 (as ammended on August 5, 1986 and August 8, 1986), E.C. Jordan Co. (Jordan) prepared a technical proposal in response to the SOW. Jordan subsequently received written authorization from ORNL to commence preparation of a work plan for the project. Jordan also received authorization to perform file searches, a site reconnaissance and an inventory, based on existing information, of nearby monitoring and water supply wells which might be potentially impacted by the site. Jordan has modified the original technical response in accord with the additional information as well as applying recent findings regarding field investigative techniques used at sites having similar site settings and problems. The resultant program is presented in this work plan. The background information gathered (Task 2A.1 of this work plan) is summarized in Appendix A and a partial well survey (Task 2A.2 of the work plan) is presented in Appendix B.

The available information (see Appendix A) indicates that over the years of operation of the base/airport, fire training activities were conducted at or nearby the present location of the FTA. Flammable liquid waste materials were collected from various base related activities and used as fuel for the fire training exercises. These exercises at the FTA resulted in the introduction of fuels, oils and greases and possibly some solvents to the ground at the FTA. The potential existed for the migration of these liquids toward the groundwater beneath the FTA. In more recent years, the facilities and procedures at the FTA have been improved to reduce greatly the potential for spills and the related potential for groundwater contamination. The distribution and identity of contaminants at the site and in groundwater are unknown although some recent (1982) but limited analytical data exist to indicate low concentrations principally of chlorinated hydrocarbons (solvents) in the shallow groundwater.



SOURCE: HAGSTROM ROAD MAP

SCALE

0 0.5 1 2 MILES

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FIGURE 1-1
LOCATION OF AIRPORT
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

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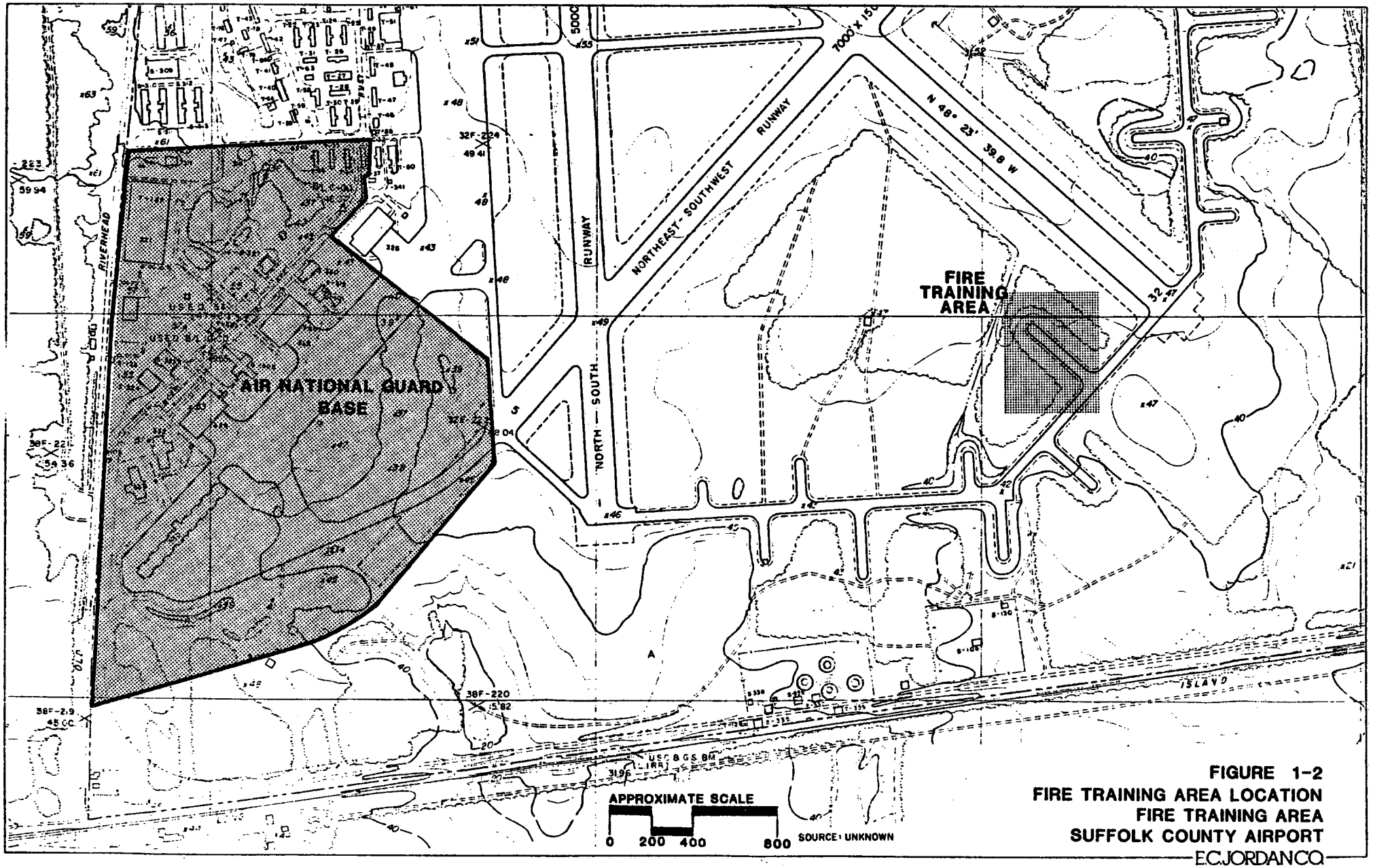

FIGURE 1-2
FIRE TRAINING AREA LOCATION
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

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Jordan's approach to the assessment of contamination at the site will be focused on the soil and groundwater. The exploration program is designed to be flexible enough to provide a stepped approach to installations. Data acquired at one location will be used to help plan subsequent exploration locations. This type of stepped approach provides an efficient use of resources dedicated to a project of this kind. Jordan's program of exploration is based on the following historical information, assessments of available data and observations of site conditions:

1. use of the FTA has led to the introduction of contaminants to the ground in five principal areas of the FTA;

2. regional and near site geology as well as environmental setting has been researched and presented in detail in a report by Dames and Moore;

3. groundwater flow direction beneath the FTA (based on Jordan measurements of water table surface elevations) is south-southeast;

4. groundwater seepage velocity may range from 30 to 150 feet per year;

5. concentrations of halogenated volatile organic analytes (VOA) in shallow groundwater appear to be low (i.e., less than 10 parts per billion (ppb) except in two wells (200 ppb in well 12 and 760 ppb in well 14) very near the FTA);

6. no significant air emissions of volatile organic compounds from the areas of stained soil in the FTA or from existing monitoring wells (which are screened near the water table surface) were detected by a photoionization (PI) meter during Jordan's site visit on September 17-18, 1986;

7. existing monitoring wells at the FTA are inadequate (for reasons of construction or lack of security) to serve as monitoring wells for this project or as locations for tests of hydraulic conductivity. They may be used to provide additional water level data, however.

Based on these assessments, the program as presented in this work plan modifies the technical approach originally presented in response to the SOW. The main modifications and the rationale for the changes follow:

1. A separate soil vapor analysis program is not proposed for this site. However, a photoionization (PI) meter screening of proposed hand auger and shallow boring location samples will be performed. A program of soil gas testing recently conducted in a similar geologic setting was deemed inconclusive. Other recent attempts at soil vapor analysis have likewise been inconclusive in establishing direct relationships between soil gas and contamination in water at the concentrations of concern. Only where gross contamination is present in soils or at the water table does the method appear effective. The method is not considered likely to generate significant cost savings in the present exploration program.

2. Soil sampling for chemical analysis will be confined to the unsaturated zone. The soil samples will be collected mainly by means of hand augers to a maximum depth of 4 feet. This appears to be sufficient in settings like the FTA to determine vertical distribution of most contaminants as migration potentials for the waste materials which may have been used at the FTA are either high or low.

In the most contaminated areas, several borings to the water table will be made to obtain additional soil samples to define vertical profiles of contaminants in the deeper soils, if present.

3. Soil samples in the saturated zone will not be taken for chemical analysis. It is most probable that contaminants below the water table would be present either dissolved in groundwater or as free product within the soil matrix. Contamination identified by visual observation and PI meter field screenings or reference soil samples and the results of groundwater sample analyses will be recorded.

4. Only limited split spoon samples will be taken with depth in the borings for wells. The first well, the downgradient deep well, will be sampled closely to confirm the interpretation of local geology and reveal the possible presence of lenses or interbedding with soils of lower permeability. Observations noted in the logging of the first deep borehole will be used as the basis for the need for detailed split spoon sampling in other boreholes. Two deep holes will be sampled to determine the depth to an underlying clay stratum and to obtain samples of the clay and aquifer materials for grain size analysis and estimates of hydraulic conductivity. The maximum depth of any boring will be 150 feet.

   The geology is believed to be simple enough, based on background information, such that downhole logging geophysical techniques, such as gamma logging, would not add appreciable further definition to the understanding of the site geology. Hence no geophysical methods are included for this site investigation.

5. Two rounds of groundwater sampling and analysis will be conducted to enhance data repeatability and accuracy. Initial groundwater sample results often show the effects of well installation and yield misleading data.

6. The analytical program has been reduced relative to the number of samples obtained for chemical analysis, principally for the soil samples.

7. Air monitoring will be limited to that necessary for safety monitoring and will be done using a PI meter. Risk assessments are likely to be conducted on the basis of residual contaminants in the soil rather than on any brief program of air sampling. Volatiles are not believed to be a problem, nor do the soils present appear to be conducive to dusting (leading to contaminant transport by particulates). Hence, no formal air sampling or analysis is proposed.

Section 2 of this work plan presents the technical program from the initial activities, prior to field explorations, to the production of the Remedial Action Plan (RAP).

Section 3 of the work plan presents the project management structure and identifies the Jordan personnel responsible for the conduct of the various elements of the program.

Section 4 presents the detailed schedule for the completion of the project. The project is estimated to take approximately 63 weeks for completion. Estimates have been made for review periods for deliverables and for laboratory turnaround time. However, if there are delays in these items, the schedule may not be met. Since part

of the field work will be done during the winter, weather may also adversely affect the anticipated schedule.

Also appended to the work plan are the site specific project Health and Safety Plan (HASP) and the Quality Assurance Project Plan (QAPP) as Appendices C and D, respectively. The overall HASP and QAPP for the IRP project have already been prepared and are included herein by reference only. Copies of these plans are available at Oak Ridge National Laboratory (ORNL) and the Air National Guard Support Center (ANGSC).

2.0 TECHNICAL APPROACH

2.1 INTRODUCTION

It was determined that a more complete and effective plan of work for site characterization of the FTA could be provided if the background review and well inventory could be accomplished concurrently with the formulation of the work plan itself. It was for this purpose that ORNL's authorization for the preparation of this work plan included the conduct of a background review (Subtask 2A.1 of the SOW) and the well survey (Subtask 2A.2 of the SOW) using existing file information.

The background review, summarized in Appendix A, was conducted as a site reconnaissance and file search. Air Force, Air National Guard, Suffolk County, United States Geologic Survey (USGS) and the Air Force Phase I were contacted. Subcontractor and personnel interviews were conducted to gain access to information relevant to the project. This review yielded information relative to the history and use of the FTA, the geology and hydrogeology of the region and site, and documentation of prior initial explorations of the site.

The well inventory was a special subset of the background review. Information was gained relative to monitoring wells in the immediate vicinity of the FTA and descriptions of the nearest municipal water supply wells. Information was obtained identifying the nearest domestic wells which lie downgradient of the FTA. Further review of these wells will be completed during the period of the site field investigative activities.

The information gathered has enabled Jordan to gain a clearer understanding of the site upon which to base a program of investigation. During the early history of the site, during and shortly after World War II, the base was operated by the Air Force until 1969. It was the practice then to burn all types of combustible waste liquids during fire training exercises in an unconfined area next to the present site. After the transition from the Air Force to the County (1970), control of the FTA was assumed by Suffolk County. During both periods, unknown fuels, oils and solvents may have been introduced into the ground. Later, as awareness of environmental concerns increased, FTA practices were improved with the construction of a containment area, installation of a surplus fuel storage tank, burns to completion and the use of only jet fuel (JP-4) as a fuel for exercises. Thus, over the years, the potential for introduction of contaminants into the ground has decreased greatly. For purposes of the investigation, however, past practices have indicated the potential for contaminants to have been introduced into the ground in five principal areas of the FTA as discussed in Appendix A. These areas are shown in Figure 2-1.

Information gathered relative to the geology and hydrogeology reveal a stratum of highly permeable glacial deposits about 140 feet thick overlying a relatively impervious stratum called the Gardiner's Clay. Regional geologic mapping suggests this clay stratum is about 30 feet thick in the vicinity of the FTA and probably acts as an effective aquitard to inhibit migration of groundwater from the glacial deposits above to the underlying Magothy Formation. Measurements made by Jordan of the water levels in the existing monitoring wells at the FTA indicate a south-southeasterly direction of groundwater flow in the glacial deposits (see Figure 2-2). This interpretation is supported by more regional determinations of groundwater flow as

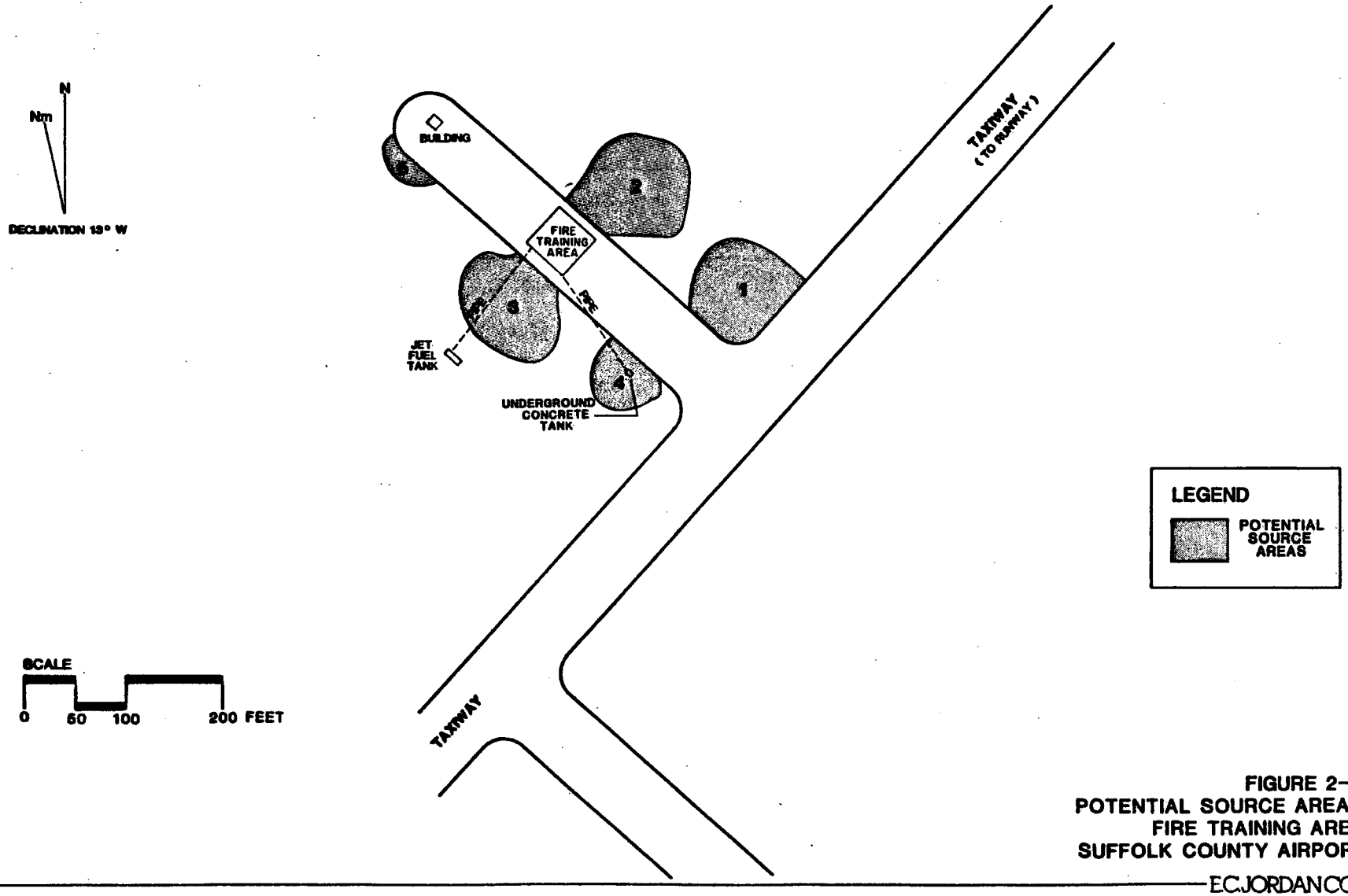

FIGURE 2-1
POTENTIAL SOURCE AREAS
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

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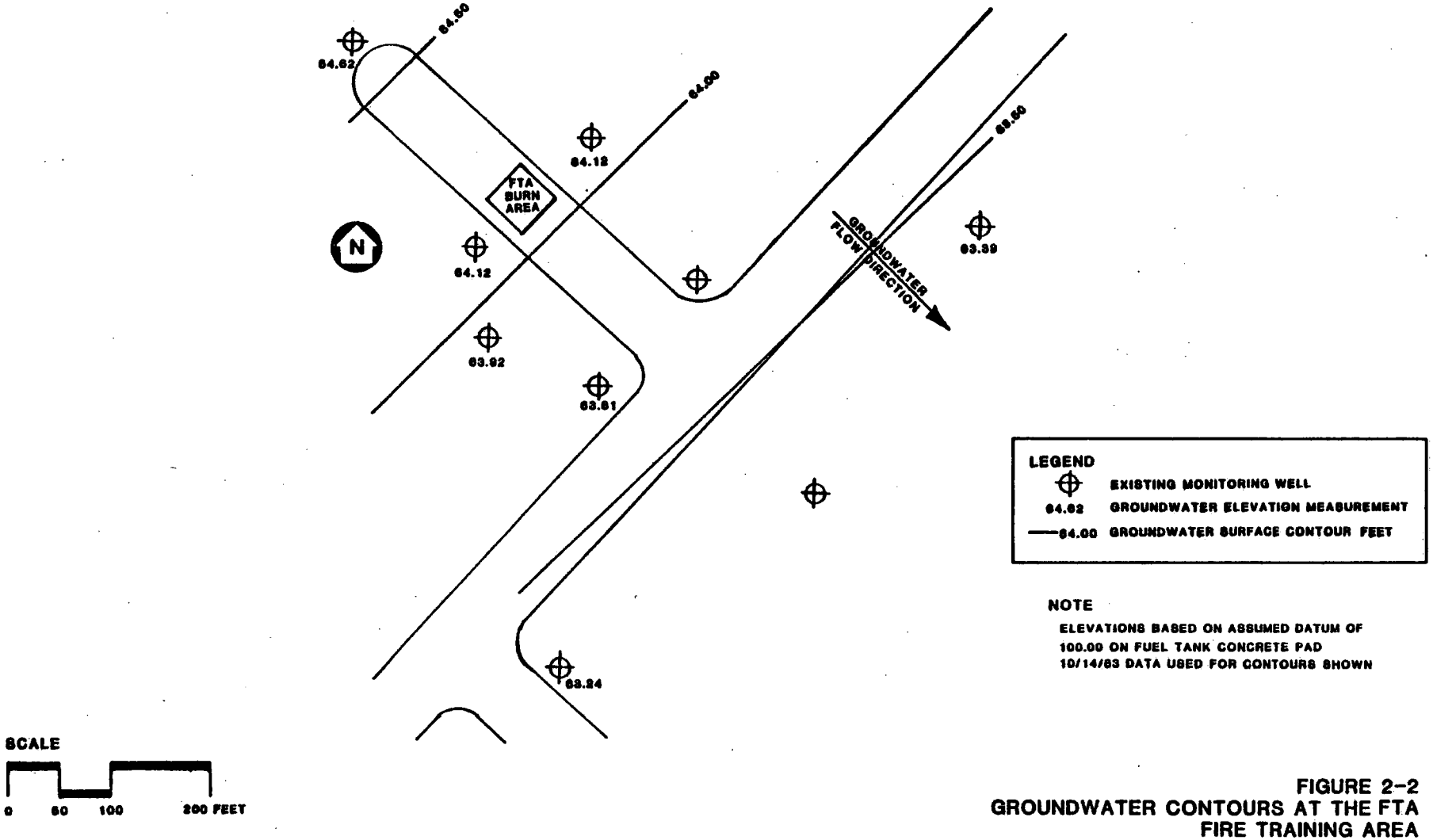

FIGURE 2-2
GROUNDWATER CONTOURS AT THE FTA FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

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reported by the USGS and the Air Force Phase I Subcontractor. Estimates of groundwater flow velocity range from 30 to 150 feet per year in the vicinity of the FTA. Knowledge of past and present site use and site hydrogeologic setting was used in designing the site investigation for the FTA.

Also of importance to the program in the background review were the following determinations:

- analytical results from previous work indicate that concentrations of volatiles in soils and groundwater are low and that soil gas would probably be inconclusive in guiding the exploration program;
- the current monitoring wells at the FTA have been assessed as inadequate for that purpose or as installations for permeability testing for this study. They may be used for water level measurements only;
- it will be desirable to obtain water level measurements from monitoring wells in the fuel tank storage area to the southwest of the FTA to provide a more complete picture of groundwater movement in the area; and
- a landfill currently under investigation by the Air Force lies about 1,000 feet directly downgradient (of groundwater flow) from the FTA.

2.2 SITE INVESTIGATION

The proposed plan of work has been designed to provide definition of contaminant distributions in the soils at the FTA and in groundwater at and downgradient of the FTA. The geology and hydrogeology in the vicinity of the FTA will also be more completely defined in order to be able to adequately characterize the site and to assess the potentials for contaminant migration and potential impact to receptors. As explained in Section 1.0 and above, the present understanding of the site has led to some modifications of the original technical response to the SOW. These modifications are believed to enhance the technical response to achieve the overall goals of the project.

2.2.1 Task 1 - Plan of Work

Preparation of this Work Plan fulfills the requirements of this Task which describes the task items necessary to acquire sufficient data to characterize the FTA and to prepare a Remedial Action Plan (RAP) which presents the selection process of a remedial action alternative for the site. Subtask 2A.1 - Background Review and Subtask 2A.2 - Well Inventory of the Jordan proposal have been conducted concurrently with this task to allow development of a site understanding using available information gathered. This site understanding was used as a basis for development of the program of investigation presented herein.

A Health and Safety Program (HASP)(Jordan, 1985) and a Quality Assurance Project Plan (QAPP) (Jordan, 1986) have already been prepared for the IRP project. Site specific health and safety procedures to be employed for the protection of field personnel and others in the area of the investigation at the FTA are included as part of Appendix C. The site-specific QAPP is included as Appendix D. The health and safety program

is an integral portion of all Jordan hazardous waste site investigations. It is based on general precautions in dealing with chemical wastes and made specific to anticipated and known site conditions and hazards. Provisions are made to increase levels of protection should conditions encountered require additional safety measures.

The QAPP will include descriptions of procedures and methodologies to assure Quality Control/Quality Assurance for all phases of field operations.

Task 1 includes preparation and participation in two meetings as follows:

- Meeting at Andrews AFB on October 24, 1986, to present the preliminary draft Work Plan to ANGSC and ORNL project members; and

- Meeting at the Air National Guard Base (ANGB) at the Suffolk County Airport on or about November 13, 1986, to present the draft work plan and receive comments from appropriate outside agencies.

2.2.2 Task 2A - Site Characterization

This task consists of several subtasks which define specific elements of the investigation to acquire information and data with which to characterize the source of contamination and possible pathways of migration. A stepped program of investigation is proposed. This type of approach allows the site investigation to be modified as information on the site is acquired, allowing the data gathering activities to focus on identified areas of concern.

