DRAFT
PLAN OF ACTION

SUBSURFACE OIL INVESTIGATION

CONFIRMATION STUDY
NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT

MARCH 1986

WEHRAN ENGINEERING
Consulting Engineers

100 Milk Street
Methuen, Massachusetts 01844
(617) 682-1980

DRAFT
PLAN OF ACTION

SUBSURFACE OIL INVESTIGATION

CONFIRMATION STUDY
NAVAL SUBMARINE BASE NEW LONDON
GROTON, CONNECTICUT

Prepared For

DEPARTMENT OF NAVY - NORTHERN DIVISION
Philadelphia, Pennsylvania

Prepared By

WEHRAN ENGINEERING CORPORATION
100 Milk Street
Methuen, Massachusetts 01844

WE Project No. 02364360

March 1986

TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 SITE HISTORY/NATURE OF THE PROBLEM

In November 1977, Northern Division, Naval Facilities Engineering Command (NORTHDIV) requested the Navy Environmental Support Office (NESO) to conduct a study to determine the source and extent of the underground oil contamination on the lower SUBASE (see Figure 1). This oil was believed to leach from the soil into the Thames River causing oil slicks to be reported in the pier area.

To help determine the extent and magnitude of the problem, 12 borings completed as wells were installed in June 1978 within the lower base area. Soil samples from the borings were analyzed for oil content and the wells were later sampled to determine the amount of oil floating on the groundwater.

Three areas of contamination were found (see Figure 2):

Area 1, encompassing the power plant (Building 29), was found to be contaminated with a heavy oil similar to Bunker C. The oil was said to have originated from the heated day storage tanks and the reclamation tank directly behind the power plant. Recommended actions include inspection of the tanks and storm sewers for signs of oil leakage and sealing abandoned lines and any cracks found as a result of the inspections.

Area 2 is situated near oil storage Tanks E, F, G, K and L, east of Building 29. This area was determined to pose no environmental threat; however, it was recommended that the adjacent well (No. 7) be monitored regularly.

Area 3, located northwest of Building 79 was found to be contaminated with an oil similar to lubricating oil. The contamination appeared to originate from an abandoned exfiltration basin previously used when Building 79 was a diesel engine service facility. Recommended action for this area was to install a well system that would remove the oil from the soil. At the completion of the study, the Navy implemented the recommended remedial measures.