2.2.2.1 Subtask 2A.1 - Background Review. A site specific Phase I report is not available for the FTA. Jordan has conducted file searches, discussions with Dames & Moore (the U.S. Air Force Phase I Subcontractor for two landfill sites), Suffolk County and State personnel, and interviews with current and past personnel familiar with the activities at the FTA. This subtask was conducted concurrently with Task 1 and has allowed refinement of the subsurface investigation program prior to the start of site activities.

This subtask has been completed as part of the original task order and is summarized in Appendix A. Information gained from this subtask is referenced throughout the work plan and has been used as a basis for much of the proposed work plan.

2.2.2.2 Subtask 2A.2 - Well Inventory. Concurrently with the writing of the Work Plan, a well inventory was performed. This task included an evaluation of existing monitoring wells in the vicinity of the FTA and identification of water supply wells within 1 mile downgradient of the FTA. Although the inventory of existing monitoring wells has been completed and a major water supply wellfield has been identified, there may be other small household water supply wells in the 1 mile radius which have not yet been identified, but may be important for future risk assessments.

The proximity and number of individual household wells will be a factor in the public health analysis in Task 4, Evaluation of Detailed Alternatives. These household wells, within one mile downgradient of the site, will be identified during the site characterization field investigation program. They will be identified by:

- An investigation of the Suffolk County Water Authority Records, and/or

- A door-to-door or telephone survey of each household in the area of interest to determine, on an individual basis, if that house has a well, the construction of the well and water usage. Sampling of individual household wells will not be done as part of this task.

A preliminary status report of the findings of the well inventory has been included in Appendix B.

2.2.2.3 Subtask 2A.3 - Soil Sampling. Available information suggests that 5 areas exist at the FTA where spillage of combustible materials may have occurred (Figure 2-1). The soil sampling and analytical program proposed for these areas is designed to: 1) define the spatial distribution of contamination in soil; 2) characterize contaminant source areas; and 3) provide samples for grain size analysis.

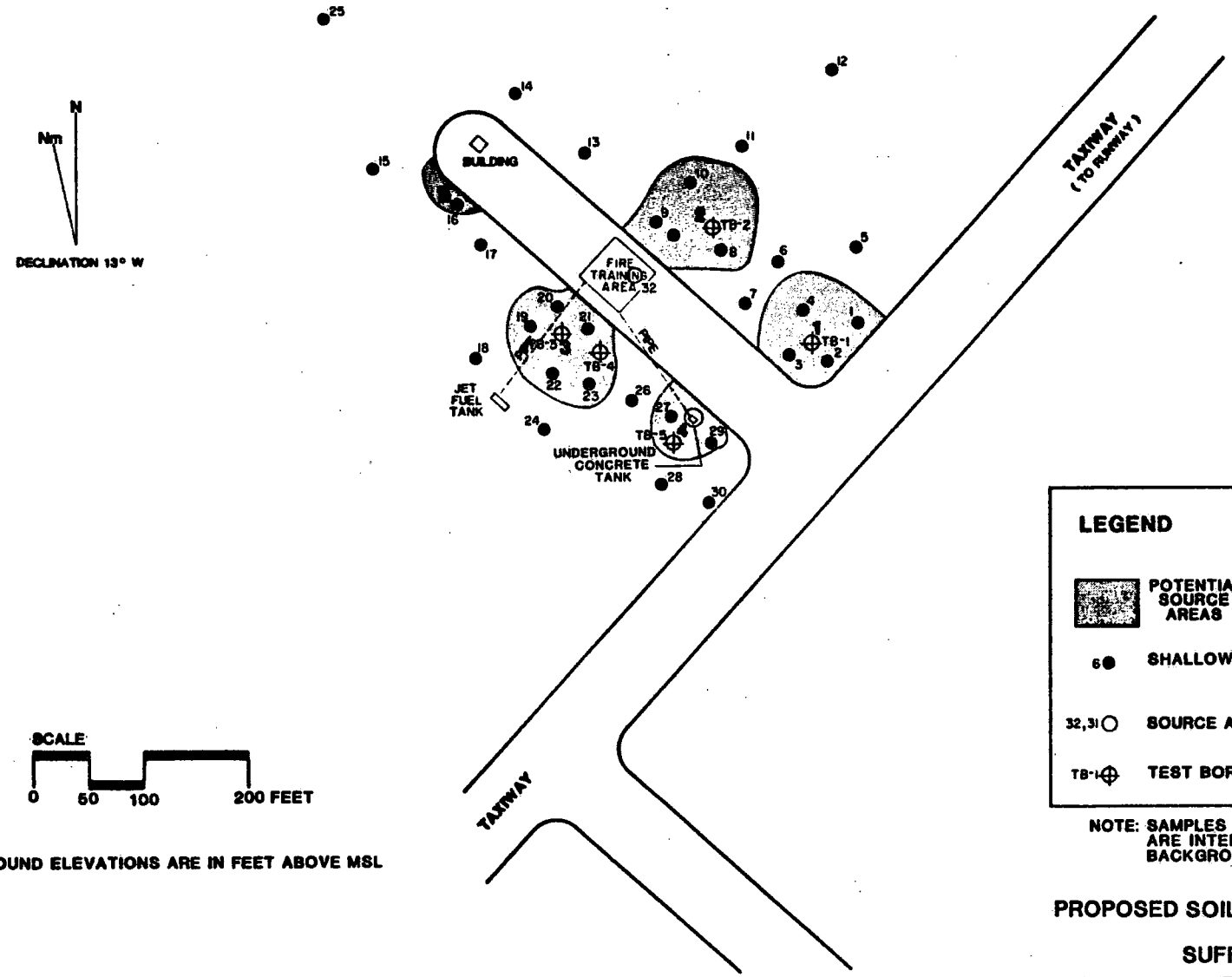
The soil sampling program consists of two steps. The first (shallow) step will sample the soil within four feet of the ground surface. The second (deep) step will sample soils from ground surface to the water table, in the areas of highest contaminant concentration as determined by the first step.

The sampling of shallow soils will involve the use of hand augers at 30 locations (Figure 2-3). Samples will be collected at depths of 0-0.5', 1.5'-2.0', 3.5'-4.0' at each location (except background - 0-0.5' only). These samples will be field screened (see Section 2.2.2.6) for oil and grease and volatile organic compounds (VOC). Selected samples (based on field screening) will be sent to the laboratory for detailed analysis for Hazardous Substance List (HSL) organic contaminants and lead. Four additional samples (2 background, 1 fire pit, and 1 sample of the underground tank) will also be analyzed. Grain size distributions for ten of the above soil samples will be determined in the laboratory.

While there have been no indications that PCBs were ever present at the FTA, six composite samples will be prepared and submitted to the contract laboratory for analysis for PCBs. In each of the five identified areas of most probable contamination, a composite will be made of material at each of the three levels from two boreholes. A composite sample of the background location soils will be similarly prepared.

The second (deep) soil sampling step involves the collection of samples through five test borings advanced by hollow stem auger, or casing methods. Split spoon samples will be collected at five foot intervals starting at a depth of five feet. These samples will be used for general geologic characterization, while seven samples will be analyzed for grain size distribution. Four samples from each boring (for a total of 20) will be analyzed for HSL (volatile and extractable) compounds (plus the 10 next highest peaks), lead, and oil and grease (see Section 2.2.2.6). It is expected that all borings will be terminated at the water table (generally 35 feet below ground).

Each split spoon sample will be scanned with a PI meter immediately upon opening (unless an analytical sample is to be collected first) to determine if



LEGEND

- POTENTIAL SOURCE AREAS
- 6● SHALLOW SOIL SAMPLING POINT (HAND AUGER)
- 32,31○ SOURCE AREA (POTENTIAL) SAMPLING POINT
- TB-1⊕ TEST BORING (UNSATURATED ZONE ONLY)

NOTE: SAMPLES 12 AND 25 ARE INTENDED AS BACKGROUND LOCATIONS.

FIGURE 2-3
PROPOSED SOIL SAMPLING LOCATIONS
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

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volatile organic compounds are present. The sample will then be described (logged) in the field with regards to: geologic characteristics and soil classification; waste characteristics; presence of visual contamination; water content; and other observations. Samples from each split spoon will be stored for geologic reference in a clean glass jar.

If a boring cannot be advanced to the predetermined depth, the boring will be abandoned and a replacement boring made within ten feet of the first. If the second boring cannot be advanced to the desired depth, the ORNL Representative will be consulted. All abandoned test holes will be backfilled with bentonite pellets and/or a cement/bentonite slurry. Based on current information problems with drilling are not anticipated and additional replacement footage has not been budgeted.

All sampling equipment (such as hand augers, split spoons, etc.) will be decontaminated (as described in the QAPP) between each sample collection to avoid cross contamination and to provide Quality Assurance.

2.2.2.4 Subtask 2A.4 Monitoring Well Program. The monitoring well program has been divided into two steps. The objective of the first step is to characterize groundwater quality near potential source areas. The objective of the second step is to further define groundwater contaminant plume(s) encountered during Step I.

In Step I, two well nests (locations MW-101 and MW-107) and two single level monitoring well (MW-104 and MW-103) will be installed at the approximate locations shown in Figure 2-4. These wells have been located to provide optimum data with regards to source characterization, spatial distribution of groundwater contaminants and groundwater flow direction.

The locations of proposed monitoring wells were developed based upon information developed during the background search, initial site visits, and well inventory. Specific rationales for each well placement are presented in Table 2-1. All wells will be finished between approximately 50 and 150 (maximum well depth) feet below ground surface. The deeper wells are designed to monitor the deeper regions of the upper unconfined aquifer. The boreholes for these wells will also be used to characterize the Gardiner's Clay layer, if present within 150 feet of the ground surface. In no instance, will any borings or monitoring well penetrate more than about five feet of this clay layer. It is the intent to avoid breaching this clay layer, which might create a conduit for mixing between the underlying and overlying overburden aquifers.

The installation description for each monitoring well is presented in Table 2-2. As illustrated by this table, some well borings will be used to collect split spoon samples for geologic characterization (and analytical screening at some locations). The screening of the reference soil samples for VOA will provide some data with which to help determine the wellscreen interval at a given location. Shallow wells within a well cluster will be installed after information from the deeper wells has already been obtained to characterize the location. For this reason, these shallow wells will not require any sampling during installation.

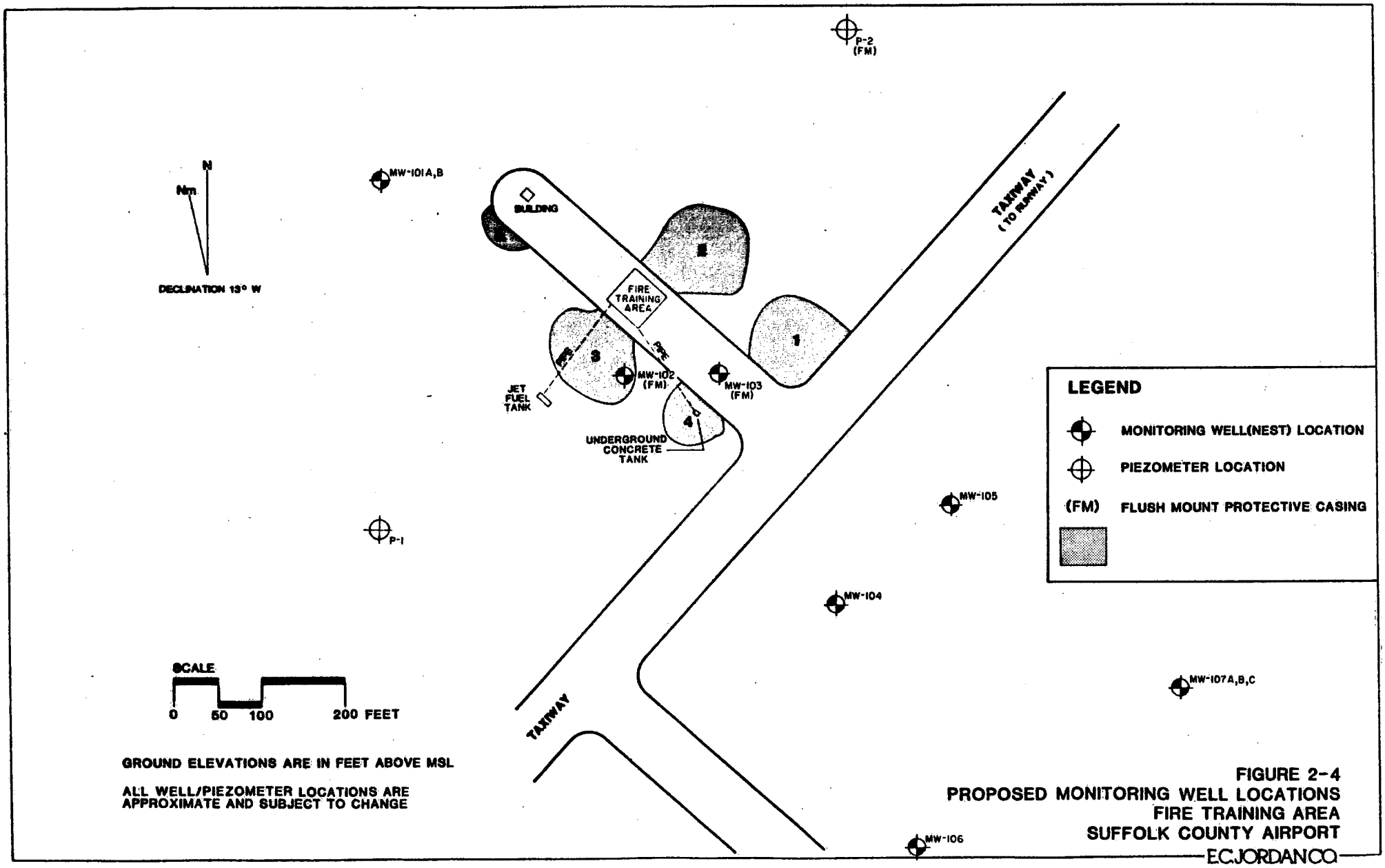


FIGURE 2-4
PROPOSED MONITORING WELL LOCATIONS
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

TABLE 2-1
RATIONALE FOR WELL PLACEMENT
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

LOCATION	OBJECTIVE AND RATIONALE
MW-101A,B	Upgradient water quality, depth to and sample of clay (if less than 150'), vertical groundwater gradients, water table elevations. An additional intermediate depth well may be installed if conditions are encountered (e.g., contamination of separate aquifer) in the deep boring that warrant the installation of a well.
MW-102	Water quality in area of highest residual contamination in soils, water table elevations.
MW-103	Shallow water quality downgradient of contaminated areas which receive little or no recharge, water table elevations.
MW-104	Downgradient water quality well, water table elevations.
MW-105	Same as MW-104.
MW-106	Same as MW-104.
MW-107A,B,C	Downgradient water quality, depth to and sample of clay (if less than 150'), vertical groundwater gradients, water table elevations, detailed geologic reference samples, field screening for volatiles plume.

TABLE 2-2
WELL PLACEMENTS
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

Location	Step	nest#	well/ boring depth	SS	ST	PT(2)	GS
MW-101(1)	I	B	50	0	0	Yes	0
		A	150	15	1	Yes	2
MW-102	II	--	50	5	0	Yes	1
MW-103	I	--	50	5	0	No	1
MW-104	I	--	100	10	0	Yes	1
MW-105	II	--	70	0	0	No	0
MW-106	II	--	70	0	0	No	0
MW-107	I	C	50	0	0	No	0
		B	100	0	0	Yes	0
		A	150	30	1	Yes	3
P-1	I	--	50	0	0	No	0
P-2	I	--	50	0	0	No	0
Totals			940	65	2		8

SS = Split Spoons
ST = Shelby Tube (of clay)
PT = Permeability Testing
GS = Grain size analysis
* = location to be determined

Notes:
1. If contamination or geologic conditions aare encountered as the deep borehole is advanced, then an intermediate depth well may also be installed.

2. A permeability test will be conducted in all wells screened below the groundwater table.

3. All depths are in feet below ground.

Upon mobilization by the drilling subcontractor, all equipment (including well construction materials) will be thoroughly decontaminated to prevent the possibility of introducing contaminants to the subsurface. Drilling tools will be decontaminated between well locations to prevent cross contamination.

The monitoring well installation will be accomplished with hollow stem auger or steel (driven/spun) casing drilling methods. It is likely that the deeper wells (>100 feet) will be installed with casing techniques, while the shallower wells will be installed within augers.

During drilling, standard penetration tests will be conducted at five foot intervals (unless otherwise specified), utilizing a two inch (O.D.) split spoon sampler. Since split spoons will be used for collecting samples for geological classification and analytical field screening, they will be decontaminated between each sample.

In situ falling head permeability tests will be attempted within the steel casing prior to well installation. However, because high permeability values are expected at the site, it is not known if these tests will be successful (see Subtask 2A.5, Section 2.2.2.5).

All wells will be constructed utilizing National Sanitation Foundation approved, schedule 80 polyvinyl chloride (PVC) two-inch (inside diameter), casing with flush threaded joints designed to avoid the use of joining compounds which might introduce contaminants into the borehole. Well screens will be provided with either 0.010, or 0.020-inch slot sizes and will be 15 to 20 feet in length depending on location. Criteria used for screen placement include the type of geologic material present, location of the water table, and results of the analytical field screening to determine depths of greatest VOA concentration in groundwater.

Depending upon the geological materials present, all wells will be backfilled with a 40/20 Ottawa (or similarly graded) sand filter pack to two feet above the top of the PVC screen. Above this sand pack, a two-foot-thick bentonite pellet seal will be installed. The annulus above the seal will be backfilled with a cement/bentonite slurry. A cement plug will be installed at the ground surface, around the security casing, and will provide another seal.

Two piezometers (P-1 and P-2) will be installed during the Phase I program, following basically the same procedures as for the shallow monitoring wells. The only exception is the piezometer would be screened between five and ten feet below the water table.

All wells will be developed by using a pump or the pump and surge technique, to open the well to the aquifer, remove suspended fine particles, and evacuate water used during the drilling process.

All wells will be provided with a protective steel (flush mount or stick up) casing to protect future sample integrity and provide quality assurance. All drilling methods and procedures will be documented in a logbook by a geologist or experienced engineer. In addition, well logs and well descriptions will also be maintained.

After well installation and development, water levels will be determined to the nearest 0.01-foot. This will enable further refinements to be made in regards to

computations of groundwater flow direction and velocity. Three complete sets of water levels (different dates) will be recorded for these new wells after all wells have been installed.

To accurately define well locations, a ground survey will be conducted. This survey will also be used to provide elevation data for each monitoring well riser. This will enable water level comparisons between different wells on the site. Well elevations, ground surface elevation and locations will be determined to the nearest 0.01, 0.1 and 1.0 foot, respectively.

The Step II well installation program will follow the same procedures as the Step I program. Placement rationale of the Step II wells (MW-102, MW-105 and MW-106) (dependent upon findings of the Step I program), and installation description are also presented on Table 2-1 and Table 2-2, respectively. The depths of these wells cannot be determined at this time, but have been estimated as shown on Table 2-2.

Information gathered during all previous Phase II activities, i.e., contaminant screening, geology, hydraulic conductivity testing and Step I well installation, will be used for the actual locations of wells MW-102, MW-105, and MW-106 (the locations of these wells on Figure 2-4 are only symbolic). The placement of Step II wells will be made to further define, as necessary, the contaminant plume, if any, located in Step I. The final placement of the Step II wells will be dependent most on the depth and rate of migration as indicated by the Step I wells.

An assessment will be made at this point concerning the adequacy of the explorations to date to provide sufficient information for complete site characterization. Should the need for additional explroations be indicated, an estimate of the scope and budget for a proposed expanded program will be prepared and submitted to ORNL for review and approval before any such further explorations are undertaken.

2.2.2.5 Subtask 2A.5 Hydraulic Conductivity Determinations. Several different methods will be utilized to generate hydraulic conductivity (permeability) data. It is anticipated that the relatively high hydraulic conductivity expected of the aquifer materials (except the Gardiner's Clay unit) will be difficult to measure accurately.

To determine characteristics of the Gardiner's Clay unit (expected to be a relatively impermeable lower boundary to the upper aquifer), collection of Shelby tube samples of this clay will be attempted at wells MW-101 and MW-107. These samples will be sent to Jordan's soil testing lab for triaxial permeability testing. Permeability tests will also be conducted on reconstituted samples of the overlying sand stratum.

Falling head (or possibly rising head) permeability tests will be attempted within the steel casing during the drilling program to provide insitu data regarding subsurface permeability. These tests will also be attempted in selected PVC monitoring wells. It is recognized that the glacial deposits may be more permeable than the PVC well screens. The data will be reviewed with this possiblility in mind. The hydraulic conductivity determined from well data may represent a lower bound for the formation. All in situ testing will use potable (clean) water. A sample of water used for these purposes will be submitted to the analytical laboratory for analysis of HSL organics and inorganics.

Permeability estimates based on grain size distribution (Hazen Method) will also be generated for comparison purposes.

2.2.2.6 Subtask 2A.6 - Sampling and Analytical Program. All soil and water samples will be obtained, preserved and shipped according to EPA protocols. Splits of samples will be made available at the request of regulatory agencies and/or other parties involved with prior written notice of at least 5 days. For purposes of costing this work plan, labor for one split of all samples has been assumed. If other splits are required, it is assumed that the other party will provide for containers, shipping and analysis.

Soil Samples

Approximately 135 soil samples will be collected to characterize the vertical and horizontal distribution of soil contamination. A large number of these samples will be obtained during the exploration program and subsequently screened for oil and grease, and volatile organics (VOA's). The total number of sample locations is estimated at 35. Two of these locations are intended to be background samples. Soil samples selected on the basis of the screening as indicative of the distribution at the site will be sent for laboratory analysis. CompuChem Laboratories, Inc. of Research Triangle Park, North Carolina, has been designated as the analytical laboratory for the project. Considering the sensitivity of the potential site problems, EPA Contract Laboratory Program (CLP) procedures will be used to generate maximum quality data. The analytical parameters for the laboratory analyses are VOA, semi-volatile organics (SVOA), total petrochemical hydrocarbons, PCB/pesticides and lead. Replicates (samples which will be spiked with standards for the purposes of CLP laboratory internal control) of duplicates (samples which are split for indications of repeatability or variability within the sample medium) will be sent to Martin Marietta for additional QA/QC purposes. The screening process is anticipated to reduce the soil samples sent to the laboratory to about 92 including duplicates and replicates to the CLP program. No budget has been provided for analysis of samples sent to Martin Marietta. See Table 2-3 for a summary of the analytical program.

Groundwater Samples

Groundwater samples for laboratory analysis will be obtained in two sampling events, the first conducted no sooner than one week after the completion of the final well installation. The second event will be performed no sooner than two weeks after the first sampling event. Before sampling, water levels will be measured to the nearest 0.01 feet and each well will be purged of 3 well volumes. Samples will be collected in decontaminated Teflon or stainless steel bailers. Samples will be split (if required) and transferred directly to appropriate, clearly labelled containers, preserved (as appropriate) in the field, packed in coolers with ice, sealed and shipped via overnight courier to CompuChem. Field analysis for pH, temperature and specific conductance will be performed and the results recorded. Analyses will be perfomed for VOA, SVOA, total petroleum hydrocarbons and lead by CLP protocols for Hazardous Substance List parameters. This quantification will also include xylenes (see Table 2-3).

TABLE 2-3
ANALYTICAL PROGRAM SUMMARY
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

MEDIUM	LOCATIONS	SAMPLES	SCREEN	SAMPLES FOR ANALYSIS	BLANKS	DUPLICATES	(4) REPLICATES	MARTIN MARIETTA	DISTILLED WATER	TOTAL
SOIL										
Hand Auger	30	90	90	50	0	5	3x2	5	--	66
Borings	5	45	45	20	0	2	1x2	2	--	26
WATER										
Completed Wells	10	14	0	20	2	2	2x2	2	2	32

1. Includes: 10% Duplicates for soils; 10% field blanks, 10% duplicates plus 1 sampler blank for each of 2 planned sampling events. Replicates at 1 sample per 20 for CLP QA/QC.