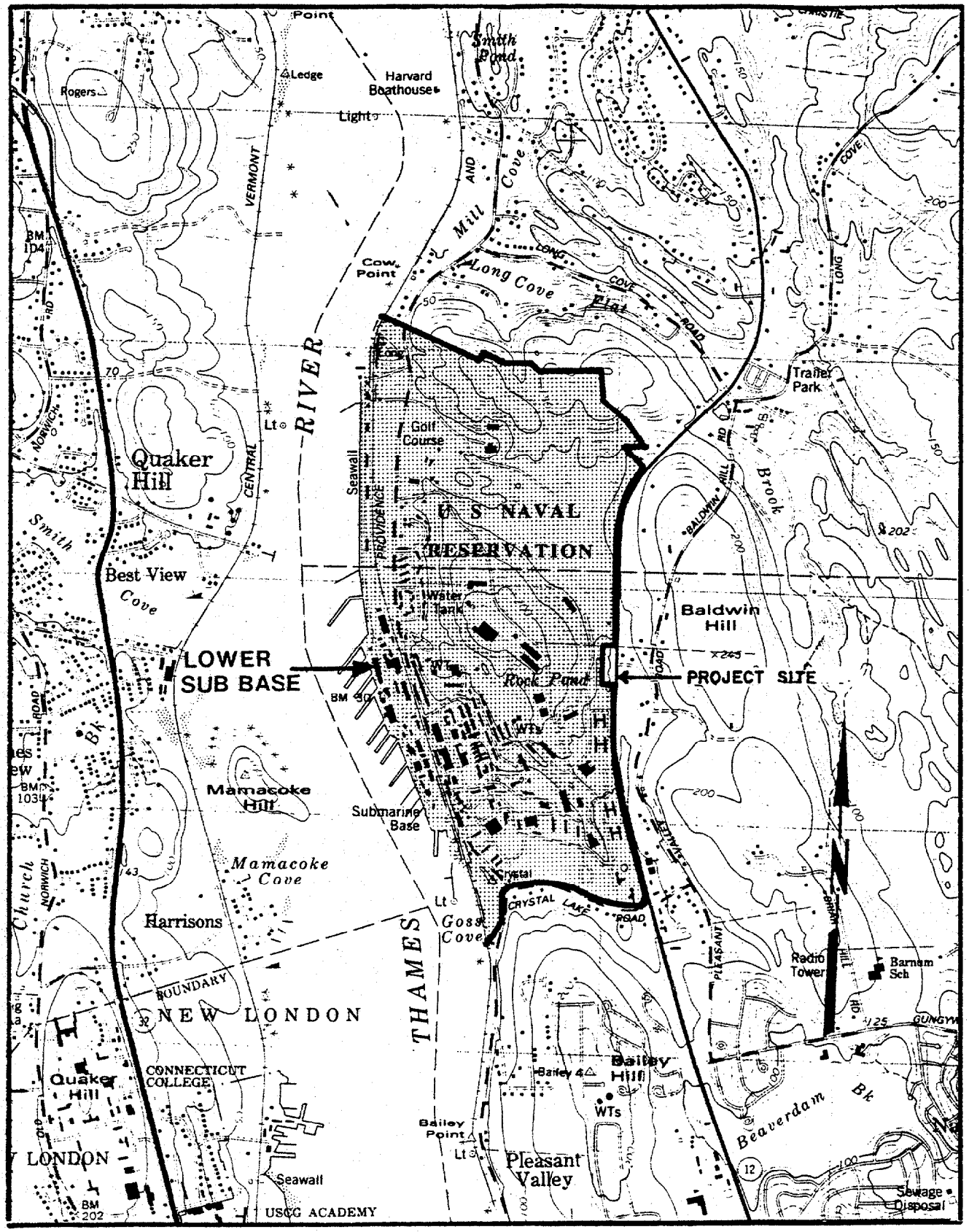


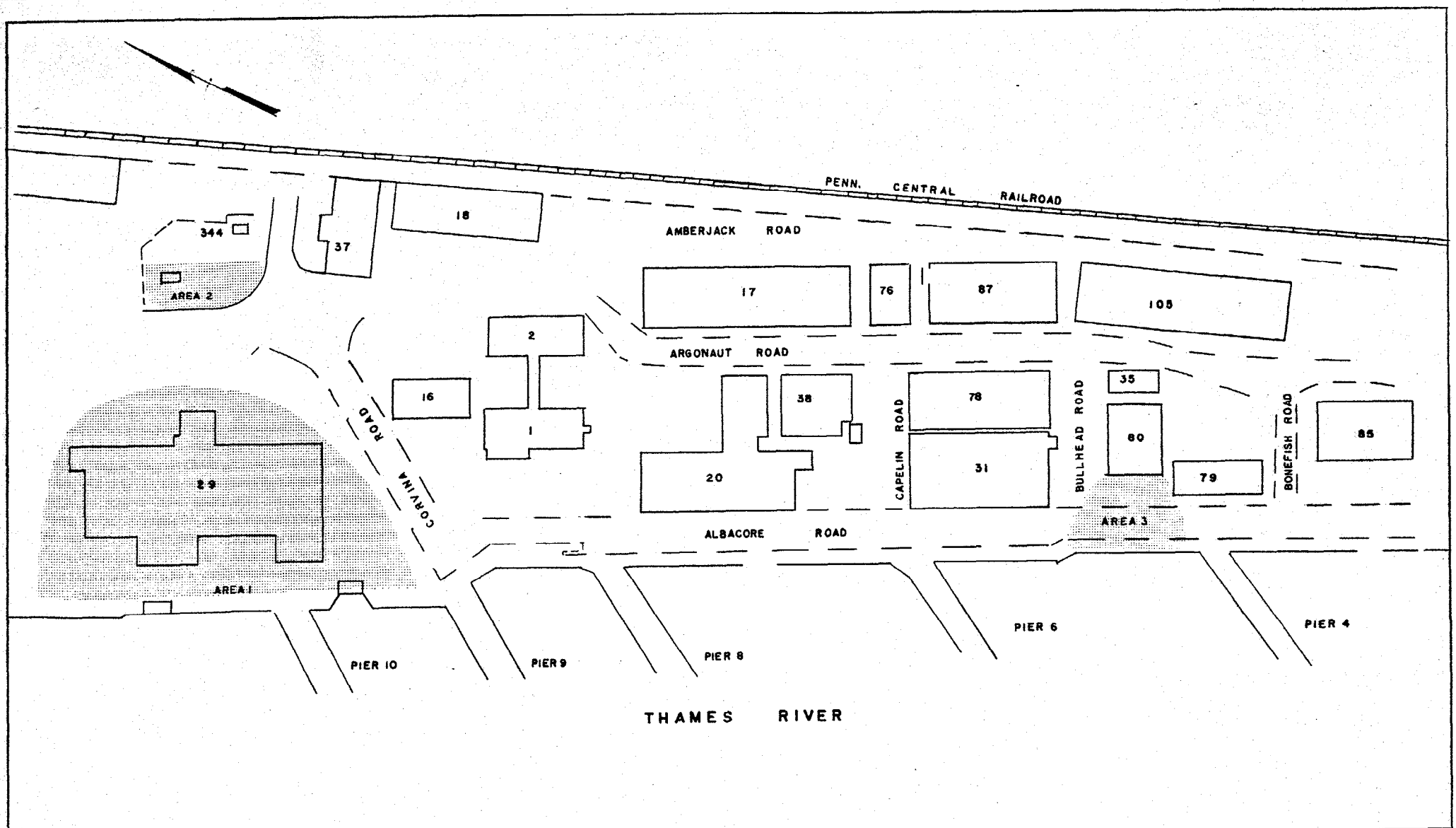
FIGURE 1

SITE LOCATION MAP

U.S. NAVAL SUBBASE

GROTON, CONNECTICUT

WE No. 02364360



WEHRAN ENGINEERING
CONSULTING ENGINEERS

NOT TO SCALE

NAVAL SUBMARINE BASE NEW LONDON

FIGURE 2. 1977 NESO AREAS OF CONTAMINATION

GROTON CONNECTICUT

In September 1980, the Navy initiated the Naval Assessment and Control of Installation Pollutants (NACIP) program. The purpose of the program is to systematically identify, assess, and control contamination of the environment resulting from past operations. The first step of this program was the Initial Assessment Study (IAS). The IAS for the SUBASE was conducted by Envirodyne Engineers, Inc., in March 1983. Through review of records, personnel interviews, and site inspections, a number of potential sites of contamination were evaluated. The known or suspected waste disposal sites identified by the IAS team were evaluated using a Confirmation Study Ranking System (CSRS) developed by the Naval Energy and Environmental Support Activity (NEESA). Consistent with the ranking procedure, the IAS team reviewed the three sites in question and concluded the following:

Power Plant Oil Tanks, Site No. 11 (Area 1)

These tanks are located underground on the lower base and have been in operation since World War II. There are four tanks and each has a 170,000-gallon capacity. Tanks A and B contain Number 6 grade fuel oil which is pumped from the tank farms on the north end of the base. Tank C contains diesel oil and Tank D contains waste oil from the power plant bilge water oil recovery system. The fuel and waste oil is used in the power plant boilers to generate steam and electricity for support operations on the lower base.

These tanks are old and in a deteriorated and leaking condition. Groundwater samples from the area indicated petroleum compounds are three inches thick on the groundwater. Oil slicks have been reported in the river at low tide, including the area of Pier 4 and Building 79. Leakage of petroleum into steam and pipe tunnels and underground vaults may also present a fire hazard. However, plans are already underway to replace these tanks in the near future. Recovery of oil which has leaked from the tanks will help alleviate the problem of oil on the groundwater in the lower portion of the base.