2. Soil samples screened for VOA (Headspace), oil and grease and PCB.

3. Field measurements will be made for temperature, specific conductance and pH.

4. Replicates to CLP are counted twice for costing the analytical program and are counted as such in the totals of this table for the sake of consistency.

Quality Assurance/Quality Control (QA/QC) for groundwater will be provided by collecting 10 percent duplicates, 10 percent field blanks and one sample blank for each sampling episode. Analysis by CLP protocols also requires the analysis of replicates at 20 sample intervals for matrix spikes (MS) and matrix spike duplicates (MSD). In addition, all duplicate soil and water samples will be split with the Martin Marietta Energy Systems, Inc. laboratory for further QA/QC. Costs for analysis of these replicates QA/QC samples by Martin Marietta have not been included in this project budget estimate. Chain-of-custody procedures and detailed sample identification and tracking measures will be employed to provide complete documentation and control of sampling and analysis for conduct of the site characterization report.

2.2.2.7 Subtask 2A.7 - Site Characterization Report, Task Report No. 2A. A site characterization report will be prepared and submitted to ORNL. The report will consist of a summary and interpretation of site activities and data, and present a determination of the distribution and degree of contamination at the FTA. Copies of field data summaries of laboratory results and any other data generated will be included as appendices to the report; 2 additional separate copies of this information will also be submitted to ORNL.

During the site characterization, if it is determined that other sources (other than the Fire Training Area) may contribute to groundwater contamination, this will be identified in this report. However, evaluation of a combination of sources could require additional sampling and application of computer modeling which have not been included in the present cost estimates.

2.3 TASK 2B - SCREEN CONTROL MEASURES

The initial screening of management methods and control technologies for the FTA will focus on four technical requirement areas which are described below. The Task Report No. 2B will include control measures that passed the screening process as well as the rationales used for selecting and eliminating candidate control measures. If site conditions warrant such actions, the Task Report No. 2B will also identify control measures that should be immediately implemented through Emergency Response or Removal Procedures, pending completion of the RAP.

2.3.1 Establish Cleanup Goals

The development of cleanup goals or response objectives will be established as an additional quantitative measurement of effectiveness of remedial action alternatives for the FTA. Attainment of these goals will be an indication that an acceptable environmental/health impact has been achieved. The establishment of appropriate cleanup goals can be the most important decision to be made at an uncontrolled waste site in that it will strongly influence the scope, and therefore the cost, of the selected remedial action. They will define the necessary benchmark by which to evaluate control measures.

2.3.2 Identification of Applicable Control Measures

Remedial alternatives will be developed from specific technologies which are applicable to the conditions at the site. Potential remedial technologies will be divided into the following categories:

- waste removal actions (e.g., excavation, groundwater pumping);
- in situ treatment (e.g., bacterial treatment);
- waste containment actions (e.g., slurry walls, capping);
- impact avoidance actions (e.g., providing alternative water supplies).
- long-term monitoring

For the FTA, remedial technologies from each of these categories may be applicable. As such, it is likely that these or a combination of technologies will be considered as a remedial alternative.

2.3.3 Screening of Control Measures

The objective of initial screening is to reduce the number of technologies that will be involved in the development of alternatives. Cost, acceptability of engineering practices (feasibility and implementability), and environmental and health effects will be considered in conducting the initial screening as described below.

- Cost: preliminary order-of-magnitude cost estimates (+100% to -50%) will be considered based on data available from U.S. EPA technical manuals, contractors, equipment vendors, and Jordan's cost estimators. Total costs will be considered. High-cost technologies that are not likely to provide greater public protection will be eliminated.
- Feasibility: the feasibility of each option will be evaluated, considering such factors as applicability to identified contaminants, proven reliability of the technology, expected duration of the action, applicability to specific site operational requirements, and hazards of implementation. Unproven or experimental technologies are often considered imprudent for use at critical sites. In consideration of the Air National Guard policy to evaluate new and innovative technologies, special care will be taken to give thorough consideration, yet careful screening, to these emerging technologies.
- Environmental and health impacts: the impact of a technology will be considered in two ways: 1) does the implementation of the technology have any immediate or long-term adverse impacts; and 2) how effective is the technology in mitigating any existing or potential environmental or health impacts.

2.3.4 Task 2B - Report

A Task 2B Report will be prepared which will contain: 1) a listing of technologies initially considered for the site; 2) screening criteria and methodology; 3) a listing of technologies that passed the screening process; 4) specific rationale for selection and elimination of the identified technologies; and 5) identification of control measures that should be implemented immediately if site conditions warrant such action.

2.4 TASK 3 - DEVELOP DETAILED ALTERNATIVES

Detailed alternatives shall be developed from the selected control measures which have been screened as part of Task 2B. The development of alternatives involves the integration and specification of applicable technologies for the FTA. It is necessary to develop each identified alternative in sufficient site-specific detail to allow comparative evaluation based on the evaluation criteria identified in Task 4.

Preliminary design data and operational requirements will be generated for each alternative in order to complete an effective comparison in Task 4. The presentation of each alternative for consideration will include the following:

- Description of the alternative in terms of the technology or combination of technologies utilized.
- Summary of additional data requirements, if needed.
- Cost data, including estimates of capital cost and operation and maintenance (O&M) costs, and results from a present-worth analysis.
- Measures needed to ensure worker safety during implementation.
- Identification of management methods incorporated, such as land use controls, right-of-way acquisition, personnel training and supervision, permanent relocations, and coordination with federal, state, and local agencies. Because of legal considerations and the nature of some of these management methods, if in-depth evaluation or implementation of these methods becomes necessary, other parties/governmental agencies must be involved (e.g. - the Federal Emergency Management Agency (FEMA) must be involved for permanent relocations).

The identification and description of technologies incorporated in each alternative will include the following:

- Key design assumptions that will affect performance, implementability, environmental impact, or cost.
- A narrative summary of the alternative which will describe the methodology and general advantages and disadvantages of the technology.

As part of this task, the "no action" alternative will be developed.

If additional field or technology performance information is required during the alternatives development process, ORNL shall be notified and will assist in evaluating the needs of the subcontractor and coordinate any further action with the Air National Guard. Task Report No. 3 will document the development of detailed alternatives. A summary table of identified alternatives will be presented so as to facilitate overall comprehension of the project for those client representatives who may require only a cursory rather than an in-depth understanding.

2.5 TASK 4 - EVALUATION OF DETAILED ALTERNATIVES

The objective of this task is to evaluate the limited number of remedial alternatives identified as part of Task 3 in order to determine the cost-effective alternative for the FTA. A record of the evaluation process will be generated in the form of an annotated matrix which presents the major conclusion of these evaluations.

2.5.1 Description of Evaluation Criteria

Definitions of the evaluation parameters are presented in Table 2-4.

TABLE 2-4

DEFINITION OF EVALUATION CRITERIA
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

Parameter	Description
A. Engineering Feasibility	
Performance:	ability to meet intended function and applicability to site conditions.
Reliability:	complexity of operation and frequency of maintenance; demonstrated field use and ability to prevent future problems associated with waste disposal.
Implementability:	complexity of construction and operation for conditions at site; time to install and operate.
B. Cost Analysis	
Cost Types:	capital costs; operational and maintenance (O&M) costs.
Analysis:	best estimates of present worth.
C. Public Health Analysis	
Short-term:	balance between beneficial impacts versus exposure and non-immediate safety/health risks during and immediately following the implementation of the remedial action.
Long-term:	objectives after the remedial action is completed; potential for deterioration and adverse effects on receptors; reduction of current risk to receptors.
Worker Health and Safety:	potential risks to workers and public resulting from site activities and transport of waste.
	The public health analysis will be done using the U.S. Environmental Protection Agency Superfund Public Health Evaluation Manual as a guide.
D. Environmental Assessment	
"No Action" Alternative Factors:	determination of the value or uses of land, air, and biotic resources (e.g., evaluation of the land, air or biotic resources would no longer be suitable for its current use); identification and quantification of environmental impacts; assessment of impact significance.

TABLE 2-4
(continued)

Parameter	Description
Detailed Alternative Factors:	assessment of the impacts on hydrology, geology, air quality, flora, fauna, socioeconomic, land use, cultural resources to the extent that any such impacts are significant. Where significant impacts exist, a means to mitigate adverse impacts will be identified.
E. Regulatory Requirements	
Permitting:	number of permits required; additional information and study requirements; time.
Compliance:	ability to comply with regulatory requirements.

2.5.2 Effectiveness Analysis

An effectiveness analysis will use non-cost factors as described in Sections A, C, D, and E in Table 2-4. This analysis will be conducted using a qualitative approach in evaluating remedial alternatives at the FTA. Where appropriate, a predictive analog or model will be used to help conduct the risk assessment portion of the feasibility study. This model will be used to describe the transport of chemicals, especially in the groundwater flow regimes.

When used under a "no action" scenario, the analog describes the level and duration of impact on receptors if the site were to remain in its present condition. The effectiveness of alternatives in reducing concentration levels at receptors can be estimated by imposing the constraints represented by remedial alternatives on the analog. The results obtained by the use of analogs contribute to the completion of the non-cost effectiveness matrix and in conducting an assessment of risk to receptors.

2.5.2.1 Cost Evaluation. The detailed cost estimate of each alternative will include construction and operating costs. These costs will be expressed as a total cost of implementation and the present worth of operating costs over the period that the alternative must be implemented. The cost assessment will include an analysis of the sensitivity of cost to the degree or level of implementation of an alternative. For example, the cost of excavating 50 percent of the contaminated soils at the site will be compared to the cost for excavating 90 or 100 percent of the contaminants. Due to variances in contaminant concentrations, the cost is generally not directly proportional to the degree of implementation. Cost estimates will be prepared using data from Jordan's project files, U.S. EPA technical reports, quotations from equipment vendors, and Jordan's estimators.

2.5.3 Presentation of Results

Task Report No. 4 will include a written and matrix evaluation of the alternatives, including a summary of the cost analysis for each detailed alternative. A typical matrix, as illustrated in Table 2-5, will be modified as needed to apply more directly to the FTA site. This report will also include a recommendation for a remedial action alternative (or a combination of alternatives). This alternative will be the one which is considered to be the most cost-effective (i.e., the one which is the most technically acceptable, adequately protects public health and the environment and meets regulatory requirements at the lowest cost). A project meeting is recommended for the purpose of reviewing the Task 4 Report and obtaining concurrence of the ANGSC through ORNL on the recommended remedial action for the site.

2.6 TASK 5 - DESCRIBE SELECTED ALTERNATIVE

Once agreement has been reached on the remedial action to be pursued at the site, a narrative description with appropriate illustrations and drawings will be developed to describe the alternative. The alternative will be selected which best meets the objective of protecting the public health and environment in a cost-effective and technically sound manner.

TABLE 2-5
MATRIX SUMMARY OF ALTERNATIVES
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

Screening Parameters	Alternatives					
	No Action	Alt #1	Alt #2	Alt #3	Alt #4	Alt #5
Engineering Feasibility						
Public Health						
Environmental Assessment						
Regulatory Requirements						
Adverse Environmental Impacts						
Capital Cost						
Operating and Maintenance Cost						
Total Cost						

The selected alternative will be described in sufficient detail to explain the rationale for the selected alternative, including the following information:

- Engineering Description:
  - conceptual design criteria and rationale;
  - operational description of process units or other facilities;
  - description of operation and maintenance requirements;
  - types of equipment required, including approximate capacity, size, and construction materials;
  - list of additional engineering data required to proceed with design;
  - preliminary project schedule; and
  - conceptual plan view drawing(s) of overall site showing general locations for project actions and facilities.

- Cost Analysis:
  - best estimates of present worth;
  - capital cost estimates; and
  - operation and maintenance cost estimates and duration of operating expenses.

- Regulatory Compliance:
  - construction and environmental permit requirements;
  - description of technical requirements for environmental mitigation measures (e.g., comparison of selected alternative to applicable environmental regulations);
  - operating permit requirements.
  - right-of-way requirements.

The description will be sufficiently detailed to be used as a baseline document for design and construction of the selected remedial alternative. The descriptions will be submitted as Task Report No. 5. These descriptions will also be incorporated into the Preliminary Draft RAP.

2.7 TASK 6 - PREPARE ENVIRONMENTAL ASSESSMENT

The Environmental Assessment shall be done concurrent to Task 4 - Evaluation of Detailed Alternatives. The Environmental Assessment will be prepared in accordance with the draft Air National Guard Regulation 19-2. The Environmental Assessment will be presented in the Task Report No. 6 and will include:

- summary descriptions of detailed alternatives considered in the Remedial Action Plan;

- environmental impact analyses of each alternative;

- references for all data cited in the studies or the actual data which supports the analyses; and

- descriptions of mitigating measures appropriate for each detailed alternative.

2.8 TASK 7 - PREPARE PEER REVIEW DRAFT REMEDIAL ACTION PLAN

Subsequent to the development and evaluation of alternatives, a Peer Review Draft Remedial Action Plan (RAP), Task Report No. 7, will be prepared for technical review. This report shall include an introduction and Task Report Nos. 2B, 3, and 4. A recommendation for the most appropriate remedial action(s) for the site and a detailed rationale for this decision will be prepared for presentation at a peer review meeting.

The Peer Review meeting will be held at the ANGSC at Andrews Air Force Base at which time the Peer Review Draft RAP will be discussed and commented on. The Peer Review Draft RAP will be available two weeks prior to the peer review meeting to allow sufficient time for the attendees to review and prepare their comments on the RAP.

2.9 TASK 8 - PREPARE PRELIMINARY DRAFT REMEDIAL ACTION PLAN

Task Report No. 8 Preliminary Draft RAP, will consist of a revised Task 7 Report based on the changes and recommendations requested by the ANGSC Project Officer as a result of the Peer Review meeting. It will include the Task 5 description of the selected alternative. The preliminary draft RAP will be submitted to ORNL for coordination, technical review, and distribution. In addition to the Draft RAP, visual aids will be prepared for presentation to the Air Force Installation Restoration Management (AFIRM) Committee.

2.10 TASK 9 - PREPARE FINAL DRAFT REMEDIAL ACTION PLAN

The Final Draft RAP, Task Report No. 9, will include any approved revisions of the Preliminary Draft RAP. This report will be distributed as determined in the initial coordination meeting.

2.11 TASK 10 - MEET WITH REGULATORY AGENCIES AND PREPARE FINAL REMEDIAL ACTION PLAN

After the Final Draft Remedial Action Plan (RAP) has been prepared and distributed, ANGSC will meet with and present the RAP to regulatory agencies with ORNL/Jordan assistance on an as requested basis. Following this meeting(s), Task Report No. 10, the Final RAP will be prepared and will include documentation of modifications to the Final Draft RAP and ANGSC's responses to the regulatory agencies' comments.

2.12 TASK 11 - PROJECT COORDINATION

Project Coordination includes specific activities designated in the Statement of Work. They are as follows:

- Monthly progress reports to be distributed to the IRP Management Team (ANGSC, ORNL, and Jordan) and other designated parties will contain the following items:

- Summary of accomplishments
- Significant findings
- Problems encountered and means of addressing problems
- Estimated degree of completion of Tasks, Subtasks and the Task Order
- Manhours expended versus scheduled to date for each Task
- Cost summary information

The monthly progress report will be compiled by the Program Manager and the Contracts/Administration Manager on the basis of input from the Task Leaders and the Jordan Accounting Department;

o Documentation and distribution to the Installation Restoration Program (IRP) management team of all significant meetings/interactions/telephone calls with personnel external to Jordan pertaining to the IRP at the FTA;

o Generation and distribution of minutes of coordination/management/ technical meetings of which Jordan is a party within 10 calendar days of the meeting; and

o Participation in a preperformance meeting at the ANGB at Suffolk County Airport within 15 calendar days of "notice to proceed".

In addition, it is recommended that the following activities be included as part of the Project Coordination effort.

o Monthly progress meetings to be attended by the Task Order Manager and/or the Contracts and Administrative Manager from Jordan, and the Project Manager or an appropriate representative from Oak Ridge National Laboratories;

o Project Management activities as may be required to administer contract variations and to provide response to requests for involvement in meetings or discussions as they are generated from public interest, or from changing contract needs developed from knowledge gained throughout the course of the project.

Estimates to include costs for these additional items have been included in the Business Management Proposal.

2.13 TASK 12 - PREPARE DESIGNS AND SPECIFICATIONS

Jordan will prepare designs and specifications for the selected remedial alternative for the FTA should such action be necessary. A work plan which describes the tasks necessary to develop the designs and specifications will be prepared within 3 weeks of a notice to proceed from ORNL. This work plan will also contain a schedule for completion of each task, staff hours required for each task and an estimated cost for construction. Jordan will also provide technical support through construction of the chosen remedial action when requested by ANGSC coordinated through ORNL.

3.0 PROJECT MANAGEMENT

3.1 MANAGEMENT APPROACH

In undertaking the Suffolk County Airport Fire Training Area Phase II/IVA Task Order, Jordan will be responsible for management of the Installation Restoration Program (IRP) technical program with senior Jordan personnel filling the key roles of Corporate Officer, Program Manager, Task Order Manager, contracts/administration, quality assurance, and health and safety. The quality review board will be staffed by three senior Jordan staff. For the purposes of technical management, the various tasks and subtasks of the FTA Task Order have been consolidated in two activities with each activity area assigned a technical leader. Jordan will take a holistic approach to problem-solving at the FTA. None of the tasks/subtasks are "stand alone" activities; instead, they are interrelated. The results of one work assignment has the potential to affect other work elements. As such, the activity leaders will work closely with the Task Order Manager and each other to create an appropriate level of synergism.

3.2 PERSONNEL

3.2.1 Key Personnel

The designated roles for the IRP work at the Suffolk County Airport FTA are given below. The Task Order organization is shown in Figure 3-1.

- Corporate Officer. The Corporate Officer is William R. Adams, Jr., P.E., a vice president of Jordan. He is responsible for committing the corporate resources necessary to conduct the program work activities, for supplying corporate-level input for problem resolution, and for assisting the Program Manager and Task Order Managers as needed in project implementation.

- Program Manager. The Program Manager, John D. Tewhey, Ph.D., C.G., is responsible for the overall program.

- Task Order Manager. The Task Order Manager for the FTA Task Order will be William R. Fisher, P.E.

  In this position, Mr. Fisher is responsible for evaluating the appropriateness and adequacy of the technical or engineering services provided for the FTA Task Order and in developing the technical approach and level of effort required to address each of the 12 tasks. He is also responsible for the day-to-day conduct of the work, including the integration of the input of supporting disciplines and subcontractors (i.e., drilling and laboratory subcontractors). He will be reviewing the ongoing quality control during performance of the work, and the technical integrity, as well as the clarity and usefulness of all project work products.

  Some specific responsibilities of his role include:

  - overall technical responsibility for the program;

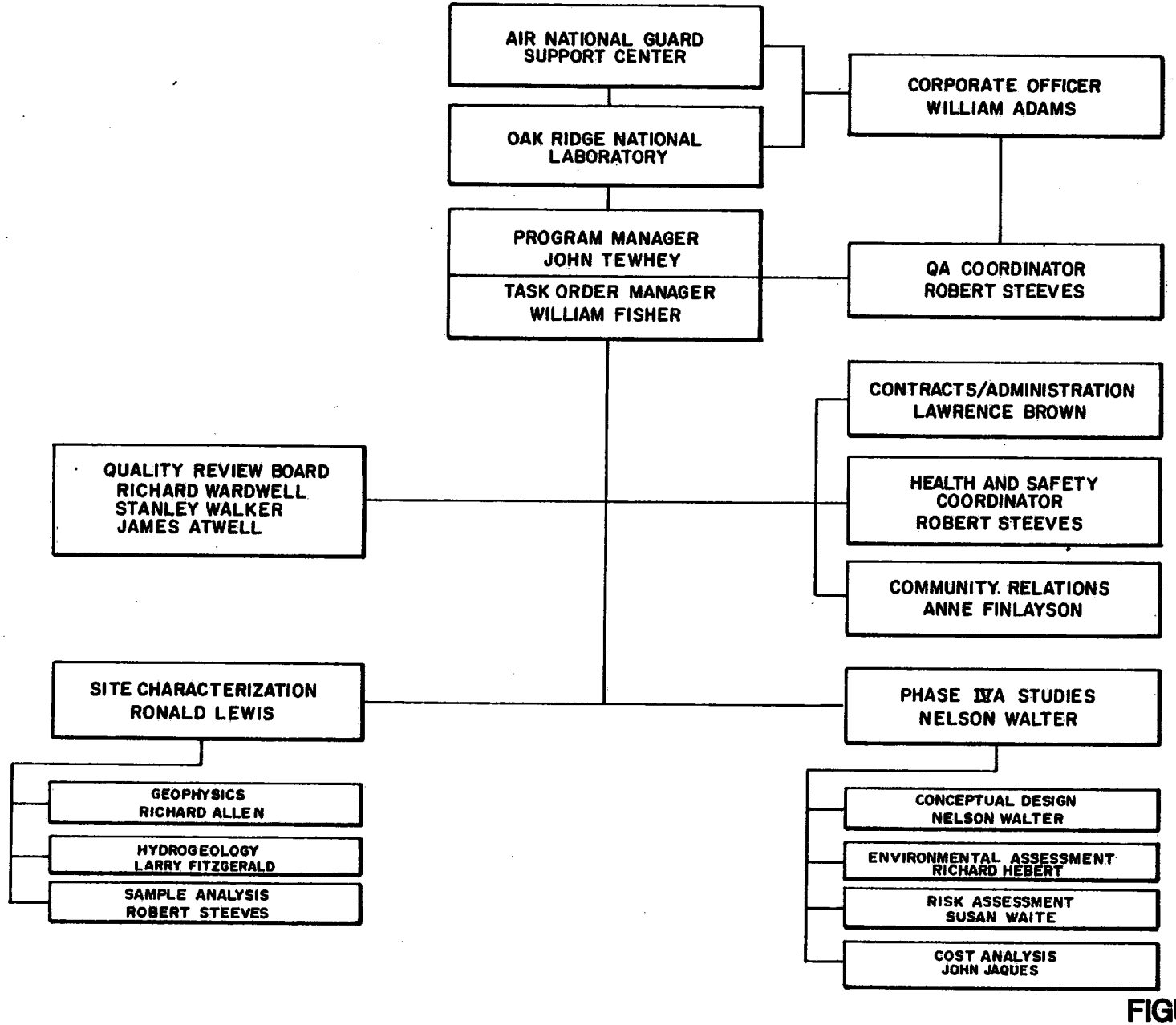


FIGURE 3-1
PROJECT ORGANIZATION
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

E.C. JORDAN CO.

- initiating program activities;

- implementing the subcontracting plan to significantly involve qualified small and/or small disadvantaged business in the program;

- participating in the work plan preparation and staff assignments;

- identifying and fulfilling equipment and other resource requirements;

- monitoring task activities to ensure compliance with established budgets, schedules, and the scope of work; and

- regularly interacting with the IRP Management Team, the Corporate Officer and others, as appropriate, on the status of the project.

- Contracts and Administrative Manager. The staff-level position of Contracts and Administrative Manager is established because of the importance of day-to-day scope, schedule and budget monitoring for the FTA Task Order both within Jordan and between Jordan and the IRP Management Team. It is expected that program decisions will be occurring frequently. Therefore, it is necessary to anticipate and immediately implement the administrative actions (initiate internal work orders, follow-up on support needs, amend subcontracts, track cost-charges) to carry out the program plans. Lawrence Brown will be responsible for these areas to Jordan through the Task Order Manager and will be the principal communication link to the client for these areas. Three specific tasks for which Mr. Brown will be responsible are the following:

  - establishing and overseeing all subcontracts for support services;

  - preparing monthly technical/management/cost progress reports; and

  - ensuring that appropriate financial record and reporting requirements are met.

- Quality Review Board. A Quality Review Board, made up of senior technical staff from the Jordan team, will assist the Task Order Manager by providing review of the technical aspects of the project to assure that the services reflect the accumulated experience of the firms, that they are produced in accordance with corporate policy, and meet the intended needs of the IRP Management Team. The primary function of this board is to assure the application of technically sound methodologies and the development of litigatively defensible data, interpretations and conclusions.

  James S. Atwell, P.E., Stanley E. Walker, P.E., and Richard E. Wardwell, Ph.D., P.E., will comprise the Quality Review Team.

- Quality Assurance and Health and Safety Coordinator. The Task Order Manager is supported by a Quality Assurance Coordinator and a Health and Safety Coordinator. These staff-level positions will report to the Corporate Officer and the Task Order Manager, respectively. The Quality Assurance Coordinator will assure that appropriate IRP and U.S. EPA protocols are followed on the FTA Task Order and will be responsible for the development of the quality assurance

plan. The coordinator works with the Program Manager/Task Order Manager to assure that established quality control procedures are implemented. The Health and Safety Coordinator is responsible for assuring that the FTA project team complies with the company's health and safety plan when conducting site visits. He is responsible for seeing that the health and safety plan is developed for the implementation of the selected alternative.

Robert A. Steeves of Jordan will serve both as the QA Coordinator and Health and Safety Coordinator for the Program.

3.2.2 Team Members

Other key line positions in the FTA Task Order are the technical activity leaders, i.e., the senior and/or most-experienced individual in each technical area of the project. These technical activity leaders as shown on the Project Organization Chart are as follows:

- Site Characterization. Ronald A. Lewis, chemical engineer, will be the technical leader for all site characterization studies described in Task 2A. As part of this, he will be responsible for the development of the Task 2A work plan.

- Phase IVA Studies. Nelson Walter, chemical engineer, will be responsible for all Phase IVA activities.

Other personnel for each major task are presented in Figure 3-1. Resumes of each individual listed, which are included in Appendix E, discuss their hazardous waste and Remedial Action Plan-related qualifications and experience.

4.0 PROJECT SCHEDULE

The schedule for IRP Phase II/IVA activities at the Suffolk County Airport FTA as described in herein is shown in Figure 4-1. The start date is September 8, 1986.

The proposed schedule reflects that an estimated 63 weeks will be required to complete the project rather than the 59 weeks presented in the Statement of Work (SOW). Changes to the SOW schedule occurred in the following tasks:

- Task 4 - Evaluate Detailed Alternatives. The start of this task was delayed by 2 weeks to allow more information to be available from Task 3.
- Task 4 Review. This period of review was inserted to allow the ANGSC sufficient time to review the Task 4 report and select a remedial alternative.
- Task 7 - Prepare Peer Review Draft Report. A two-week review period has been inserted to allow Peer Review Team members sufficient time to review the report prior to the meeting.

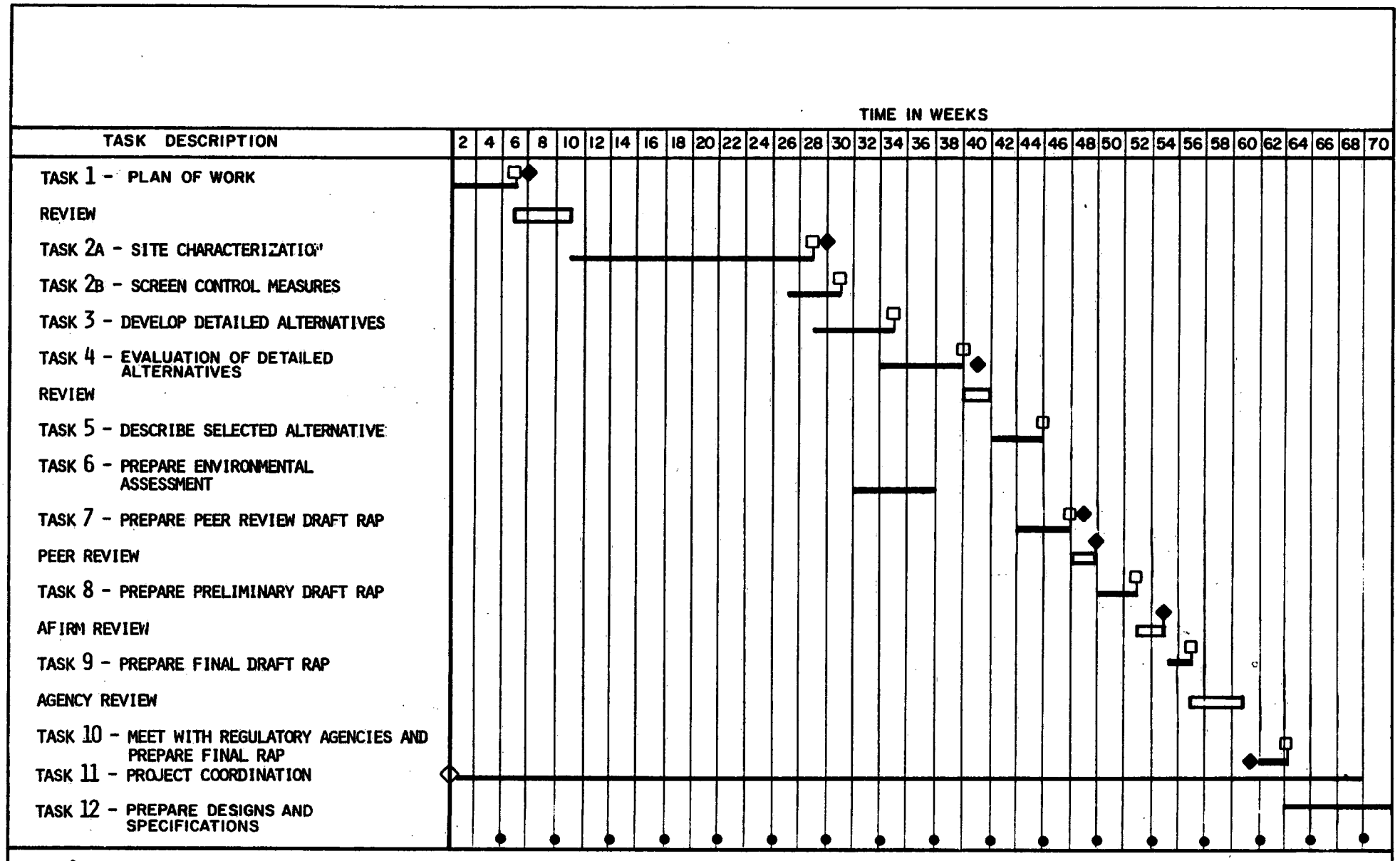


FIGURE 4-1
PHASE II/IVA TASK SCHEDULE
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

E.C.JORDAN CO.

5.0 REFERENCES

- Statement of Work for Phase II/IVA, Site Characterizaton/Remedial Action Plan/ Design Specifications, Installation Restoration Program for the Fire Training Area at Suffolk County Air National Guard Base, New York - Hazardous Materials Technical Center, June 30, 1986.

- U.S. Air Force Installation Restoration Program, Phase I, Record Search for Suffolk County Air Force Base (Retired), Suffolk County Airport, Westhampton Beach, New York, Preliminary Draft - Dames and Moore, September 18, 1986.

- Installation Restoration Program Phase I - Records Search, 106th Aerospace Rescue and Recovery Group, Suffolk County ANG Base, Suffolk County Airport, Westhampton Beach, New York - Hazardous Materials Technical Center, September, 1986.

- Hydrologic appraisal of the Pine Barrens Suffolk County, New York - U.S Geological Survey 1986.

- Westhampton Beach Water Supply Wells Production Data - Suffolk County Water Authority 1955-1986.

- Monitoring Well Analytical Results from the Air National Guard, Suffolk County Department of Health Services and Suffolk County Water Authority.

- Variability of Major Organic Components in Aircraft Fuels (ESL-TR-84-02) Air Force, 1984.

- Characterization and Evaluation of JP-4, Jets and Mixtures of those Fuels in Environmental Water Samples, Suffolk County Airport, N.Y.-USAF Occupational and Environmental Health Laboratory, March 1984.

- Guidance on Feasibility Studies Under CERCLA-USEPA, June 1985.

6.0 LIST OF ACRONYMS

ANG	Air National Guard
ANGSC	Air National Guard Support Center
DOD	Department of Defense
EPA	U.S. Environmental Protection Agency
FTA	Fire Training Area
HASP	Health and Safety Plan
HSL	Hazardous Substance List
IRP	Installation Restoration Program
JP-4	Jet Fuel used by the Air Force and Air National Guard
NYANG	New York Air National Guard
ORNL	Oak Ridge National Laboratory
PCBs	polychlorinated biphenyls
POL	petroleum, oil and lubricants (storage area)
PI	photoionization (Meter)
PVC	polyvinyl chloride
QAPP	Quality Assurance Program Plan
RAP	Remedial Action Plan
SOW	Statement of Work
SVOA	semi-volatile organic analytes
VOA	volatile organic analytes

APPENDIX A

BACKGROUND REVIEW

APPENDIX A

BACKGROUND REVIEW

Introduction

The Air National Guard Installation Restoration Program (IRP) is a program to identify the location and contents of past disposal sites and to investigate and to remedy those sites, where necessary and appropriate, to protect public health and the environment. The program is normally conducted in four phases: Phase I - Record Search; Phase II/IVA Site Characterization/Remedial Action Plan/Design and Specifications; Phase III - Technology Development; and Phase IVB - Implementation of Remedial Actions.

Although two Phase I studies are being done for the Suffolk County Airport (one for the Air Force Sites and the other for Air National Guard Sites), a separate record search has not been done for the Fire Training Area (FTA).

As part of this Phase II/IVA study, E.C. Jordan Co. has completed a limited record search which included: a file search of Air National Guard (ANG) records, interviews with ANG employees, and discussions with the U.S. Air Force Phase I Subcontractor.

The file search of the Air National Guard Support Center files was conducted on September 25, 1986 and several relevant documents were acquired including:

- a computer printout of groundwater sample results for the Air National Guard wells at the FTA;
- tables excerpted from "Variability of Major Organic Components in Aircraft Fuels" which lists the constituents found in jet fuel (JP-4);
- a review of the New York State Department of Law well installation and sampling procedures performed during October 1984 at the Suffolk County Airport;
- oil and grease soil sampling results;
- analytical results for monitoring well water samples collected by the Suffolk County Department of Health Services;
- well logs for the Air National Guard wells; and
- a characterization of jet fuels and jet fuel mixtures in groundwater at the Suffolk County Airport.

Based on the information gained through these and other related activities a review of the background of the Fire Training Area follows.

History of Suffolk County Airport

In 1941, the U.S. Civil Aeronautics Authority began leasing parcels of land in Suffolk County for construction of an air base. They accumulated about 11,500 acres

of land for the base. In May 1943, the base was activated for gunnery training. After World War II, the base was deactivated and was leased to the Arabian American Oil Company between 1948 and 1951.

The base was reactivated in 1951 (as a result of the Korean War) and was occupied by various Air Force and Air National Guard groups betwen 1951 and 1969. In 1969, the base again closed and the land was acquired by Suffolk County.

In 1971, the Air National Guard moved as a tenant onto a portion of the base and now leases about 70 acres on the west side of the base along Riverhead Road. The Air National Guard has access to and uses other portions of the base including the Fire Training Area (FTA).

History of the Fire Training Area

It is reported that there were two FTA's on the base - one near the present area and the other on a dispersed parking hardstand on the west side of the base. Aerial photographs from 1961 show a blackened spot on the ground off to the side of the concrete hardstand where the FTA is now located. This spot is considered likely to be the original location of the old FTA.

1969 aerial photographs show a large blackened spot on the concrete hardstand in the location of the current FTA. This spot extends off the concrete to the northeast and southwest sides. The lack of vegetation in the vicinity of the area also indicates that fire training probably occurred in this area.

During the earlier operation of the base (prior to 1971) waste oils, solvents and fuels were placed in underground storage tanks located outside hangers and shops. About twice a month, these flammable liquids were collected and transported to the FTA to be burned during a fire training exercise. These liquids were then poured onto the ground (or concrete) at the FTA and ignited; and the fire was put out during the fire training exercise. The waste liquids used for fire training are reported to have included waste oils, solvents (e.g., kerosene, mineral spirits, trichloroethylene, methyl ethyl ketone, toluene, etc.) and jet fuel. The quantity of liquids burned at each fire training exercise is unknown.

Since the Air National Guard moved onto the base in 1971, two major changes have taken place in the burn procedures. First, since 1971, the Air National Guard has used only jet fuel (JP-4) as the flammable liquid. According to base personnel interviewed, no waste oils or solvents are known to have been used by the Guard in the FTA. Second, in 1978 a concrete curbing was installed around the outside of the fire training burn area. This allowed a new burn procedure to be used. Water was placed inside the curbed area and 200-300 gallons of JP-4 was floated on top of the water and ignited. After the fire was put out, fuel which remained on top of the water could be floated off into a drain and then into an underground concrete tank located south of the FTA. During more recent operation of the FTA, after the fire was put out during the fire training exercise, the fire was reignited to burn off most remaining fuel.

The operation of the FTA was discontinued in August 1986.

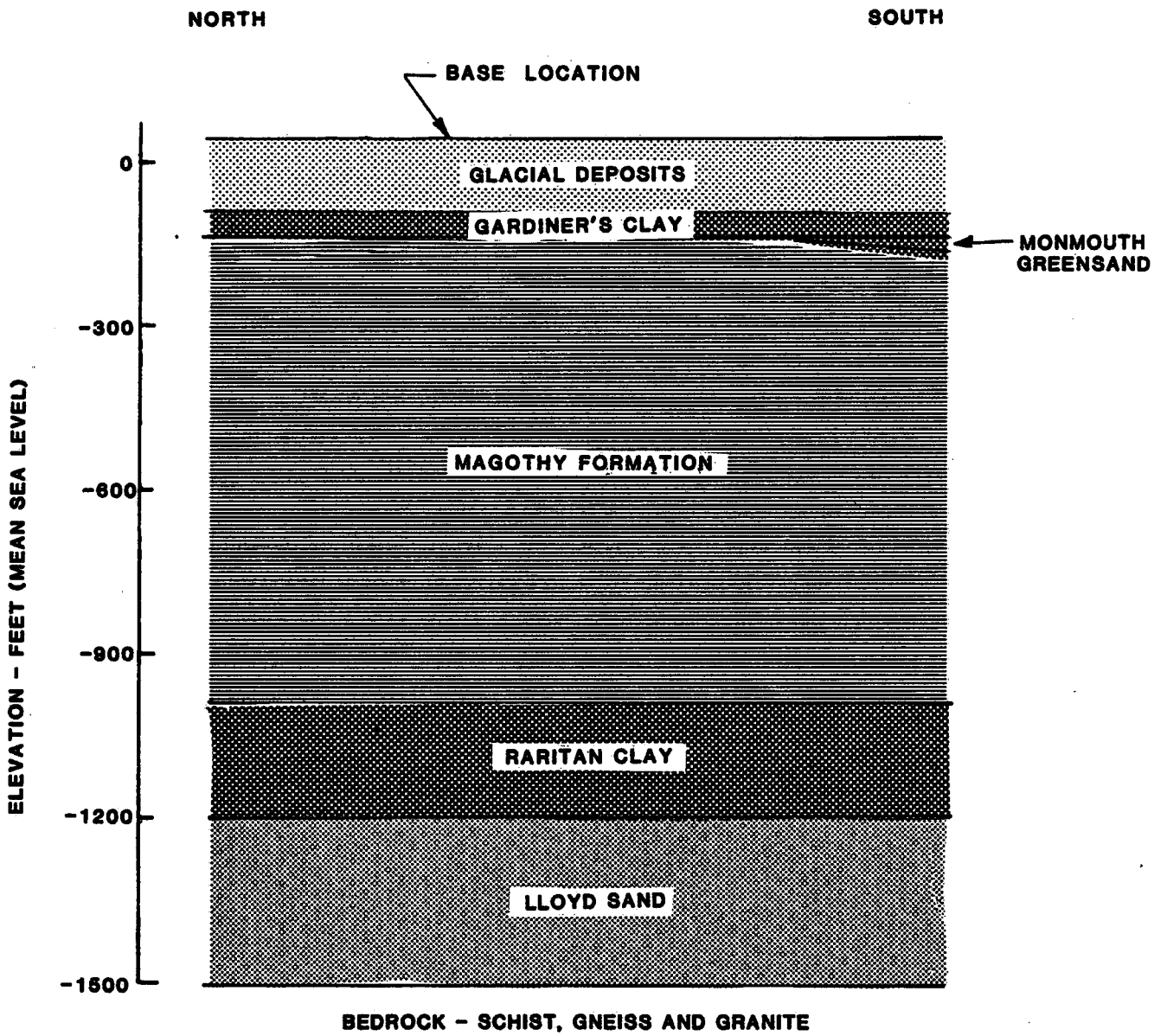
Geology

The regional geology of Suffolk County has been explored and documented as a result of the interest in utilizing and protecting sources of groundwater in the area. Many reports are available which document existing data regarding the geology and hydrogeology of the region. The Dames and Moore Draft Phase I report prepared for the U.S. Air Force through ORNL summarizes these data. The reader is referred to that report for a detailed presentation of the regional geology. For the puposes of this study, only a portion of that information is of import. Dames and Moore reports (1986) that the soil stratum immediately beneath the site consists of "mostly outwash deposits consisting of stratified fine to coarse sand and gravel. Approximately 100 to 120 feet of these sediments are found below the airport and above the underlying Gardiner's Clay". The Gardiner's Clay is of particular importance. The report continues that the Gardiner's Clay is approximately 40 feet thick and of a low hydraulic conductivity which serves to confine the underlying Magothy Formation aquifer. This layer would retard vertical movement of contaminants from the upper aquifer to the Magothy Formation. The Magothy Formation is "a thick body of continnental deposits composed of lenses of sand, sandy clay, clay and some gravel." This formation is also used extensively as an aquifer. An interpretive geologic profile is presented in Figure A-1, but as mentioned above, only the top three strata would appear significant to the study of the FTA.

Hydrogeology

Of primary concern is the groundwater flow in the glacial deposits which directly underlie the FTA. The hydraulic conductivity is cited in the Dames and Moore (D&M) report as about 0.094 cm/sec although there may be variations due to lenses of sands and gravels. The groundwater flow direction is reported (D&M) and in a USGS report on the Pine Barrens (1986) as being to the south and southeast toward the Atlantic and the headwaters of Quantuck Creek (see Figure A-2). The USGS report also indicates an east-west trending groundwater divide about 2 miles north of the site. This information is in agreement with the groundwater flow direction determined by Jordan in September, 1986 (see Figure A-3).

The Gardiner's Clay is important as an aquitard in moderating the hydraulic connection between the overlying glacial outwash deposits and the underlying Magothy Formation. No hydraulic conductivity values were reported for this unit, but the unit is characterized as "poorly permeable and constitutes a confining layer for the underlying aquifer." The piezometric head in the Magothy Formation is reported to be about 15 feet MSL. This means that there are upward hydraulic gradients across the Gardiner's Clay which would further enhance the protection afforded to the Magothy aquifer. The gradient betwen the two aquifers may be affected by recharge rates and withdrawal of water locally by pumping wells. Although the glacial deposits are highly permeable and the Gardiner's Clay will not be breeched, some evidence of upward vertical gradients may be measurable in the proposed nested wells.
Based on the hydraulic conductivity of the glacial deposits as cited above, and the measured hydraulic gradient, the groundwater seepage is estimated to be 100 feet per year with a probable range fo 30 to 150 feet per year. This information has been considered in developing the proposed locations of monitoring wells for the work plan. The estimates will be refined as the wells are placed and subsequent locations adjusted based on the newly determined flow rate and indications of the presence of any contaminants in groundwater.

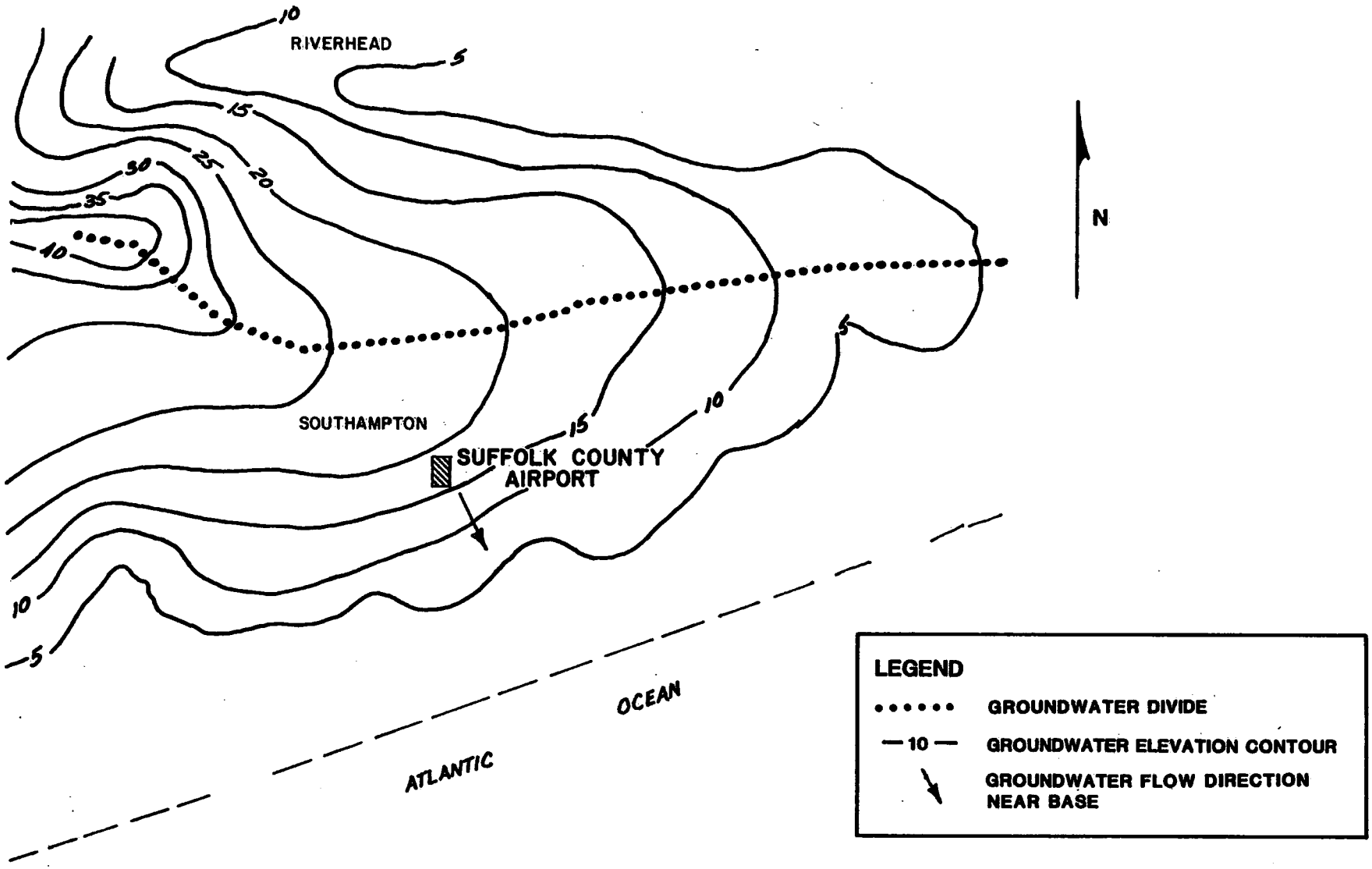


NOTE: THIS INTERPRETIVE CROSS SECTION IS BASED ON INFORMATION PRESENTED IN THE PRELIMINARY DRAFT DAMES AND MOORE REPORT ENTITLED: "U.S. AIR FORCE IRP PHASE I - RECORDS SEARCH FOR SUFFOLK COUNTY AIR FORCE BASE (RETIRED) SEPTEMBER 18, 1986."