Fuel Oil Storage Tanks, Site No. 10 (Area 2)

This site (east of Amberjack Avenue, south of Building 107) is located in the lower base approximately 300 feet from the river shoreline. The five storage tanks are underground and next to a paved parking area. The tanks are concrete and have been in use since prior to World War II. Three of the tanks (E, F, and G) each have a 125,000-gallon capacity and are used to store diesel fuel. Tanks K and L have a 25,000-gallon capacity and are used to store lube oil. Monitoring wells installed in the area of the tanks yielded only small amounts of petroleum products.

The potential for contamination of the surrounding environment by leakage from the tanks is moderate. The tanks are just above the water table and in close proximity to the river. Groundwater flow would transport the petroleum compounds in the direction of the river.

It is recommended that the level of these tanks be closely monitored to determine if they are leaking. If leaking is discovered, these tanks should be repaired or replaced. Monitoring should be conducted directly from the tanks for greatest accuracy.

Building 79 Waste Oil Pit, Site No. 13 (Area 3)

This was an open sump pit covered by a floor grate which received waste oil and solvents from the cleaning of diesel engines during and after World War II. The pit was constructed of concrete and had a 500-gallon capacity. It has been filled with concrete and eliminated from the drainage system; therefore, it is no longer considered a problem.

1.2 CURRENT SITUATION

In December 1985, Northern Division Naval Facilities Engineering Command (NORTHDIV) requested that Wehran Engineers and Scientists investigate the problem of Number 6 fuel oil appearing within several utility manholes and trenches. Wehran immediately responded with a data investigation and field reconnaissance of the oil problem. Through the review of historical data coupled with field examination of the manholes and trenches in the areas of concern, Wehran has determined that the apparent

oil problem is found in the vicinity of Building 79 (see Figure 3). The plan of action detailed herein delineates the procedures that Wehran proposes to utilize in conducting this underground oil investigation confirmation study.