FIGURE A-1
INTERPRETIVE GEOLOGIC CROSS SECTION
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

NO HORIZONTAL SCALE

E.C. JORDAN CO.



SCALE

0 1/2 2 4 MILES

BASED ON A FIGURE FROM THE USGS REPORT "HYDROLOGIC APPRAISAL OF THE PINE BARRENS, SUFFOLK COUNTY, NEW YORK" (1986)

FIGURE A-2
REGIONAL GROUNDWATER TABLE ELEVATIONS
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

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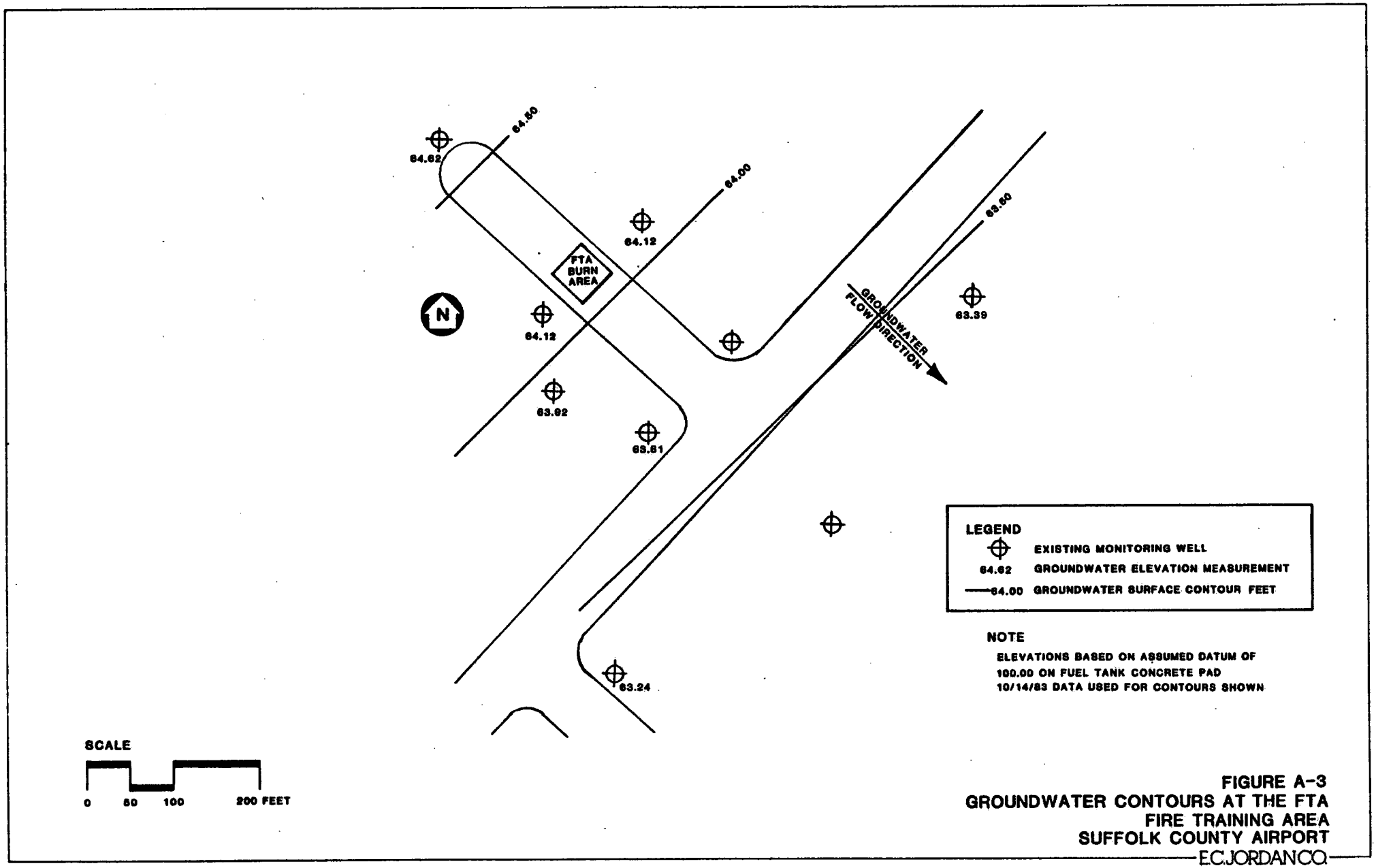


FIGURE A-3
GROUNDWATER CONTOURS AT THE FTA
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

Conclusions

Based on the information available as a result of Jordan's activities for this task, there are five areas around the FTA which are potentially contaminated with fuels, wastes, oils or solvents. These areas are shown on Figure A-4 and are described below.

Area 1 - Original FTA. This area is located at the north corner of the junction of the taxiway and the dispersed parking hardstand where the current FTA is located. Based on an aerial photograph from 1961, it appears that the FTA was in this location rather than on the concrete hardstand where it is now located. Since this area was used prior to 1971, it is reasonable to assume that flammable waste liquids were poured on the ground here for the purpose of burning. The quantity of wastes placed here and the length of time this site was used is unknown.

Area 2 - Northeast side of FTA. Before the concrete curbs were placed around the FTA in 1978, wastes were poured onto the concrete hardstand and ignited. It is likely that some of the liquid ran off the concrete onto the ground on either side of the FTA. Because of the topography of the area, liquids would tend to flow towards a low spot about 70 feet north of the edge of the hardstand.

It should be noted that the surface soils in this area are dark colored and appear to be oil stained.

Area 3 - Southwest side of FTA. Wastes poured on the pad would have also spilled onto the ground on the southwest side of the FTA. In addition, the present fuel storage tank on the southwest side of the pad is connected to the pad via a fuel line. If this line had ever leaked in the past, the fuel would have flowed onto the ground in area 3.

Area 4 - Underground concrete tank. An underground concrete tank is present in this area south of the FTA. The purpose of this tank was to store excess fire training fuel which would float on top of the water within the FTA curbing after a burn was completed. This would prevent fuel from spilling over the curb and onto the ground as a result of precipitation accumulating within the curbed portion of the FTA. The age, construction and integrity of this tank are unknown.

Area 5 - Trailer. A trailer is present on the northwest corner of the hardstand. Although the trailer is now burned out, it was used several times in the past during fire training exercises. The purpose was to train fire fighters to put out a trailer fire which is substantially different from the normally simulated fires at the FTA.

To start the fire, fuel was placed in the trailer and ignited. Some fuel may have spilled out of the trailer and onto the ground beside the hardstand.

Investigative programs are planned for all five of these areas and are described in the Work Plan.

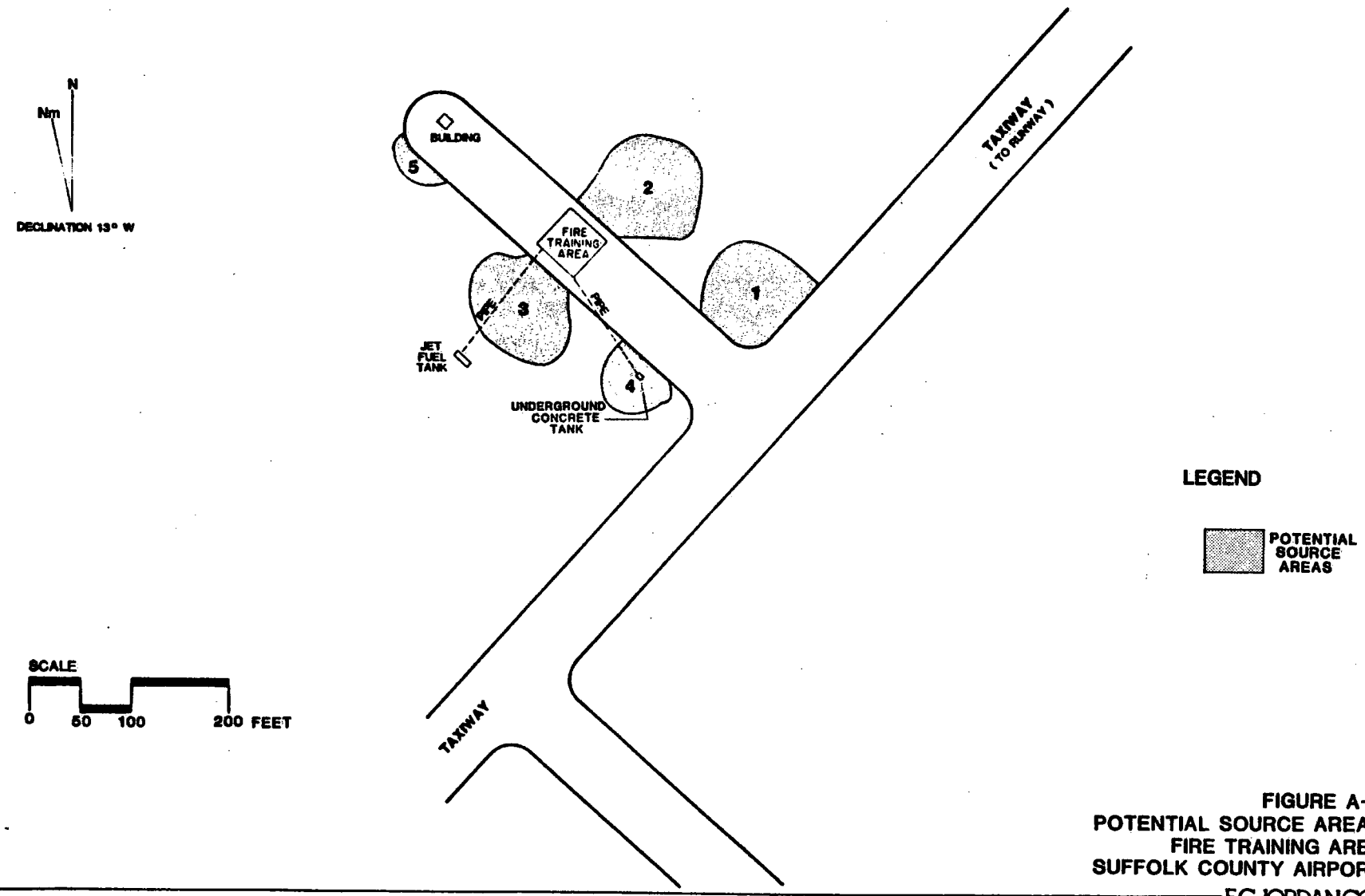


FIGURE A-4
POTENTIAL SOURCE AREAS
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

E.C. JORDAN CO.

APPENDIX B

WELL INVENTORY

APPENDIX B
WELL INVENTORY

Monitoring Wells

Nine monitoring wells have previously been installed in the vicinity of the Fire Training Area (FTA). The locations of those wells are shown on Figure B-1. One well was installed by the Suffolk County Department of Health Services, the other eight were installed by Soil Exploration Corporation for the NY Air National Guard (ANG).

The ANG wells are constructed of Schedule 40 PVC with 10 feet of PVC slotted screens and PVC caps. Well Nos. 9, 10, 11, 12, and 14 are 3-inch diameter wells. Well No's. 22, 23, and 24 are 4-inch diameter wells. All ANG wells are screened across the water table, i.e., about 5 feet of the screen is above the water table and about 5 feet is below the water table. No protective casing or locking cap was installed with the wells. The Suffolk County well is a steel well. However, the construction details for this well are not known. Well logs are available for the ANG wells and are appended.

The ANG wells were installed using a hollow stem auger. Split spoons samples of soil were obtained every 10 feet as the borings were advanced. Other details on the well installation (e.g., decontamination procedures for tools and equipment, personnel present during the drilling, backfill or seals around the well, etc.) are not documented. Based on information supplied by ANGSC, decontamination procedures between borings consisted of a sequence of n-hexane wash, distilled water rinse, reagent grade acetone rinse and air drying of all downhole tools.

Two of the wells have been damaged since they were installed. Well No. 12 has been broken off below the ground surface and only pieces of the PVC casing could be found. Well No. 10 has been partially melted and is slightly bent; probably as a result of fire training activities. The metal cap on the Suffolk County well could not be loosened by hand during the September site visit.

During a site inspection on September 17-18, 1986, the wells were surveyed for location and elevation and depth to groundwater measurements were taken. Based on this survey a new map of the well locations has been drawn which more accurately shows the location of the wells. The groundwater table is approximately 35 feet below the ground surface at the site. The groundwater flows in a south-southeasterly direction at the FTA.

In an attempt to perform a permeability test at the FTA, water was pumped into Well No. 14 at a rate of about 30 gallons per minute for about 10 minutes. The water level never came up to the top of the well. The soils are extremely permeable and the permeability in this area is estimated to be more than 10^{-3} cm/sec.

It is recommended that the existing wells not be used for water quality sampling for the following reasons:

- the wells are not secured with a locking cap, and therefore, the wells could have been accessed by others;
- decontamination procedures were not used during installation of the wells;

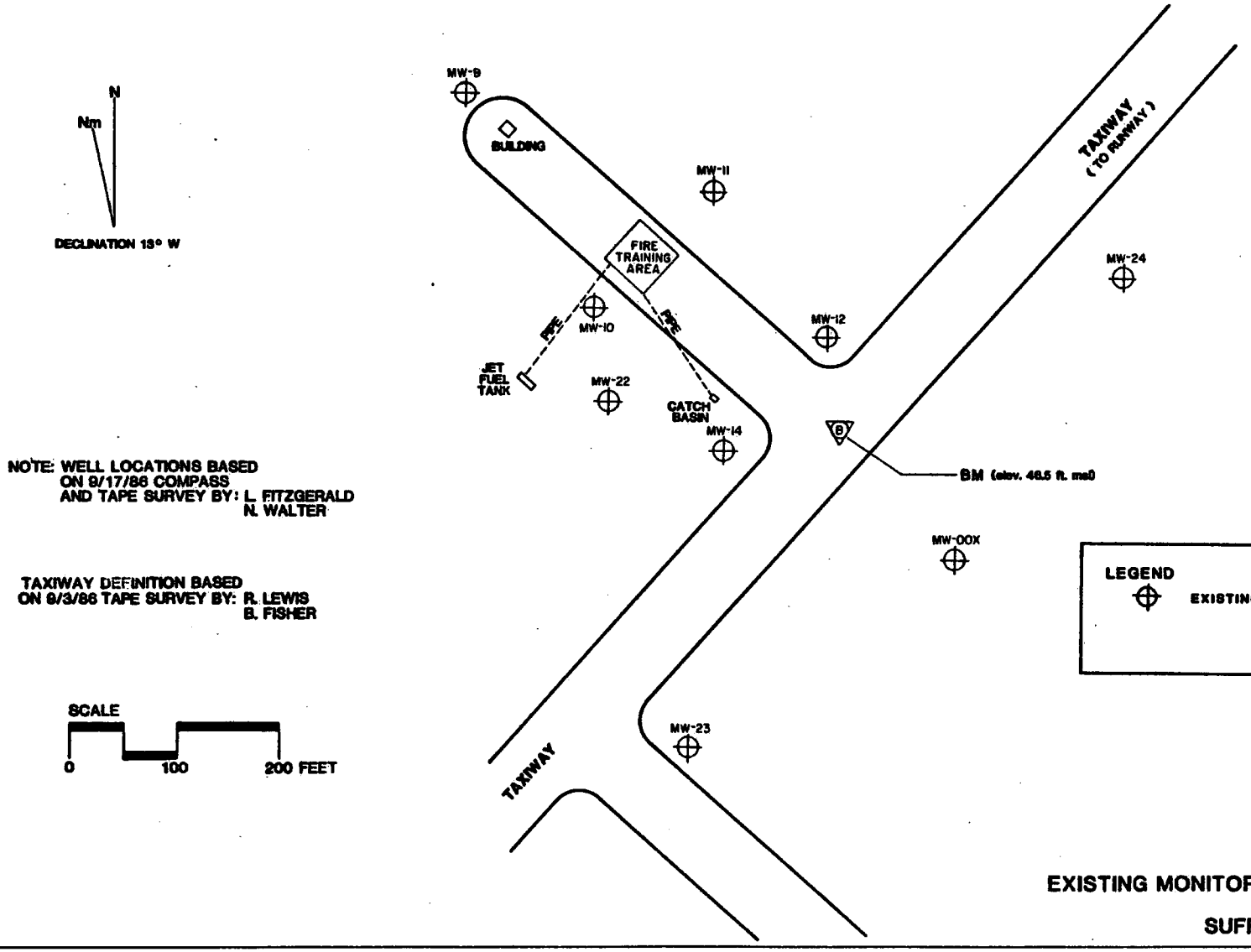


FIGURE B-1
EXISTING MONITORING WELL LOCATIONS
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT
E.C.JORDAN CO.

- details of the backfill and seals on the wells are not available;
- Well No. 10 has been damaged by fire training activities.

These wells may be used for piezometric data, however.

Water Supply Wells

One major water supply well complex has been identified within one mile downgradient of the FTA. This is the Suffolk County Water Authority, Meeting House Road Wellfield. These wells supply the water for the Westhampton and Westhampton Beach areas.

The wellfield contains nine wells. The wells vary in depth between 50 and 80 feet below the ground surface.

Monthly water production from the wells varies greatly with low production during the winter months (as low as 672,000 gallons in January 1983) and much higher production in the summer (42,000,000 gallons in July 1983). The annual production over the last 5 years has varied between 123 million gallons/year and 185 million gallons/year.

Monitoring wells have been installed along South Country Road by Suffolk County upgradient of the wellfield to provide early warning of any potential groundwater contamination problem for the water supply. The Suffolk County Water Authority reports that there has never been any contamination detected in the monitoring wells or in the water from the water supply wells.

Private water supply wells for homes may exist within one mile downgradient of the FTA. Tasks necessary to locate and describe these wells are identified in the Work Plan.

425 TAYLOR ROAD
STOW, MASSACHUSETTS 01775
(617) 897-8737

SOIL EXPLORATION CORPORATION

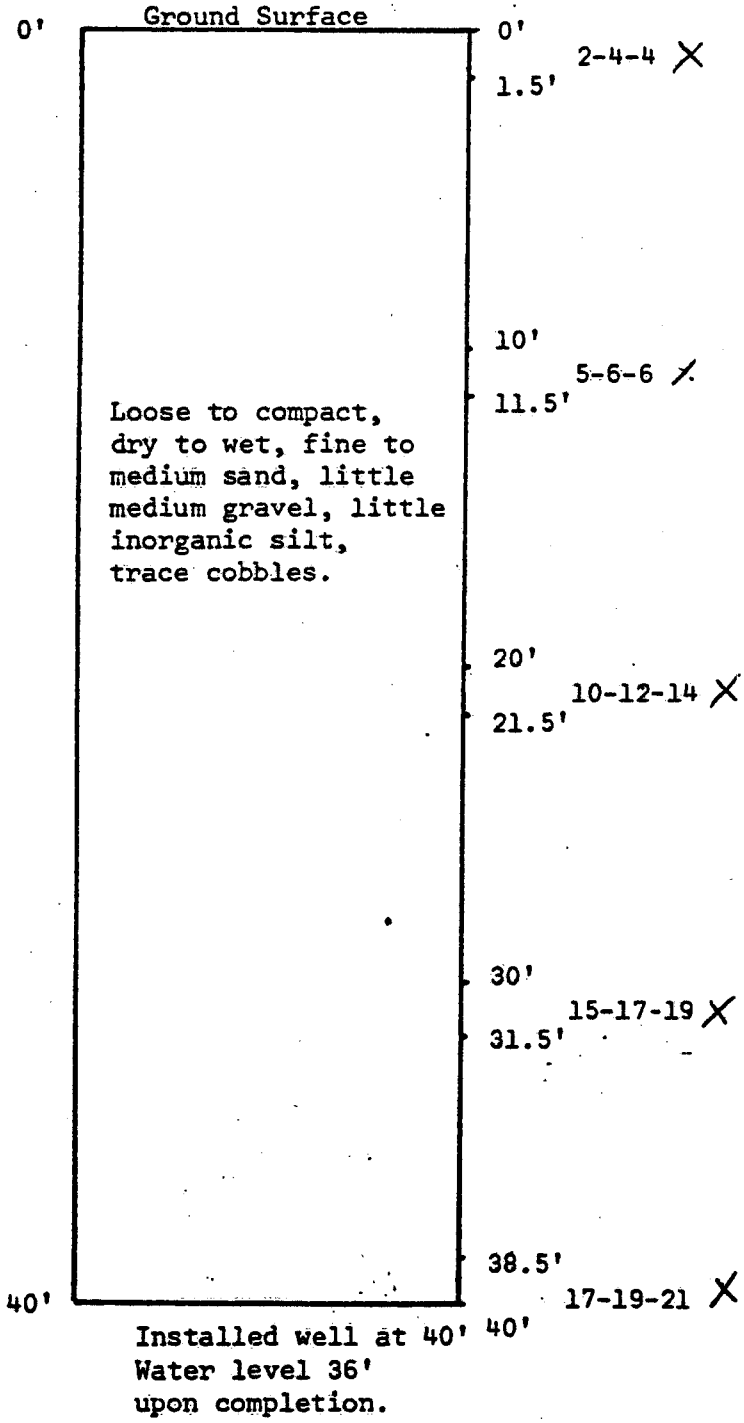
TEST BORINGS • GEOLOGICAL CONSULTING

OAK HILL PROFESSIONAL PARK
LONDONDERRY, N.H. 03053
(603) 627-3051

To: Civil Engineering, NYANG Date: 5/10/82 Job No. 82-098

Location: Suffolk County Airport, Westhampton Beach, NY Scale 1" = 6 ft.

Observation Well No. 9
5/6/82
Ground Surface



Installed well at 40'
Water level 36'
upon completion.

Materials used:
1 - 10' x 3" sch. 40 machine slotted PVC
1 - 20' x 3" sch. 40 machined ends PVC
1 - 10' x 3" sch. 40 machined ends PVC
1 - 2' x 3" sch. 40 machined ends PVC
3 - 3" sch. 40 couplings
1 - 3" sch. 40 cap

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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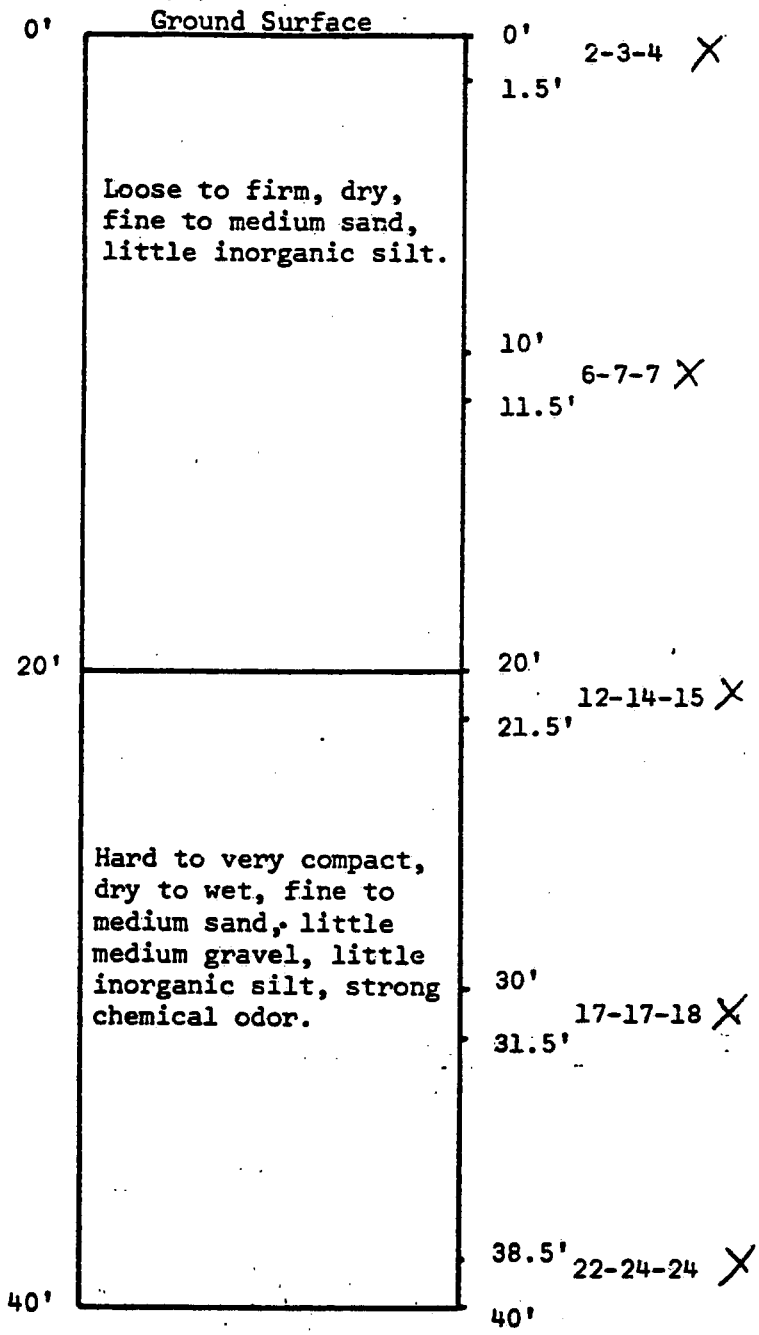
To Civil Engineering, NYANG Date 5/10/82 Job No. 82-098

Location Suffolk County Airport, Westhampton Beach, NY Scale 1" = 6 ft.

Observation Well No. 10
5/6/82
Ground Surface



Installed well at 40'
Water level 35.5'
upon completion.

Materials used:
1 - 10' x 3" sch. 40 machine slotted PVC
1 - 20' x 3" sch. 40 machined ends PVC
1 - 10' x 3" sch. 40 machined ends PVC
1 - 2' x 3" sch. 40 machined ends PVC
3 - 3" sch. 40 couplings
1 - 3" sch. 40 cap

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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LONDONDERRY, N.H. 03053
(603) 627-3051

To: Civil Engineering, NYANG Date: 5/10/82 Job No.: 82-098

Location: Suffolk County Airport, Westhampton Beach, NY Scale 1" = 6 ft.

Observation WEll No. 11
5/5/82
Ground Surface

0' — Loose, dry, fine to med sand, little organic silt.

2' — Firm to very compact, dry to wet, fine to medium sand, little medium gravel, little inorganic silt, trace cobbles.

38' — Installed well at 38'
Water level 34'
upon completion.

0' — 2-3-4
1.5' — no sample required at change
10'
11.5' — 5-6-6 X
20'
21.5' — 14-15-17 X
30'
31.5' — 17-19-22 X

no samples required at bottom of hole

Materials used:
1 - 10' x 3" sch. 40 machine slotted PVC
1 - 20' x 3" sch. 40 machined ends
1 - 10' x 3" sch. 40 machined ends
2 - 3" sch. 40 couplings
1 - 3" sch. 40 cap

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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(603) 627-3051

To Civil Engineering, NYANG Date 5/10/82 Job No. 82-098

Location Suffolk County Airport, Westhampton Beach, NY Scale 1" = 6 ft.

Observation Well No. 12
5/5/82
Ground Surface

0'

Loose to hard, dry, fine to medium sand, little medium gravel, little inorganic silt.

29'

Very compact, dry to wet, fine to medium sand, little inorganic silt, trace medium gravel, trace cobbles, petrol odor.

35.5'

0'
2-4-5 X
1.5'
10'
6-7-8 X
11.5'
20'
10-12-14
21.5'
30'
17-19-21 X
31.5'

Installed well at 35.5'
Water level 33'
upon completion.

Materials used:
1- 10' x 3" sch. 40 machine slotted PV
1 - 20' x 3" sch. 40 machined ends PVC
1 - 5' x 3" sch. 40 machined ends PVC
1 - 2½' x 3" sch. 40 machined ends. P
3 - 3" sch. 40 couplings
1 - 3" sch. 40 cap

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

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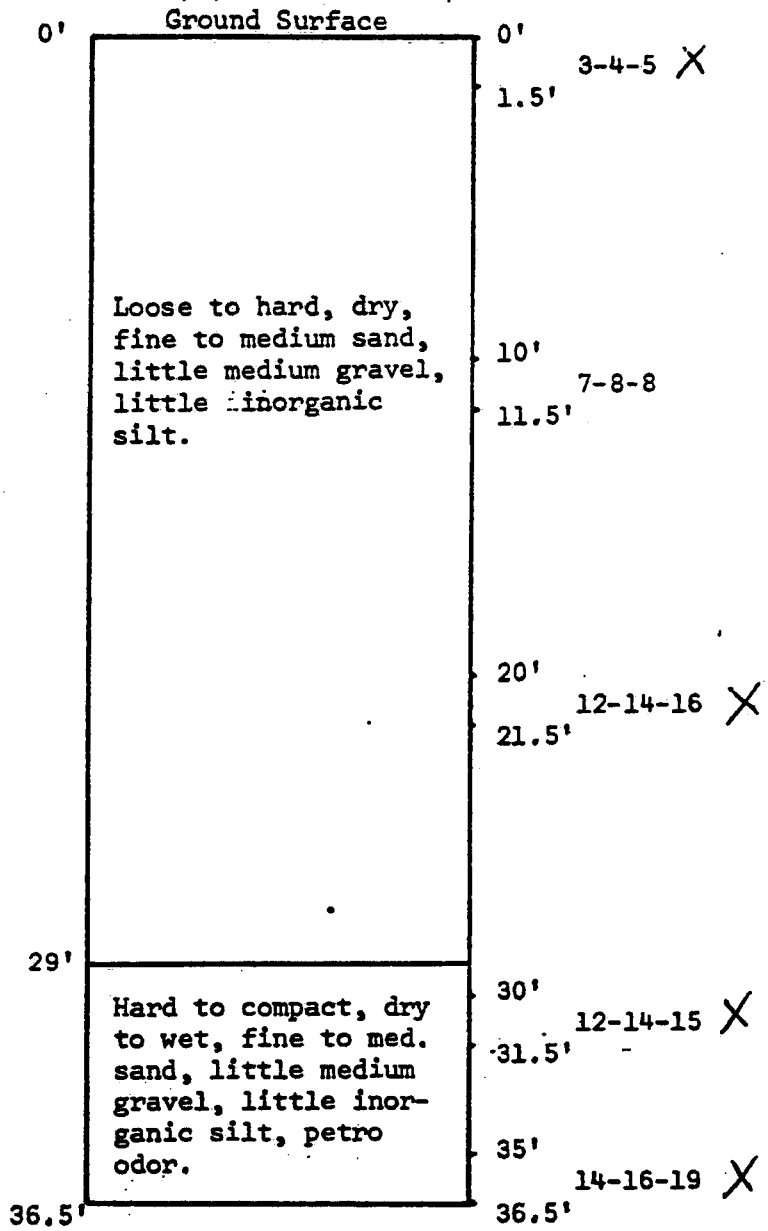
To Civil Engineering, NYANG Date 5/10/82 Job No. 82-098

Location Suffolk County Airport, Westhampton Beach, NY Scale 1" = 6 ft.

Observation Well No. ~~13~~ 14
5/5/82
Ground Surface



Installed well at 36'
Water level 32'
upon completion.

Materials used:
1 - 10' x 3" sch. 40 machine slotted
2 - 10' x 3" sch 40 machined ends PV
1 - 8' x 3" sch. 40 machined ends PV
1 - 3" sch 40 cap
1 - 3" sch 40 coupling

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

425 TAYLOR ROAD
STOW, MASSACHUSETTS 01775
(617) 897-8737

SOIL EXPLORATION CORPORATION
TEST BORINGS • GEOLOGICAL CONSULTING

OAK HILL PROFESSIONAL PARK
LONDONDERRY, N.H. 03053
(603) 627-3051

To NYANG, Base Contracting Division Date 6/14/82 Job No. 82-128

Location Suffolk County Airport, Westhampton Beach, NY Scale 1" = 6 ft.

Observation Well No. 22
6/9/82
Ground Surface

Depth	Description	Blows
0'		
.5'	Very loose, dry, fine to medium sand, little fuel smell, little inorganic silt.	2
1.5'		3-3
5'	Very loose, dry, fine to med. sand, little inorganic silt.	
6.5'		8-9-10
10'		
11.5'	Hard to compact, dry to wet, fine to coarse sand, some medium gravel, little inorganic silt, trace cobbles, No fuel odor.	10-11-12
15'		
16.5'		15-19-19
20'		
21.5'		14-16-17
25'		
26.5'		17-18-19
30'		
31.5'		19-19-20
36.5'		15-18-20
38'		

End of boring 38'
Water level 34'9"
upon completion.

Installed well at 38'

Materials used:

1 - 10' x 4" sch. 40 machine slotted screen
3 - 10' x 4" sch. 40 machined pipe
1 - 4" sch. 40 cap

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

425 TAYLOR ROAD
STOW, MASSACHUSETTS 01775
(617) 897-8737

SOIL EXPLORATION CORPORATION

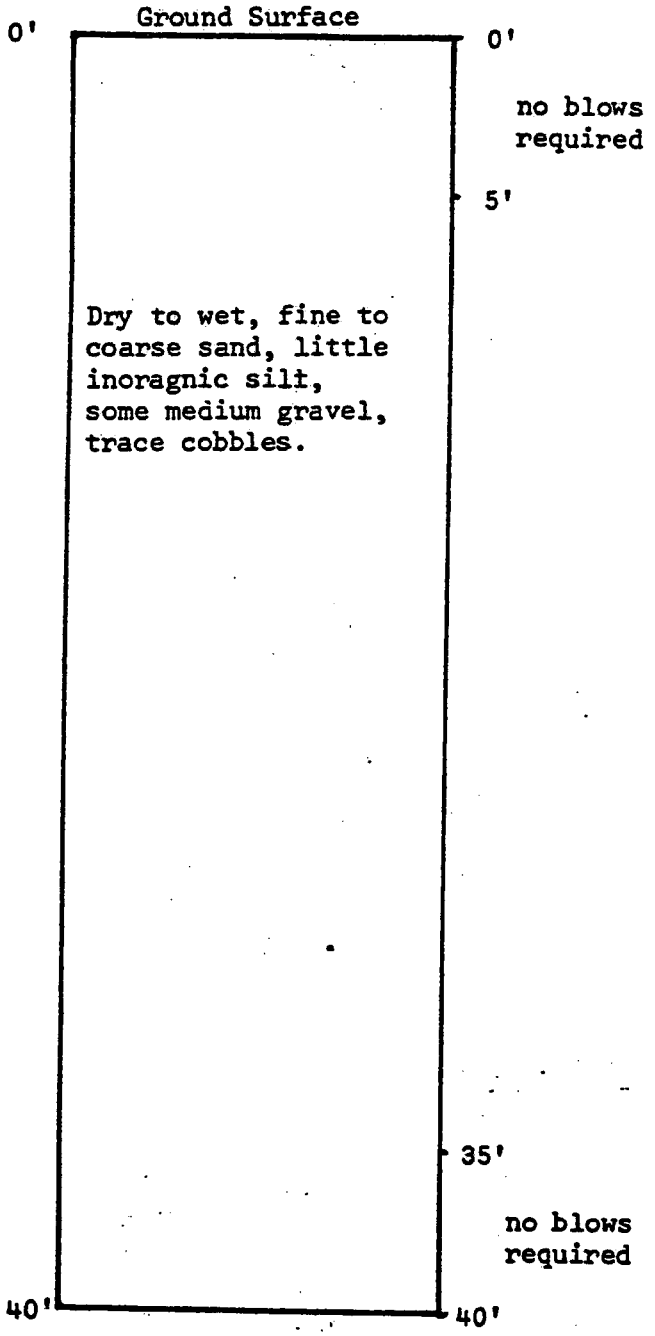
TEST BORINGS • GEOLOGICAL CONSULTING

OAK HILL PROFESSIONAL PAR
LONDONDERRY, N.H. 03053
(603) 627-3051

To NYANG, Base Contracting Division Date 6/14/82 Job No. 82-128

Location Suffolk County Airport, Westhampton Beach, NY Scale 1" = 6 ft.

Observation Well No. 23
6/10/82
Ground Surface



Materials used:
1 - 10' x 4" sch. 40 machine slotted screen
3 - 10' x 4" sch. 40 machined pipe
1 - 4" sch. 40 cap

End of boring 40'
Water level 30'7" upon completion.

Installed well at 38'

Standard Penetration Test - 140# hammer failing 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

425 TAYLOR ROAD
STOW, MASSACHUSETTS 01775
(617) 897-8737

SOIL EXPLORATION CORPORATION

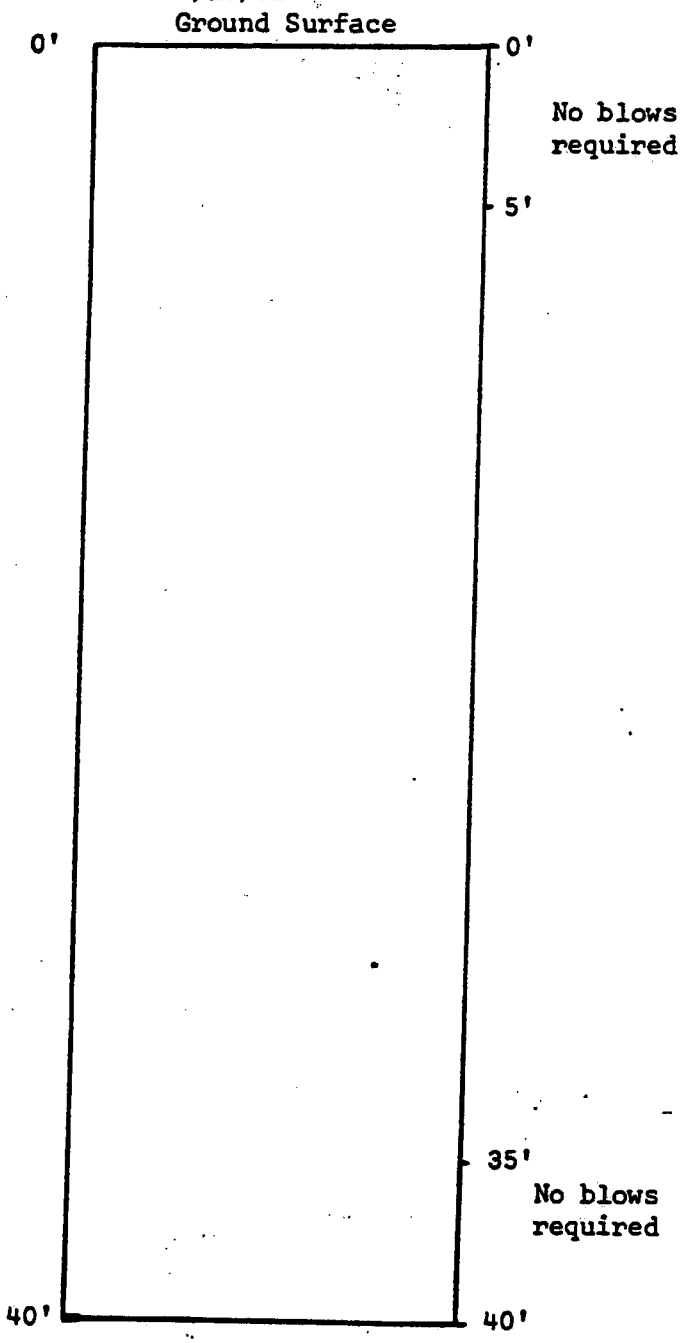
TEST BORINGS • GEOLOGICAL CONSULTING

OAK HILL PROFESSIONAL PAR
LONDONDERRY, N.H. 03053
(603) 627-3051

To NYANG, Base Contracting Division. Date 6/14/82 Job No. 82-128

Location Suffolk County Airport, Westhampton Beach, NY Scale 1" = 6 ft.

Observation Well No. 24
6/10/82
Ground Surface



Materials used:
1 - 10' x 4" sch. 40 machine slotted screen
3 - 10' x 4" sch. 40 machined pipe
1 - 4" sch. 40 cap

End of boring 40'
Water level 32'7"
upon completion.

Installed well at 38'

Standard Penetration Test - 140# hammer falling 30" - Blows are per 6" taken with 18" long x 2" O.D. x 1-3/8" I.D. Split Spoon Sampler unless otherwise noted.

Type of Boring - 2½" Casing ☐ 3½" Casing ☐ Hollow Stem Auger ☒ Solid Stem Auger ☐

Notes - Water levels indicated may vary with seasonal fluctuation and the degree of soil saturation when the boring was taken. The following terms used in the soil descriptions are based on visual identification: Trace 0-10%, little or few 10-20%, Some 20-40%, and 40-50%.

APPENDIX C

SUMMARY SITE SAFETY PLAN

E.C. JORDAN CO.
SUMMARY SITE SAFETY PLAN

A. GENERAL INFORMATION

SITE: Suffolk County Airport Fire Training Area

SITE OWNER/CONTACT: Suffolk County Department of Aviation

Major Gerald Harris - Air National Guard

LOCATION: Suffolk County Airport, Westhampton Beach, N.Y.

PLAN PREPARED BY: Nelson Walter DATE: 10/3/86

APPROVED BY: _____ DATE: _____

OBJECTIVE(S): To maintain a safe work environment and to protect the health of on-site personnel.

PROPOSED DATE(S) OF INVESTIGATION: December 1986 - January 1987

BACKGROUND REVIEW: Complete: X Preliminary: ____

OVERALL HAZARD: Serious: ____ Moderate: ____ Low: X Unknown: ____

B. SITE/WASTE CHARACTERISTICS

WASTE TYPES: Liquid X Solid ____ Sludge ____ Gas ____

CHARACTERISTICS: Corrosive ____ Ignitable X Radioactive ____

Volatile X Toxic X Reactive ____ Unknown ____

SITE DESCRIPTION: The Suffolk County Airport Fire Training Area (FTA) is located on a dipsersed parking hardstand next to the Northeast-Southwest runway of the Suffolk County Airport. The FTA was used by the Air Force at least as early as 1961 and more recently experienced shared use by the Air National Guard and local fire departments. Flammable liquids were placed on the ground or concrete hardstand and ignited, and the fire was extinguished during the fire training.

The uppermost geological layer at the site is "mostly outwash deposits of coarse and fine sand and gravel." This layer is about 120 feet thick at the airport. The layer is extremely permeable; at least 10^{-3} cm/sec. A more impermeable layer (Gardiner's Clay) underlies the upper layer.

C. HAZARD EVALUATION

During the operation of the FTA by the Air Force (prior to 1970) various waste flammable liquids were used. These probably included waste oils, solvents (e.g., kerosene, mineral spirits, trichloroethylene, MEK and toluene), and jet fuels. Since 1971, the Air National Guard has used only jet fuel (JP-4) at the FTA. It should be noted that jet fuel is composed of several organic constituents which are considered toxic or hazardous. These include naphthalene, benzene, ethylbenzene, toluene, xylene, and other alkylbenzenes.

Nine monitoring wells have been installed around the FTA. Sampling of these wells indicate that there are low levels of volatile organic compounds (all results less than 1 ppm) in the groundwater under and downgradient of the site.

A list of chemicals which may be found on site and their chemical toxicity is listed in Table C-1.

D. SITE SAFETY PROCEDURES

Map/Sketch Attached? yes (Figure C-1) Site Secured? no

Perimeter Identified? yes Zone(s) of Contamination Identified? yes

Perimeter Establishment: The Suffolk County Airport is surrounded by a chain link fence.

PERSONNEL PROTECTION: All site activities will be Level D with the ability to upgrade to Level C if needed based on PI meter readings and safety officer's assessment of situation.

SITE MONITORING EQUIPMENT:

- photoionization meter
- oxygen deficiency meter
- explosimeter
- organic vapor analyzer

DECONTAMINATION PROCEDURES:

Personnel: Since most of the site work is anticipated to be Level D, decontamination will simply be to remove coveralls and leave them on-site. If disposable protective clothing is used (e.g., Level C) the clothing will be placed in a 55-gallon drum at the end of each shift.

TABLE C-1
CHEMICAL TOXICITY AND OTHER RELATED INFORMATION
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

CHEMICAL	TLV (ppm)	APPROXIMATE ODOR THRESHOLD (ppm)	PHYSICAL CHARACTERISTICS	DERMAL TOXICITY	REMARKS
Benzene	10		colorless liquid with aromatic odor	local systemic	Poisoning occurs most commonly through inhalation; also penetrates through skin. Symptoms: irritates eyes, nose, respiratory system, giddiness, head, nausea, staggered gait; fatigue, depression, abdominal pain Target organ: blood, CNS, skin, bone marrow eyes, respiratory system First Aid: Swallow: NO VOMIT Skin: soap wash Incompatibilities: strong oxidizers, chlorine, bromine with iron. Dangerous when exposed to heat or flame.
Trichloroethylene (TCE)	50	50	colorless liquid sweet odor		Symptoms: headache, vertigo, vision distortion, tremors, somnolence, nausea, vomit, irritates eyes, cardiac arrythmias, parestesias Target organ: respiratory system, heart, liver, kidneys, CNS, skin First Aid: Swallow: Ipecac, vomit Skin: soap wash immediately Incompatibles: strong caustics; chemically active metals: Ba, Li, Na, Mg, liquid O_2, Al, O_2, KNO_3, Ti.
methylethyl ketone (2-Butanone) (MEK)	200		colorless, clear liquid with a fragrant mint-like odor		Symptoms: Irritates eyes, nose, head, dizziness, vomit Target organs: CNS, lungs First Aid: Swallow: Ipecac, vomit Skin: water wash immediately
Ethyl Benzene	100		colorless liquid with aromatic odor	local systemic	Symptoms: irritant to eyes and mucous membrane, headache, narcotic Target organ: eyes, upper respiratory system First Aid: NO VOMIT Incompatibilities: oxiding materials; dangerous when exposed to heat or flame.

TABLE C-1 (cont.)
CHEMICAL TOXICITY AND OTHER RELATED INFORMATION
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

CHEMICAL	TLV (ppm)	APPROPRIATE ODOR THRESHOLD (ppm)	PHYSICAL CHARACTERISTICS	DERMAL TOXICITY	REMARKS
Xylene	100		liquid colorless, aromatic odor	local systemic	Symptoms: dizziness, excitement, drowsiness incoordination, staggering gait, irritates eyes, nose and throat, corneal vacuolization, nausea, vomit, abdominal pain Target organs: CNS, eyes, GI tract, blood, liver, kidneys, skin First Aid: Swallow: NO VOMIT Skin: soap wash Incompatibilities: strong oxidizers; dangerous when exposed to heat or open flame.
Toluene	100		liquid	local systemic	Symptoms: fatigue, confusion, euphoria, dizzy, headache, dialated pupils, lack of appetite, nervousness, insomnia Target organs: CNS, liver, kidneys, skin First Aid: Swallow: NO VOMIT Skin: soap wash Incompatibilities: strong oxidizers.
Naphthalene	10	.01	mothball odor	local systemic	Poisoning may occur through ingestions of large doses, inhalation or skin adsorption.
Kerosene (Mineral oil)			pale yellow to water white oily liquid		Inhalation of high concentrations of vapors can cause headache, stupor. Ingestion causes irritation of the stomach with nausea and vomiting.
Mineral Spirits (petroleum spirits)			volatile clear colorless liquid		Ingestion can cause burning sensation, vomit, drowsiness, diarrhea. Inhalation of concentrated vapors causes intoxication like alcohol.
Lead	.15		Bluish white or silvery gray solid		Lead is a cumulative poison. Increasing amount builds up in the body and eventually a point may be reached where symptoms and disability occur. Symptoms: (Long term exposure) Decreased physical fitness, fatigue, sleep disturbances, headache, aching bones, constipation, decreased appetite, and abdominal pain. Inhalation of large amounts of lead may lead to seizures, coma and death. Target organs: GI, CNS, kidneys, blood, gingival tissue.