The plan of action has been structured to enable a comprehensive sampling of soils and oil residue in the vicinity of Building 79, and consistent with the resultant analytical data, interpret appropriate recommendations and conclusions. The methods to be utilized in the site investigation, data analyses, and evaluation have been presented in detail. Implementation of this plan of action will allow the Wehran project team to refine the findings of the IAS and develop a basis for conducting remedial measures.

2.0 SITE INVESTIGATION

2.1 SITE INVESTIGATION OBJECTIVE

The objective of the plan of action is to establish site investigation procedures that will enable the Wehran project team to delineate the fuel oil contamination in the vicinity of Building 79. This will be accomplished by conducting a comprehensive field investigation and environmental sampling program. Included in the investigation is the sampling of the oil residue in the relieving platform's sand-filled manholes. This requires Navy personnel to remove the sand from the four manholes shown on Figure 4 to provide access to the sampling location.

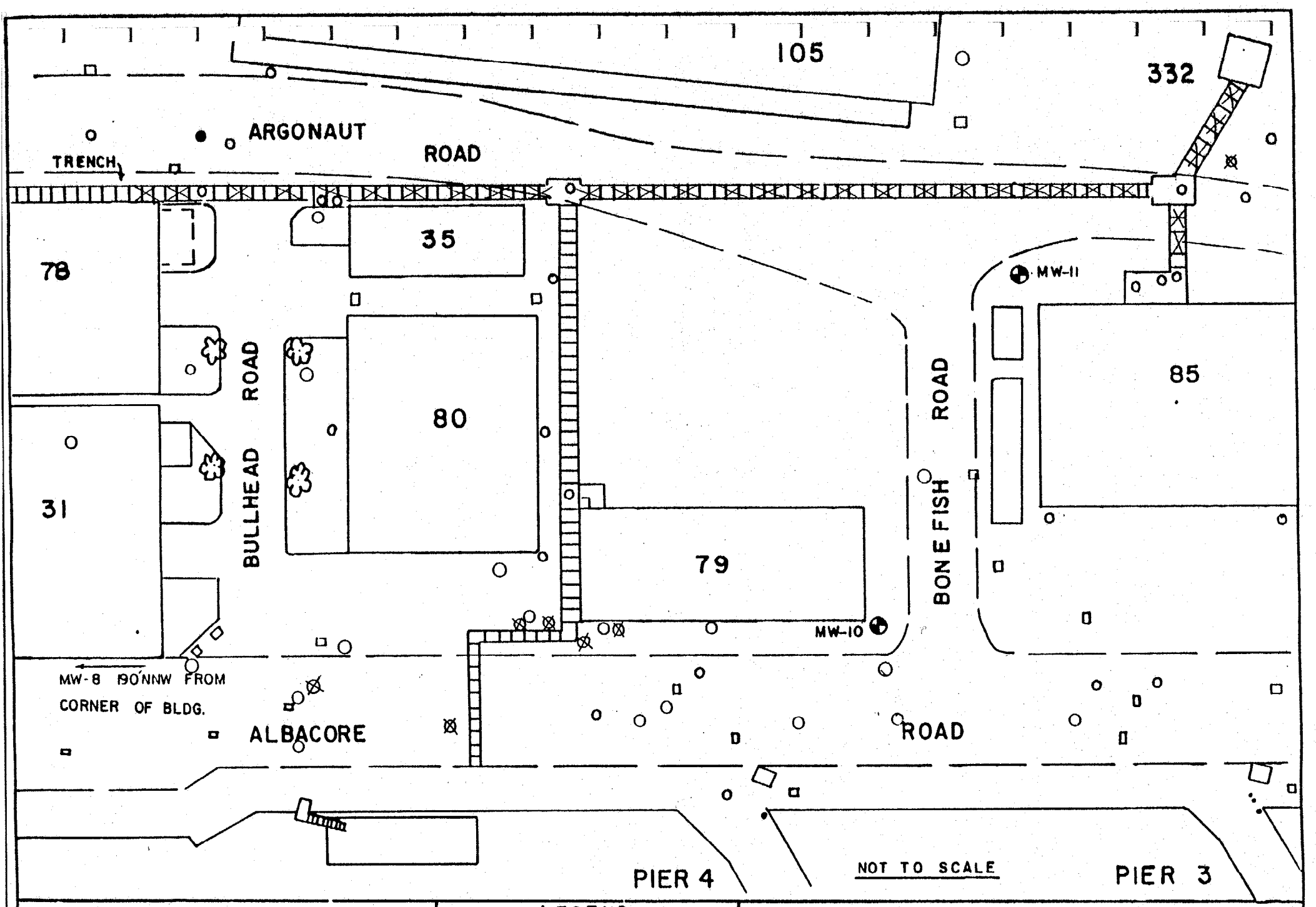
The following paragraphs describe the proposed locations for sample collection and further detail the procedures and analyses to be utilized in conducting the environmental sampling.