TABLE C-2
ON-SITE PERSONNEL TRAINING
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

TOPIC	HRS.	L. Fitzgerald	N. Walter	I. Broadwater	J. McMullen	R. Burger
INTRODUCTION/REFRESHER	4	o	o	o	o	o
FIRST AID	8	o			o	o
CPR (OPTIONAL)	8	o			o	
NUS COURSE OR EQUIVALENT	30	o	o	o	o	
OVA	16	o				
PI METER	2	o	o	o	o	o
SCBA REVIEW	4	o			o	
SAMPLING	--	o			o	o
HEALTH MONITORING	--	o	o	o	o	o

o indicates training completed

Equipment: Equipment decontamination will be performed according to the Jordan Health and Safety Plan. Highlights of specific decontamination procedures to be used are:

- Drill rigs will be steam cleaned prior to being used on site and before leaving the site.
- All down-hole tools will be steam cleaned between borings.
- Split spoons will be cleaned immediately after they are used. This will be accomplished by diposing of soils from the split spoon in a 55-gallon drum, washing with soapy water, rinsing in potable water, followed by an isopropyl alcohol rinse, and finally a distilled water rinse.
- Other sampling equipment, unless badly soiled, will be decontaminated by rinsing with isopropyl alcohol followed by a distilled water rinse.

MOBILIZATION AND SITE ENTRY: A contamination reduction zone will be established onsite. Field work preparation, staging and decontamination will take place in this area.

TEAM ORGANIZATION:

Team Member	Responsibility
Larry Fitzgerald	Site Safety Officer
Nelson Walter	Team Leader and Field Laboratory
Ian Broadwater	Drill Monitor
Bob Burger	Sampler
Jay McMullen	Sampler
Rick Allen	Geophysics

WORK LIMITATIONS: (Time of day, etc.): Work will be done during daylight hours primarily. However, occasionally work may contine past sunset only with adequate lighting to work safely.

DISPOSAL OF WASTES

Protective Clothing - Protective clothing will be drummed and stored onsite in an area designated by the Air National Guard until the field work is complete and the analtyical results are available from the soil and water sampling. The drums will then be taken off site and disposed of in a sanitary or secure landfill as appropriate. It is anticipated that fewer than three drums of protective clothing will be generated.

Soil - Excess soils will be generated as a result of drilling and sampling operations. Generally these excess soils will be left on the surface of the

ground in the location where they are generated. However, as a safety precaution, soils, which when monitored with a PI meter cause an organic vapor reading of 5 ppm or more above background, will be placed in 55-gallon drums. These drums will be transproted to an area 70 feet north of the FTA hardstand and emptied on the ground. At the conclusion of the field investigation program, these soils will be covered with 6 inches of native clean sand to reduce the chance of exposure to the waste soils.

Water - Water generated during drilling, sampling, and decontamination activities will be poured on the ground and allowed to percolate into the soils where it originated.

E. EMERGENCY INFORMATION

LOCAL RESOURCES

Ambulance 728-3400

Central Suffolk Hospital Emergency Room 548-6026

Poison Control Center 542-2323

Police 548-3200 (Suffolk County Sheriff), 728-3400 (South Hampton Town)

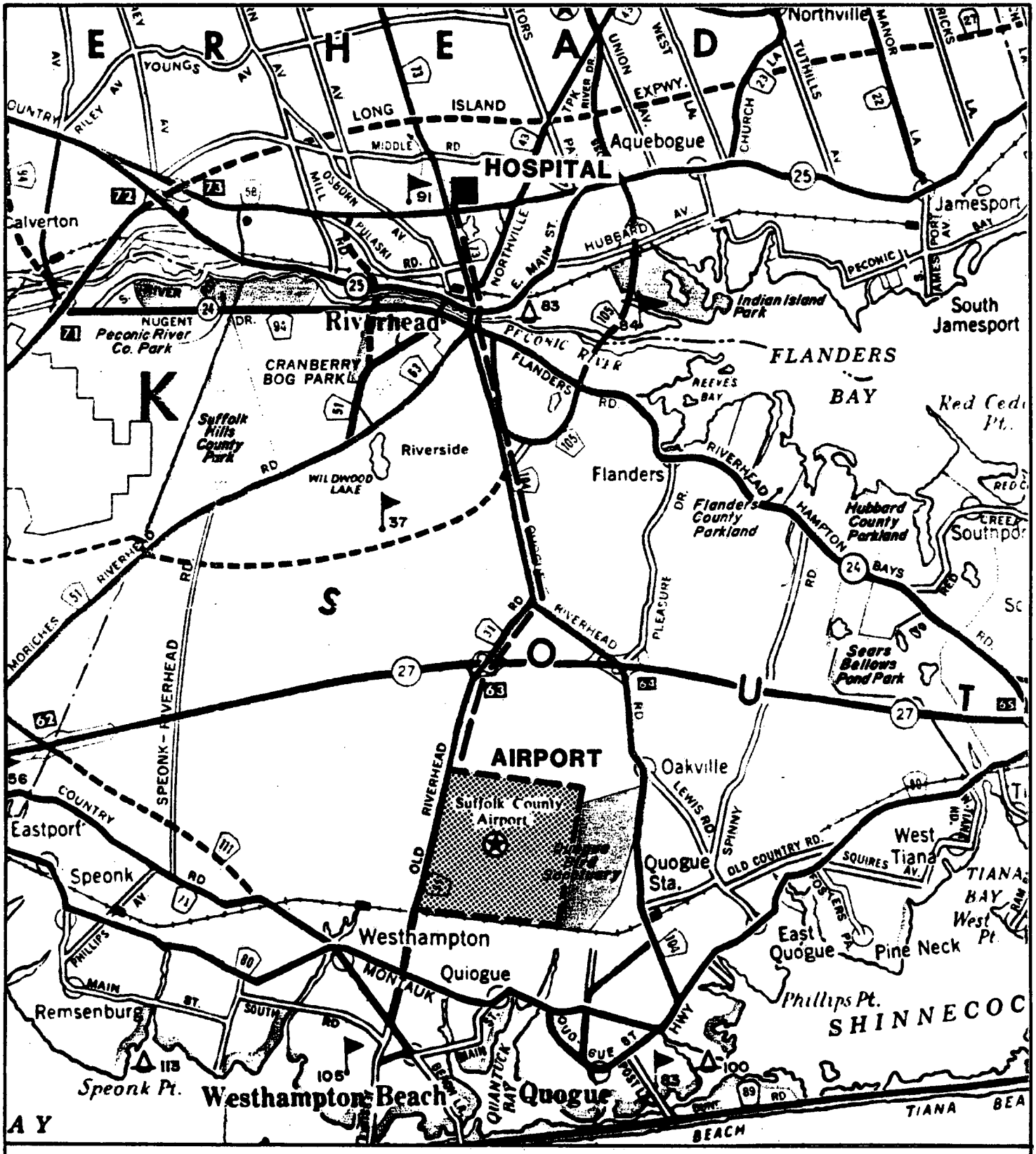
Fire Department Base 233 (for emergency)

EMERGENCY CONTACTS

1. Dr. Frank Lawrence/Envirologic Data. . . . . .(207) 871-2617
2. Bruce Campbell, RPh. . . . . .(207) 871-2449
3. Maine Poison Control Center. . . . . .(207) 871-2950
4. E.C. Jordan (Maine). . . . . .(207) 775-5401
5. E.C. Jordan (Florida). . . . . .(904) 656-1293
6. E.C. Jordan (Detroit). . . . . .(313) 569-3955
7. Envirologic Data . . . . . .(207) 773-3020
8. USEPA Emergency Response . . . . . .(800) 424-8802
9. Air National Guard (Major Harris). . . . . .(516) 288-4200
10. Suffolk County Airport (Mr. LaTrenta). . . . . .(516) 288-3600

F. EMERGENCY ROUTES

DIRECTIONS TO HOSPITAL: Exit site, turn right onto Old Riverhead Road (County Route 31). Go North on Old Riverhead Road to junction with County Route 104. Turn left on 104 (North). Follow 104 into downtown Riverhead. Turn right on Main Street (NYS Route 25). Make an immediately left onto Roanoke Avenue (County Route 73 North). Follow Roanoke Avenue to traffic circle. Hospital is on northeast side of circle.



ROUTE TO HOSPITAL
FIGURE C-1
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

E.C.JORDAN CO.

TABLE C-3
PERSONNEL SAFETY EQUIPMENT CHECKLIST
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

Quantity Required	Protective and Safety Equipment	Model or Material
	SCBA	MSA 401
	Spare Cylinders	
	Escape Mask	ELSA
1 pp	Full Face Respirator	
2 ppd	Cartridge	
1 pp	Hardhat w/ Face Shield	
1 pp	*Safety Glasses	
	Ear Protection	
2 ppd	*Gloves, inner	surgical
2 ppd	*Gloves, outer:	nitrile
	Chem Resist Coveralls	
	Disposable Coveralls	Coated Tyvek
	Splash Aprons	Vinyl
1 pp	*Boots: Safety Boots	
	Fully Encapsulated Suits	
1 pp	*Dosimeters	TLD
	First Aid Equipment	
1	*Utility first aid kit	
	Industrial first aid kit	
	Stretcher	
	Oxygen	
1	*Eye Wash Station	Portable
	Emergency Shower	
1	*Fire Extinguisher	CO_2
	Safety Harness	
	Emergency Tools	
	Other	
5	duct tape (rolls)	

* - Mandatory
pp - per person
ppd - per person per day

TABLE C-4

DECONTAMINATION EQUIPMENT/MATERIALS
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

Quantity	Type	Remarks
4	wash tubs	
1	steam sprayer	
4	scrub brushes	
	containers	
3	protective clothing	55 gallon drum
4	soil cuttings	55 gallon drum
1 box	detergent	
85 gallons	isopropanol	
170 gallons	deionized water	
2 Boxes	disposable wipes	
	plastic wrap	
	Ziploc bags	

APPENDIX D

QUALITY ASSURANCE PROJECT PLAN SUMMARY

Quality Assurance Project Plan
(QAPP)

Task: 2-A Suffolk County Airport Fire Training Area

Subtasks	Standard Protocol Selected
Soil Sampling During Hand Borings	QAPP (6.5.2)
Soil Sampling During Drilling	QAPP (6.5.2)
Drilling and Installation Wells	will be described in Standard Specifications in Driller Subcontract
Test Pitting	QAPP (6.5.3)
Groundwater Sampling	QAPP (6.6.2)

Task Organization

Name	Function
N. Walter	Team Leader
L. Fitzgerald	Safety Officer
I. Broadwater	Drilling Team
R. Burger	Sampling Chief
J. McMullen	Sampler
R. Allen	Geophysics

Subcontractors	Function
Compuchem, Inc.	Chemical Analysis
Driller - to be selected	Boring and Well Installation
Backhoe - to be selected	Test Pitting and covering potentially contaminated drilling soil cuttings

Contacts	Function
William Owens	Oak Ridge National Laboratory - Project Manager
Major G. Harris	DOD Point of Contact, Suffolk County Airport Air National Guard Base
Lt. Col. Washeleski	ANGSC Project Officer

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0068.0.0

Analytical Data

Matrix/Analysis		Methods to be utilized
Water:	VOA	CLP - COP
	SVOA	CLP - COP
	Lead	CLP - CIP
	Oil and Grease	EPA 418.1
Soils:	VOA	CLP - COP
	SVOA	CLP - COP
	Lead	CLP - CIP
	Pest/PCB	CLP - COP
	Oil and Grease	USEPA Method 3540
	Clay Permeability	Triaxial Permeability
	Grain Size Analysis	ASTM D-422

Comments

Disposal of wastes and decontamination of equipment procedures can be found in the Health and Safety Plan.

TABLE D-1
SAMPLING DATA
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

Sampler Matrix/Analysis Blanks	Samples	Field Blanks	Sampler Blanks	Duplicates	Martin Marietta Duplicates	Matrix Spikes	Matrix Spike Duplicates	Distilled Water	Total
Water: VOA	20	2	2	2	2	2	2	2	34
SVOA	20	--	2	2	2	2	2	2	32
Lead	20	--	2	2	2	2	2	2	32
Oil and Grease	20	--	--	2	2	--	--		24
Soils: VOA	70	--	--	7	7	4	4		92
SVOA	70	--	--	7	7	4	4		92
Lead	70	--	--	7	7	4	4		92
Pest/PCB	6	--	--	1	1	1	1		9
Oil and Grease	70	--	--	7	7	--	--		84
Grain Size	18	--	--	--	--	--	--		18
Triaxial Permeability	2	--	--	--	--	--	--		2

[1] Total does not include ORNL Duplicates

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TABLE D-2
ANALYTICAL PROGRAM SUMMARY
FIRE TRAINING AREA
SUFFOLK COUNTY AIRPORT

MEDIUM	LOCATIONS	SAMPLES	SCREEN	SAMPLES FOR ANALYSIS	BLANKS	DUPLICATES	(4) REPLICATES	MARTIN MARIETTA	DISTILLED WATER	TOTAL
SOIL										
Hand Auger	30	90	90	50	0	5	3x2	5	--	66
Borings	5	45	45	20	0	2	1x2	2	--	26
WATER										
Completed Wells	10	14	0	20	2	2	2x2	2	2	32

1. Includes: 10% Duplicates for soils; 10% field blanks, 10% duplicates plus 1 sampler blank for each of 2 planned sampling events. Replicates at 1 sample per 20 for CLP QA/QC.

2. Soil samples screened for VOA (Headspace), oil and grease and PCB.

3. Field measurements will be made for temperature, specific conductance and pH.

4. Replicates to CLP are counted twice for costing the analytical program and are counted as such in the totals of this table for the sake of consistency.

APPENDIX E

PROJECT PERSONNEL RESUMES

Name: WILLIAM R. ADAMS, JR.

Program Assignment: Corporate Officer

Level: P-4

Relevant Experience

Mr. Adams has extensive professional experience in the administration of state and Federal environmental laws as the result of more than 12 years with the U.S. Environmental Protection Agency as Region I Administrator, and with the Maine Department of Environmental Protection as Commissioner.

Mr. Adams has served as project officer on over 25 of Jordan's recent contracts to assist state and local governments and industry in the assessment of hazardous waste problems and in the proposal of remedial actions. Mr. Adams is currently serving as Corporate Officer for the multi-site RI/FS program Jordan is conducting for New York State Electric & Gas at the sites of former coal gasification plants. For services provided to the Massachusetts Department of Environmental Quality Engineering at the Silresim Chemical Corporation site, Mr. Adams was responsible for such management and administrative duties as reviewing, coordinating, and monitoring the project's organizational and technical efforts; and representing the company in meetings with the client and, as necessary, representing the client in meetings with other parties.

In addition to the Silresim project, Mr. Adams has also served as project officer for a hazardous waste evaluation for the Vermont Agency of Transportation at the Pine Street Canal site; a cost-effectiveness study of remedial action for the Rhode Island Department of Environmental Management (RIDEM); a toxic organic groundwater abatement program at a Superfund site also for RIDEM; and a remedial action and design program at the Winthrop Landfill (Maine) Superfund site for the Inmont Corporation. Mr. Adams serves on Jordan's quality assurance team for the firm's remedial action assessment and long-term environmental monitoring at Love Canal in Niagara Falls, New York.

While Administrator of EPA Region I, Mr. Adams aggressively pursued the assessment and clean-up of illegal hazardous waste sites in New England. During his tenure, a full 25 percent of the total hazardous waste assessment funds in U.S. EPA was spent in New England. Seven major hazardous waste clean-up operations were conducted by EPA under Mr. Adam's direction. The projects were geographically spread throughout New England and he was in constant close contact with mayors, governors and congressional delegations concerning hazardous waste impact.

Education

B.S. in Civil Engineering, University of South Carolina, 1951

Professional Registration

Professional Engineer in Maine and New Hampshire
Registered Land Surveyor in Maine

Name: RICHARD P. ALLEN

Program Assignment: Soil Scientist

Level: P-2

Relevant Experience

Mr. Allen is responsible for all Jordan Company geophysical exploration activities. These responsibilities include the application of geophysical techniques to the assessment of subsurface conditions at proposed and existing solid and hazardous waste sites, earth resource studies including groundwater and minerals exploration, and engineering studies for siting and preliminary design. Jordan Company projects to which he has contributed include:

- remedial investigations and feasibility studies for two uncontrolled hazardous waste Superfund sites in Michigan for the Department of Natural Resources. Activities included earth resistivity studies to obtain geologic information, and metal detector/magnetometer surveys to locate buried repositories of drummed wastes.

- a soil and groundwater quality assessment for Delta Chemical Corporation (Maine). Terrain conductivity measurements were made along several traverses to assess the impact on surficial soils of an accidental acid spill.

- a hydrogeologic study at a New England industrial complex to assess the impact on the groundwater regime of several accidental spills of volatile organic chemicals; more than 8,000 feet of seismic profiling was accomplished to provide groundwater flow directions and to site monitoring wells;

- two plume-tracing studies in New Hampshire by the earth resistivity technique to determine the extent of groundwater contamination by: a) a paper company sludge landfill; and b) a filter bed for wastewater effluent from an industrial fasteners manufacturer;

Mr. Allen has participated in more than 200 individual geophysical studies. His background has given him a broad range of exposure to the geophysical techniques used in earth science and engineering studies, including seismic refraction, electrical resistivity, terrain conductivity, magnetics, gravity, ground-penetrating radar and borehole logging. He has extensive experience in the application of these techniques to evaluate subsurface conditions for waste impact studies, earth and groundwater resource investigations, and siting of facilities for engineering projects.

Education

B.S. in Physics, Bowdoin College, 1967
M.S. in Geophysics, Bowdoin College, 1971

Name: JAMES S. ATWELL

Program Assignment: Quality Review Board

Level: P-4

Relevant Experience

Mr. Atwell is responsible for the development of hazardous and nonhazardous waste management programs for public and private sector clients. Recent projects have included remedial investigations/feasibility studies at Superfund and other hazardous waste sites in Michigan for the Michigan Department of Natural Resources; evaluation and design of remedial action at the Pine Street Canal Superfund site (Vermont); evaluation and implementation of closure plans for several industrial hazardous waste facilities including design of capping systems and monitoring programs; and a geologic investigation and contamination assessment at a site formerly used for chemical storage and now under consideration for purchase by the Boston Edison Company. He played a major role in Jordan's support to the U.S. EPA in review and recommendations for hazardous waste regulation guidance documents.

He has served on Jordan's Quality Review Committee for such projects as a remedial action assessment and long-term environmental monitoring at Love Canal (New York); an assessment of the extent of solvent, resin and inorganic contamination in soils and surface and groundwaters at the Silresim Superfund site (Massachusetts); data evaluation and remedial action assessment at the North Hollywood Dump Superfund site (Tennessee); and the site evaluation, selection and design of three ash disposal systems for Central Maine Power Co. These landfills incorporated dual liner systems (flexible synthetic liner and compacted clay) and leachate collection.

During the past five years, Mr. Atwell has been responsible for several design projects including secure landfills with low permeability liners and leachate collection, industrial waste lagoon closures, and remedial actions at closed hazardous and non-hazardous waste sites.

Mr. Atwell served as project manager for U.S. EPA Contract No. 68-01-5772 from February 1979 until April 1980. This contract involved several subcontracts and required the establishment of large-scale sampling programs for the collection and analysis of solid and liquid samples for priority pollutant analyses. The contract also required assessment of waste management technologies and the preparation of industry profiles, regulatory support packages, and technical guidance documents.

Education

B.S. in Civil Engineering, University of Maine, 1965
M.S. in Civil Engineering, University of Maine, 1966

Professional Registration

Professional Engineer in Maine, Massachusetts, Michigan

Name: LAWRENCE W. BROWN

Program Assignment: Contracts and Administration

Level: P-4

Relevant Experience

Mr. Brown is responsible for management of hazardous waste, water, wastewater, industrial and commercial development projects. Areas of responsibility include project scope, schedule, budget and client relations.

Prior to his IRP contracts and administration assignment, Mr. Brown had overall responsibility for E.C. Jordan Co. project management and supervised all project managers and their support staff. In addition, during this turn-over period, Mr. Brown managed selected industrial design and hazardous waste projects.

Prior to joining Jordan, Mr. Brown was responsible for managing teams of project engineers, applications programmers, systems engineers and programmers for process control systems located throughout the U.S. and in Canada, Australia, New Zealand and Europe. His overall responsibilities included commercial and technical aspects of projects, including customer liaisons, test specifications, project schedules, manpower requirements, budgets and costs, and hardware procurement. In addition, Mr. Brown provided planning for international service commitments; developed international operating procedures and policies; planned service requirements for new systems products; and developed training requirements for service personnel.

Education

B.S. in Mechanical Engineering, University of Maine
MBA Program, University of Massachusetts

Name: ROBERT M. BURGER

Program Assignment: Manager, Groundwater Sampling

Level: P-1

Relevant Experience

As Manager of the Monitoring Department, Mr. Burger is responsible for the planning and implementing of sampling efforts for the Jordan Company as they relate to land disposal, groundwater contamination, and hazardous waste site investigations. He has coordinated and performed hazardous waste, air, soil and water sampling using U.S. EPA and specific state sampling protocols and procedures for priority pollutants.

Specific site experience includes:

- coordinated and performed surface and groundwater sampling of Pine Street Canal Superfund site (Vermont).
- developed sampling and monitoring procedures and protocols and performed sampling at Silresim Chemical Corporation site (Massachusetts).
- coordinated and performed remedial investigation sampling at Acme Solvent Superfund site (Illinois).
- performed sampling of soils, surface water and groundwater at Cannons Engineering Corporation Superfund site (Massachusetts).
- performed soil and sediment sampling for U.S. EPA and State of New Jersey dioxin sampling programs.
- provided on-site field inspection for industrial client of EPA sampling at Winthrop Landfill Superfund site (Maine).
- coordinated and performed groundwater and surface water sampling at Brunwsick Naval Air Stations hazardous waste sites (Maine).
- provides ongoing coordination and oversight of 18 groundwater monitoring sites on a quarterly basis; liaison between Jordan's analytical laboratory and project engineers for water quality analysis.

Education

A.S. in Wastewater Technology, State University of New York, 1972
NWWA Short Course - "Design, Installation and Sampling of Groundwater Monitoring Wells," July 1984

Name: ANNE M. FINLAYSON

Program Assignment: Community Relations

Level: P-2

Relevant Experience

As an environmental planner with E.C. Jordan Co., Ms. Finlayson is responsible for preparing federal and state environmental license and permit applications. She coordinates technical exhibit drawing preparation, agency consultation, and environmental report preparation for a variety of permits. Past projects have included industrial, commercial, and residential development; hydroelectric power projects; public works projects; solid waste landfills; and resource management plans. She also participates in agency consultation to identify environmental concerns and coordinates the conduct of public hearings.

For U.S. EPA regulatory development and support programs, Ms. Finlayson reviewed existing guidelines regarding corrective measures for release of contaminants to surface waters. The summary report was used to develop a guidance document for use by industry.

Education

University of Maine at Orono - B.S. in Natural Resource Management, 1981

Name: WILLIAM R. FISHER

Program Assignment: Task Order Manager

Level: P-4

Relevant Experience

Mr. Fisher is experienced in the management of major multidisciplinary projects related to sites dealing with hazardous waste issues. He has acted as project manager on several projects related to hazardous waste, including a field investigation and site assessment of an abandoned hazardous waste site, design of containment systems for potentially hazardous materials, and design of a transformer storage facility. He served as project manager for waste management studies at several Superfund sites including:

- Remedial Investigation/Feasibility Study at the Solvent Savers site (Lincklaen, NY) for a consortium of industrial clients to determine the nature and extent of environmental problems and identify appropriate remedial alternatives. The project's scope of services includes sampling and analysis of soils, sediments, surface water and groundwater as well as a magnetometer survey to map and delineate the location of buried waste.

- Pollution Abatement Confirmation Study at Brunswick Naval Air Station (Brunswick, ME), as part of the Department of the Navy's program to identify contamination of Navy and Marine Corps lands and to institute corrective measures, as needed. A preliminary study has been completed; Jordan is currently proceeding with program to verify the presence of chemical contaminants, which includes borings installation of monitoring wells, and collection and analyses of groundwater and surface water samples.

- Consultation/Negotiation of Remedial Investigation/Feasibility Study Work Plan for Iron Horse Park located in Billerica, Massachusetts. This project required the review of work plans prepared by U.S. EPA's REM II contractor for the site and preparation of comments and participation in meeting with representatives of the EPA and the REM II contractor regarding the scope of work of the work plan. Services for this task were provided to Guilford Industries.

Prior to his current assignment, Mr. Fisher was manager of geotechnical engineering for Jordan's geotechnical division. In that role he was responsible for all aspects of complex geotechnical engineering investigations. These involved selection of exploration programs, assignment and evaluation of soil mechanics testing, static and dynamic foundation analyses, report preparation, and client contact.

Mr. Fisher has been responsible for the following hydrogeologic/geotechnical projects:

- design of a system to contain spills from chemical storage tanks and conduct a site inspection of an underground spill collection sump for

the Gillette Company's Industrial Wastewater Treatment Facility at the Boston, Massachusetts plant.

- environmental studies for preparation of state and Federal licenses and permits for studies for Signal Cleanfuels, Inc.'s northern peat energy project; and

- hydrogeological explorations of the site's groundwater regime and geotechnical investigations for Superior Mining Company's feasibility studies for the development of mining facilities in northern Maine.

Mr. Fisher has also been project engineer for numerous projects relating to the evaluation of existing dams and earthen embankments.

Education

B.S. in Civil Engineering, University of Maine, 1972
M.S. in Geotechnical Engineering, University of Maine, 1974

Professional Registration

Professional Engineer in Maine and Massachusetts

Name: LAWRENCE J. FITZGERALD

Program
Assignment: Hydrogeologist

Level: P-2

Relevant Experience

Mr. Fitzgerald is a hydrogeologist in Jordan's Environmental Services Division. He is experienced in all technical phases of hazardous waste site investigations under Superfund and has provided technical oversight and community relations support for enforcement-related EPA activities. Mr. Fitzgerald has experience in planning and supervising groundwater sampling rounds, installing monitoring wells, conducting test pit excavations, groundwater contamination transport studies, and geophysical surveys.

Mr. Fitzgerald's current project responsibilities include conducting a geophysical survey at a former coal gasification site in Owego, New York for New York State Electric and Gas Corporation using ground penetrating radar; and performing a hydrogeological investigation for Murray Printing Co. in Westford, Massachusetts.

In addition, Mr. Fitzgerald has supervised and coordinated geochemical sampling teams, geophysics personnel, and grid layout crews. He has worked closely with geological field crews, and interpreted and field-checked geophysics data that were obtained with equipment used in large sulphide deposit explorations.

Education

B.A. in Geology, University of Rhode Island, 1982

Name: RICHARD L. HEBERT

Program Assignment: Environmental Assessment

Level: P-3

Relevant Experience

Mr. Hebert has eleven years of consulting and independent research experience in numerous areas including management of hazardous wastes and hazardous materials, remedial actions at uncontrolled hazardous waste sites, toxicology of pesticides, environmental chemistry of pesticides, exposure assessments and hazard evaluations, microbial degradation of crude oil and aromatic hydrocarbons, microbial ecology, and public health microbiology. He has also worked extensively with regulations used to promulgate RCRA, CERCLA, TSCA, FIFRA, DOT Hazardous Materials Transportation Act, and OSHA (Occupational Safety and Health Act).

Mr. Hebert managed a "hotline" service (Technical Inquiry Program) for the Defense Logistics Agency's Hazardous Materials Technical Center (HMTC). This program provided Department of Defense (DOD) personnel with technical expertise and regulatory guidance on inquiries dealing with hazardous materials and hazardous wastes. While Mr. Hebert initially responded to all inquiries himself, the program grew under his guidance and management so that a full-time staff of five scientists were handling over 40 inquiries per month at the time of his departure from the program. The inquiries dealt primarily with hazardous waste management; remedial actions at uncontrolled hazardous waste sites; hazardous materials storage, handling, and transport; worker safety; environmental toxicology; and compliance with regulations set forth by EPA, DOT, OSHA, and analogous state agencies.

The following are a few examples of major projects Mr. Hebert personally handled for the HMTC Technical Inquiry program: critical evaluation of a contractor-designed remedial action plan for a hazardous waste Superfund site (for U.S. Army Corps of Engineers); assessment of the environmental toxicology of ethylene glycol-based deicing solutions (for U.S. Air Force); handling, storage, transport, and disposal of lithium-sulfur dioxide batteries (for U.S. Navy); hazardous waste characterization of 662 items used in aircraft maintenance (for U.S. Coast Guard); and comparison of European worker safety and hazardous waste/spill regulations with the OSHA Hazard Communication Standard and CERCLA regulations (for DOD).

Mr. Hebert worked on Phase IV-A of the U.S. Air Force Installation Restoration Program for clean-up of hazardous waste disposal and spill sites. He conducted site visits, reviewed Phase I Records Search and Phase II Confirmation/Quantification studies; and prepared a Statement-of-Work for Remedial Action, specifying necessary efforts to conduct and document the remedial action plan, namely additional data collection and site characterization.

As a toxicologist on an EPA-funded project, he reviewed and evaluated private industry toxicology studies submitted to EPA in support of pesticide registrations. The studies dealt with toxicity (acute, subchronic, and chronic), carcinogenicity, mutagenicity, neurotoxicity, teratology and reproduction toxicity, and pharmacology. He prepared Data Evaluation Records, in which the

scientific validity and quality of the studies were assessed, and determinations were made regarding fulfillment of EPA data requirements.

Mr. Hebert has extensive experience in the area of environmental fate and transport of pollutants. He worked in support of EPA's Pesticide Registration Standards Program reviewing and evaluating studies dealing with the environmental chemistry of pesticides. These studies dealt with hydrolysis, photodegradation, volatility, soil and aquatic metabolism, activated sludge metabolism, effects of pesticides on microorganisms, soil leaching and runoff, terrestrial and aquatic field dissipation, accumulation in fish and aquatic vertebrates, accumulation in rotational and irrigated crops, and worker exposure and field reentry. Mr. Hebert was also responsible for synthesizing valid data and preparing pesticide Environmental Fate Profiles and Exposure Hazard Assessments for EPA.

Mr. Hebert authored a regular column for the HMTC UPDATE, a bimonthly publication focusing on hazardous materials and hazardous waste management issues. He authored a lead article in a Special Technical Bulletin on new developments in the areas of land disposal and incineration and treatment techniques.

Mr. Hebert conducted independent research, and is a coauthor of three publications, dealing with microbial crude oil degradation and the transformation of aromatic hydrocarbons by microorganisms. As a microbiologist, he participated in studies and coauthored publications dealing with marine microbial ecology and aeromicrobiology. He also developed experience in public health and medical microbiology, and designed and taught for several semesters the laboratory section of a Medical Mycology course at the University of Texas.

Education

B.S. in Microbiology, University of Massachusetts, 1974

Name: JOHN W. JAQUES

Program
Assignment: Estimator

Level:

Relevant Experience

Mr. Jaques has assisted in cost estimating for a variety of design projects, including wastewater treatment plants, commercial/industrial plant expansions, hydroelectric projects, pulp and paper mills, and solid and hazardous waste sites.

For remedial investigations and feasibility studies at several Superfund sites, Mr. Jaques has assisted in the confirmation and review of pricing of the scope of services. He has assisted in the estimating of remedial actions for Michigan Department of Natural Resources and the McKin site in Maine, including such site actions as excavation of soils, capping, and off-site and onsite disposal of wastes.

Other major projects include:

- Crown Zellerbach Corporation (New York), Service Products East Expansion ($200 million)
- Town of Old Orchard Beach (Maine), Wastewater Treatment Plant ($9 million)
- Shape Video (Maine), Manufacturing Facilities Expansion ($4 million)
- University of Maine Chemical Engineering Building ($2.5 million)
- Madison Paper Industries (Maine), Groundwood Mill Expansion ($12 million)

Education

Credits toward a degree in Industrial Technology, University of Maine
Graduate Apprentice, Outside Machine Shop Apprenticeship Program, Bath Iron Works
15-week course in Construction Estimating, Central Maine Vocational Technical Institute

Name: RONALD A. LEWIS

Program Assignment: Site Characterization

Level: P-3

Relevant Experience

As a senior chemical engineer with the Jordan Company, Mr. Lewis has 12 years of experience in waste management and hazardous waste site assessment. His broad range of experience includes acting as liaison between industry and state and Federal agencies on environmental matters, environmental data assessment, contaminant and groundwater modeling, remedial action feasibility studies, and permit applications.

Mr. Lewis has performed a variety of environmental project responsibilities while at the Jordan Company, including: on-site safety coordination and monitoring, sampling of various media for subsequent chemical analysis, coordination of sample management and shipping, environmental audits for a number of industrial clients, and permitting assistance for generators, transporters and TSDF under RCRA regulations as well as for NPDES applicants. His current responsibilities involve data compilation and interpretation, remedial action feasibility studies and design and groundwater flow and contaminant transport modeling.

He has assisted several industries in determining their environmental liability and defining procedures for complying with hazardous waste regulations under RCRA and CERCLA. In the area of remedial investigations, feasibility studies and design of remedial actions, he has participated in the investigations of such Superfund sites as: Pine Street Canal (VT); Love Canal (NY); Silresim Chemical Corporation (MA); Northernaire Plating Co. (MI); North Hollywood Dump (TN); Acme Solvents (IL); and Picillo Farm (RI).

Data interpretation has included: definition of contaminant plumes; assessment of potential impact on receptors based on mass balance, physical/chemical and kinetic considerations as well as regulatory limits and health guidelines; and definition of probable routes of contaminant migration.

His work on feasibility studies has included the application of mathematical models to simulate and predict the effectiveness of certain remedial actions as well as providing expertise in physical/chemical treatment processes to identify alternative remedial actions. Analysis has included risk assessments and cost-effectiveness determinations.

Education

B.S. in Chemical Engineering, University of Maine, 1964
M.S. in Chemical Engineering, University of Maine, 1966
Completed course work for Ph.D. in Chemical Engineering, University of Maine

Name: JAY F. MCMULLEN

Program Assignment: Sampler

Level: Tech

Relevant Experience

Mr. McMullen coordinates sample collection efforts for land disposal facilities and groundwater contamination projects. He is responsible for sampling 100+ wells on a quarterly basis at several industrial and municipal landfill sites. He coordinated and performed groundwater and surface water collection procedures using EPA sampling protocols and procedures for priority pollutants. Mr. McMullen coordinated groundwater monitoring program and analytical data reporting to clients for all solid waste projects. Acted as liaison between environmental laboratory and project engineers for water quality analysis.

He assisted in upgrading and updating computer water quality monitoring program, which gives statistical analysis of desired parameters from past to present sampling episodes.

He is experienced with a variety of equipment necessary for sampling and analysis. He assisted in the maintenance of the environmental van's equipment for sampling and field analysis including sample preservation and packaging for a variety of environmental and site conditions.

Education

A.S. in Civil Engineering Technology, University of Maine, 1983

Name: ROBERT A. STEEVES

Program Assignment: Coordinator of Quality Assurance, Health and Safety

Level: P-3

Relevant Experience

As Chairman of Jordan's Personnel Health and Safety Committee, Mr. Steeves is responsible for compliance with established safety procedures for Jordan's laboratory and field activities, particularly at hazardous waste sites. These responsibilities include monitoring of Jordan personnel field activities to assure that proper safety precautions are taken; development of health monitoring and respiratory protection programs in which nearly 100 Jordan individuals have been enrolled; and providing training in the use of safety equipment, first aid and cardiopulmonary resuscitation techniques and decontamination techniques. Mr. Steeves has provided health and safety advisory services at over 10 Superfund sites and many other hazardous waste sites.

Mr. Steeves had previously conducted nationwide sampling and analysis programs including 10 industrial waste surveys designed to measure and profile the presence of potentially toxic compounds in support of USEPA Effluent Guidelines development. As part of these industrial surveys, Mr. Steeves was responsible for establishing safety procedures to be followed by sampling teams working in industrial facilities. Mr. Steeves also prepared a Jordan safety manual used by field crews engaged in a variety of tasks at potentially hazardous material disposal sites. His sampling and analysis efforts also included five pilot plant studies. Both previous and current assignments involve the design and implementation of computerized technical data bases.

He has prepared two state-of-the-art treatment technology reviews under USEPA contracts. "The Removal of Phenolic Compounds from Wastewater" included benchscale research. "Foam and its Elimination" reviewed foam-causing substances, the structure and stability of various types of foam, and technologies available to eliminate it.

Education

B.S. in Chemical Engineering, Tufts University, 1972

Name: JOHN D. TEWHEY, PH.D.

Program Assignment: Program Manager

Level: P-4

Relevant Experience

Dr. Tewhey has over 15 years of experience in the fields of hazardous materials and waste management, including five years of hazardous waste project management at Jordan, seven years of nuclear waste management at the Lawrence Livermore Laboratory of the University of California, and four years of fuels management in the U.S. Air Force from 1967 to 1971.

Dr. Tewhey has served as technical project director on 14 hazardous waste-related projects during his tenure at Jordan; he has been on the project quality review board of 75% of the projects completed by Jordan during this time. Dr. Tewhey served as project technical director for the remedial investigation of the Silresim uncontrolled hazardous waste site in Lowell, Massachusetts. This project was the initial hazardous waste site investigation conducted by the Jordan Company and was completed on schedule and within the estimated budget. The remedial action that Jordan recommended for the site (clay cap) has been implemented. There was extensive interaction with an interested citizen group (Mass Fair Share) and Dr. Tewhey was responsible for the format, content and presentation of all public meetings which ranged from discussions in living rooms to meetings in city auditoriums covered by the local, state, and national media.

Dr. Tewhey was also the project technical director on a contract to evaluate technical data and recommend remedial alternatives for the North Hollywood Dump, a Superfund site in Memphis, Tennessee. The clients on the North Hollywood Dump project consisted of a Technical Action Group (TAG) made up of local, county and state representatives, EPA Region IV and potential responsible parties. The project reports were reviewed and approved by all of the members of the TAG. The recommended remedial action is currently being implemented.

Dr. Tewhey had extensive project management experience at the Lawrence Livermore Laboratory. He was project manager on a nuclear waste project which included development, characterization, stability assessment, and production technology of SYNROC, a ceramic waste form for the incorporation of nuclear waste. The project was a $2-million per year development project for disposal of high-level radioactive wastes located at U.S. defense sites.

Education

B.A. in Geology and Chemistry, Colby College, 1965
M.S. in Geology, University of South Carolina, 1968
Ph.D. in Geochemistry, Brown University, 1975

Professional Registration

Certified Geologist in Maine, California

Name: SUSAN A. WAITE

Program Assignment: Risk Assessment

Level: P-2

Relevant Experience

Ms. Waite is a chemical engineer with experience in environmental engineering, industrial waste stream (process) design, and construction cost estimating. Her experience includes compilation and review of analytical data; conduct of feasibility studies and public health assessments; preparation of cost analysis of remedial action alternatives; field work on hazardous waste sites as well as process design for the Pulp and Paper Industry.

Ms. Waite has participated in Remedial Investigation/Feasibility Studies for Superfund projects in Maine, New York and Michigan. Specifically, her responsibilities have included development of site Applicable Regulations and Appropriate Regulations (ARARs), alternatives development, evaluation and screening, preparation of cost estimates for remedial action alternatives for feasibility studies, as well as preparation of preliminary assessments for hazardous waste sites and participation in laboratory quality assurance programs.

Ms. Waite has also been responsible for preparation of major components of several Superfund public health assessments and endangerment assessments. These responsibilities include selections of indicator chemicals, development of toxicological profiles, and risk/hazard characterization for contaminants in groundwater, soils, and air.

Ms. Waite was a member of the field investigation team at the Love Canal Superfund site in New York. Her responsibilities included description of soils and bedrock, sampling of soils, monitoring of drilling operations and installation of monitoring wells.

As an Industrial Process Engineer, Ms. Waite has worked for the Pulp & Paper/ Industrial Process Department. Her responsibilities have included process design, preparation of process flow, and instrumentation diagrams, preparation of equipment specifications and recommendations, and flow balances.

Education

B.S. in Chemical Engineering, University of Maine, 1984

Name: STANLEY E. WALKER

Program Assignment: Quality Review Board

Level: P-4

Relevant Experience

Mr. Walker has been responsible for the execution of a wide range of earth resource-related studies and designs for many Superfund and other hazardous waste projects including: design of the modeling and long-term monitoring programs to predict and measure remedial action effectiveness at Love Canal in Niagara Falls, New York; development of risk assessment procedures for closure of hazardous waste impoundments for Mississippi Department of Natural Resources; remedial investigation and feasibility study of Acme Solvent Site in Winnebago County, Illinois; exploration and assessment of subsurface contamination and remedial cost-effectiveness at the Silresim site in Lowell, Massachusetts; identification of cost-effective management of coal gasification plant wastes during highway construction at the Pine Street Canal site in Burlington, Vermont; and data interpretation and remedial feasibility study of the pesticide-contamianted North Hollywood Dump in Memphis, Tennessee.

Mr. Walker has technical and administrative responsibility for the firm's multidisciplinary services in design, industrial process, environmental, and civil engineering, as well as project management. These responsibilities include the direction and review of Jordan projects in solid and hazardous waste management, which involves the interdisciplinary efforts of geologists, hydrologists, soil scientists, and chemists.

Education

B.S. in Civil Engineering, University of Maine, 1962
M.S. in Civil Engineering (Geotechnical), University of Maine, 1966

Professional Registration

Professional Engineer in Maine, Massachusetts, Mississippi, New York, New Hampshire, New Jersey, Illinois, Minnesota, Vermont, Florida, and Michigan

Name: NELSON WALTER

Program Assignment: Phase IV-A Studies

Level: P-3

Relevant Experience

Mr. Walter has seven years of environmental engineering experience in waste management in the areas of corrective action, remedial design, development of pretreatment programs, and evaluation of facility control and compliance. He is familiar with U.S. EPA, RCRA, and CERCLA regulations.

As a chemical engineer in the Environmental Services Division, Mr. Walter is responsible for the evaluation of chemical contamination data, screening remedial technologies, and performing remedial designs.

Prior to joining E.C. Jordan Co., Mr. Walter served as a project engineer for the New York State Department of Environmental Conservation (NYSDEC) in the Divisions of Solid and Hazardous Waste, Water, and Air.

For the Solid and Hazardous Waste Division, his responsibilities centered on the Love Canal Remedial Program in Niagara Falls. During the remedial action phase of the $3.3 million Love Canal Sewer Cleaning Project, he worked on the feasibility study and on the design of the sewer cleaning program. He supervised the cleaning of the sewers, including supervision of five NYSDEC inspectors; acted as the NYSDEC On-Scene Coordinator; and was responsible for budgeting and payments to the contractor. The sewer cleaning project consisted of cleaning 65,000 feet of storm and sanitary sewers which were contaminated with organic wastes, including chlorobenzenes, pesticides, and dioxin.

With the project team, Mr. Walter developed a dewatering facility design to treat the sewerage waste that would meet RCRA criteria through the use of secondary containment, including storage of waste in hypalon-lined tanks set inside a HDPE liner. In addition, he supervised the construction of the facility, including development of plans and specifications, and contract management, including bid packages. Due to the high visibility of the sewer cleanup, Mr. Walter developed a comprehensive public participation program over the course of the two-year project, which included eight public meetings, small group information sessions, and individual meetings, both in the NYSDEC offices and in citizens' homes.

As Project Engineer for the Love Canal Perimeter Survey Contract, he was responsible for ensuring the technical quality of the work, and serving as NYSDEC's representative during drilling activities, and with the contractor.

In the Division of Water, Pretreatment Program Section, Mr. Walter assisted municipalities in developing local pretreatment programs. He worked with publicly owned treatment works (POTWs) facilities and municipalities to provide guidance on sampling programs for POTWs and industries, tolerance of POTWs to non-domestic discharges, control of industrial discharges, and development of enforcement programs. His main projects in New York State were the City of Niagara Falls POTW, a physical chemical treatment plant with activated carbon filters for secondary treatment; the City of Buffalo POTW which had 180 sig-

nificant industrial discharges; and the joint treatment plant for the cities of Johnstown and Gloversville which have 23 leather tanneries as dischargers.

His responsibilities in the Division of Air included assisting regional offices with inspection of industries as well as the associated evaluation of air pollution control and compliance.

Education

B.S. in Chemical Engineering, Rensselaer Polytechnic Institute, 1979

Professional Registration

Professional Engineer in New York

Name: RICHARD E. WARDWELL

Program Assignment: Quality Review Board

Level: P-4

Relevant Experience

Dr. Wardwell's nearly 15 years of civil, geotechnical and groundwater engineering experience has stressed earthwork stability, including supervision of construction programs for major earthworks projects, design of waste disposal systems, and evaluation of facility design for industry.

His solid waste managment experience includes: evaluating and designing waste disposal facilities for a variety of solid waste materials, including all types of mill tailings, municipal wastes, pulp and papermill sludges, coal ash, low-level nuclear waste, and a variety of hazardous waste materials. This work has included initial site feasibility studies, engineering behavior and stability of the waste deposits, and geohydrologic design considerations relating to the control and containment of potential releases from these sites. He has had significant experience evaluating the impacts of partially saturated groundwater flow conditions on contaminant transport and the engineering behavior of soil and rock. His areas of specialization relating to papermill sludges include:

- The effects of fiber decomposition on the long-term engineering characteristics of papermill sludges and organic soils.
- Landfill behavior of solid waste material specializing in saturated deposits, including papermill sludges, municipal wastewater treatment sludges, mill tailings, and coal furnace sludges and fly ash.
- Groundwater movement, gas migration, and leachate drainage from waste disposal sites and treatment lagoons.

Other project experience includes:

- Investigating the physical characterization at several landfill sites. The investigation included explorations, sampling and testing of embankment and foundation materials to evaluate their engineering behavior during operation and reclamation. Testing included identification, shear-strength compressibility testing of both saturated and partially saturated waste materials. Based on this characterization, each site's short-term and long-term stability was evaluated.
- Assisting industry clients in obtaining state and federal approval for the landfill designs of waste materials. This work related to the overall operation, reclamation planning and implementation to meet current regulations. Investigations included the field and laboratory characterization of the hydraulic and engineering properties of waste materials and foundation consolidated strata.

- Developing a cost-effective final reclamation plan for the Conquista Project in Falls City, Texas, a uranium tailings impoundment and site area. Emphasis was given to the investigation of internal tailings stability, design of the reclamation cover, evaluation of long-term stability, development of seepage models, prediction of long-term water quality, and development of the necessary license documents to obtain regulatory acceptance of the reclamation plan.

Dr. Wardwell also has extensive research experience involving the field behavior of waste materials and long-term deformation of waste disposal impoundments. He has presented symposia dealing with papermill sludges, uranium mill tailings management and geotechnical design considerations for mine mill tailings impoundments.

Dr. Wardwell has authored over 20 published technical papers on the topics of field behavior of waste materials, water movement in materials, and the geotechnical behavior of earthen structures.

Education

B.S. in Civil Engineering, University of Vermont, 1968
M.S. in Civil Engineering, University of Maine, Orono, 1973
Ph.D in Civil Engineering, Colorado State University, 1980

Professional Registration

Professional Engineer in Colorado, Maine, Vermont, Wyoming, Texas, and Arizona