2.2 SURFICIAL OIL SAMPLING PROGRAM

2.2.1 Sampling Locations

Surficial oil samples will be collected from eight (8) locations, seven in the vicinity of Building 79 (Figure 4). The proposed sample locations are:

- Oil contaminated manholes - five (5) locations.
- Oil contaminated trenches - two (2) locations.
- Power Plant No. 6 fuel oil - one (1) location.



WEHRAN ENGINEERING
CONSULTING ENGINEERS

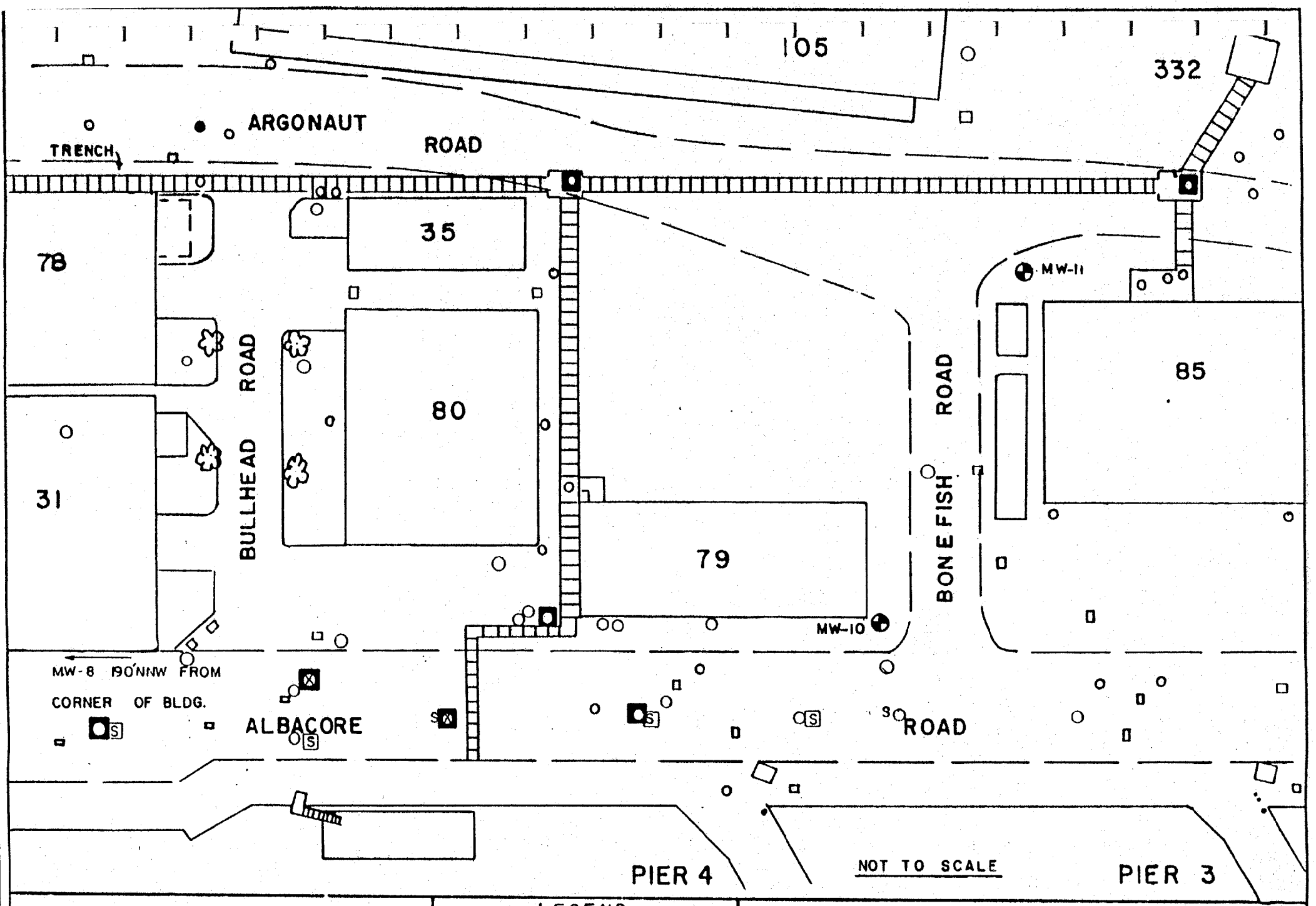
LEGEND

- EXISTING MONITORING WELLS
- X OIL CONTAMINATION

NAVAL SUBMARINE BASE NEW LONDON

OIL CONTAMINATED MANHOLES AND TRENCHES

GROTON FIGURE 3 CONNECTICUT



WEHRAN ENGINEERING
CONSULTING ENGINEERS

LEGEND

- EXISTING MONITORING WELLS
- S SAND HOLE
- SURFICIAL OIL SAMPLE LOCATION
- S SAND REMOVAL LOCATION

NAVAL SUBMARINE BASE NEW LONDON

PROPOSED SURFICIAL OIL SAMPLING LOCATIONS

GROTON

FIGURE 4

CONNECTICUT

2.2.2 Sampling Procedures

Surficial oil samples will be grab samples employing simple collection techniques. To collect the surficial oil samples, a glass quart jar and specially prepared trowel will be employed. The trowel will be used to scrape the oil from the bottom and sides of the manholes and trenches for immediate transfer into the sample containers.

To reduce the risk of transfer of contaminants within or off the site, decontamination of all equipment and containers using the washing procedures outlined below is required between sampling locations:

- Brush loose soil particles off of equipment.
- Wash equipment with laboratory grade detergent.
- Rinse equipment with tap water (minimum of three rinses).
- Rinse equipment with reagent grade methanol.
- Allow methanol to evaporate before reusing the equipment.
- Rinse equipment with distilled water.

2.2.3 Analytical Agenda

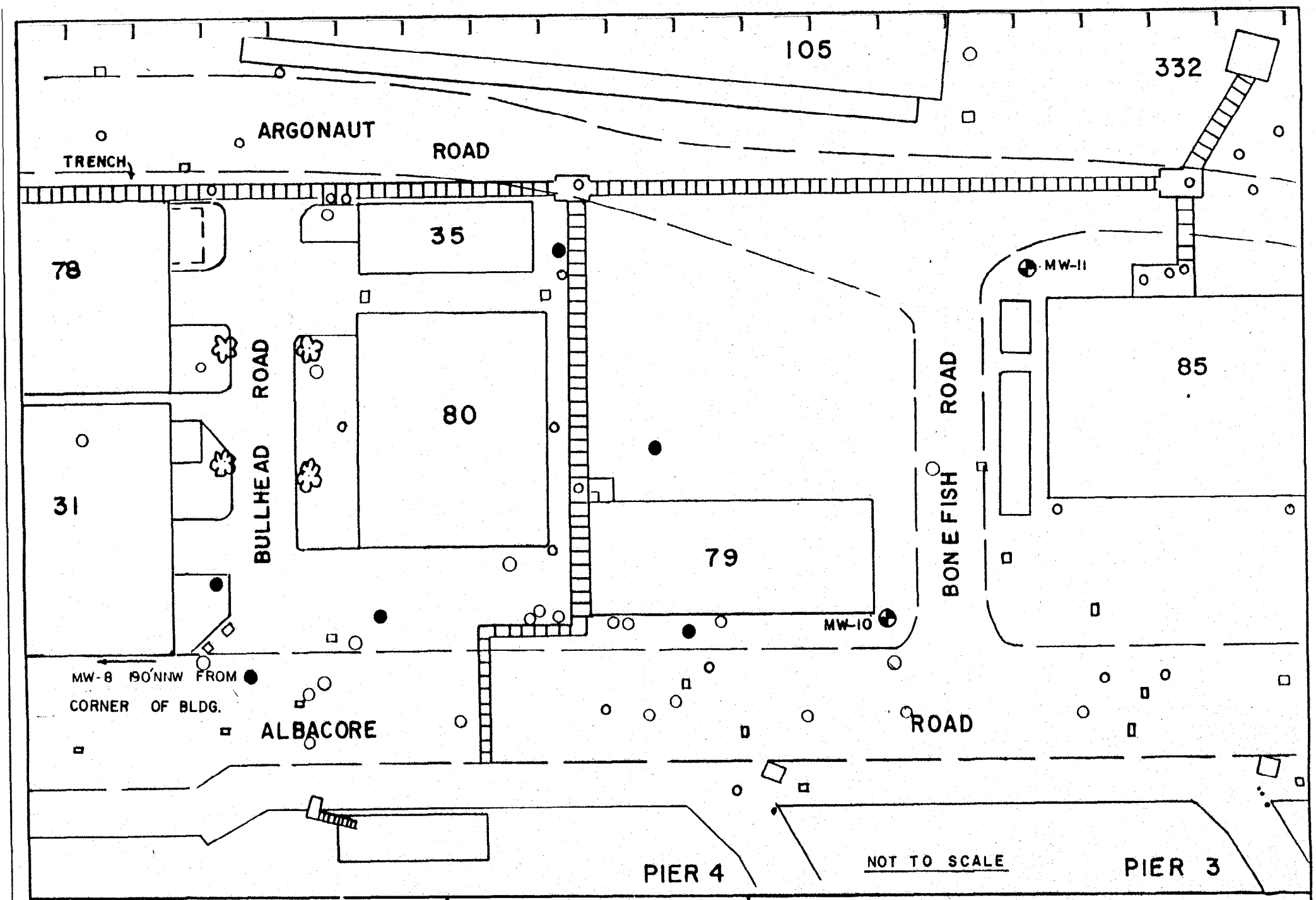
The following analytical agenda has been established for the surficial oil samples:

- Oil contaminated manholes: five (5) oil fingerprinting analyses; one (1) PCB analysis.
- Oil contaminated trenches: two (2) oil fingerprinting analyses; one (1) PCB analysis.
- Power Plant No. 6 fuel oil: one (1) oil fingerprinting analysis; one (1) PCB analysis.

2.3 SOIL BORING PROGRAM

2.3.1 Sampling Locations

Soil samples will be collected from 12 locations. At this phase of the investigation, two samples from each of the six borings will be taken (see Figure 5). The rationale for selecting the boring locations is described below:



WEHRAN ENGINEERING
CONSULTING ENGINEERS

LEGEND
- EXISTING MONITORING WELLS
- PROPOSED SOIL BORINGS

NAVAL SUBMARINE BASE NEW LONDON
PROPOSED SOIL BORING LOCATIONS
GROTON **FIGURE 5** CONNECTICUT

- One (1) boring adjacent to the south end of Building 35 in proximity of the oil-contaminated trenches. The objective is to determine if the oil has migrated through the trench bedding.
- One (1) boring northeast of Building 79. The objective is to determine if the oil or its derivatives are moving through the soil matrix.
- One (1) boring west of Building 80 in the vicinity of the destroyed NEBSA Well No. 9. The objective is to investigate the previously reported thick layer of oil in Well No. 9.
- Three (3) borings in the perimeter of the oil contaminated zone. The objective is to assess the lateral extent of the oil contamination.

2.3.2 Sampling Procedures

Soil samples taken will be composite samples from borings utilizing a split-spoon sampler. The split-spoon sampler is a two-foot long, two-inch outside diameter cylindrical sampler used to collect samples at the surface and at least every five feet thereafter. The drilling inspector may elect to collect continous samples for the entire depth to further characterize the strata and zones of oil contamination. Compositing of the split-spoon samples will be conducted in stainless steel bowls with a stainless steel trowel. All equipment will go through decontamination procedures between each sample location. Field screening will be performed by placing soil into and eight-ounce glass jar with aluminum foil placed over the top prior to sealing. The soil will be allowed to thermally equilibrate to room temperature for 20 minutes while in the jar. Once the soil has had time to thermally equilibrate, the jar lid will be removed but the foil will remain in place on the jar. The probe from a photoionization meter will then be placed through the foil to measure the ionization potential from the soil headspace. All results will be recorded.

2.3.3 Analytical Agenda

The following analytical agenda has been established for the soil samples:

- Soil borings: Twelve (12) oil fingerprinting analyses and three (3) PCB analyses.

2.4 GROUNDWATER SAMPLING PROGRAM

2.4.1 Sampling Locations

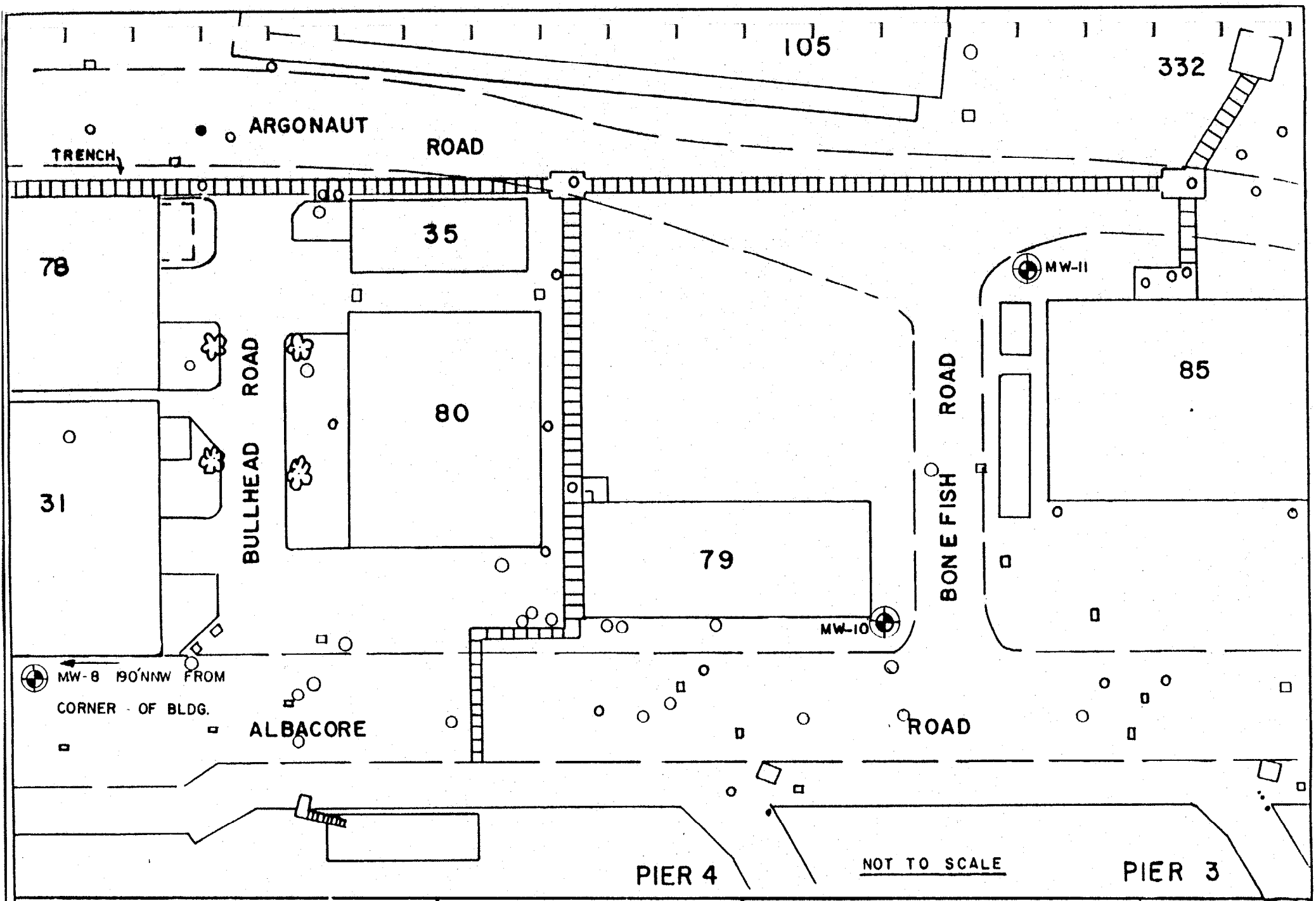
Groundwater samples will be collected from three locations. Preliminary visual inspection of the groundwater within existing Well Nos. 8, 10, and 11 (see Figure 6) indicated that no oil was present. To confirm these findings, three oil fingerprinting analyses are schedule to be conducted. The rationale for selecting these wells for further sampling is their proximity to the oil contaminated manholes and trenches.

2.4.2 Sampling Procedures

Before a groundwater sample is obtained, the stagnant water must be evacuated or purged. This process ensures that the sample subsequently obtained is representative of the groundwater. A determination of the static water level is initially made upon arrival at the well followed by a measurement of total well depth.

These measurements give the linear feet of static water in the well, which coupled with the radius or diameter of the well, allows the calculation of the total volume of static water. A minimum of three well volumes will be removed or the well will be purged dry before a sample is obtained for chemical analysis. The amount of water removed will be recorded and the well will be allowed to completely recover before the sample is taken.

A teflon bailer with new solid braided nylon rope will be used for each purging task. The bailers will be cleaned between wells by using the previously outlined decontamination techniques. Sample acquisition will be by direct transfer from the bailer to the sample container.



WEHRAN ENGINEERING
CONSULTING ENGINEERS

LEGEND
EXISTING MONITORING WELLS
GROUNDWATER SAMPLING LOCATIONS

NAVAL SUBMARINE BASE NEW LONDON
GROUNDWATER SAMPLING LOCATIONS
GROTON **FIGURE 6** CONNECTICUT

2.4.3 Analytical Agenda

The following analytical agenda has been established for the groundwater samples:

- Monitoring wells: three (3) oil fingerprinting analyses.

3.0 DATA ANALYSIS

The establishment of recommendations from the underground oil investigation of the confirmation study at the NSB site will be based upon the results of the laboratory analyses of the site's groundwaters and surficial oil within manholes and trenches.

Upon completion of all aspects of the field investigation and receipt of the analytical data from the contract laboratory, Wehran will assess the data and prepare a report summarizing the site investigation results. This data will be the basis upon which future site reconnaissance, recommendations, characterization, and remediation of contaminants will be conducted.

Standard USEPA approved sample collection and preservation procedures will be employed throughout the sampling and analytical program. York Laboratories of Monroe, Connecticut will perform all laboratory analytical services for the confirmation study. The laboratory employs standard USEPA approved analytical and chain-of-custody procedures.

4.0 PRELIMINARY REMEDIAL TECHNOLOGIES

Dependent upon the findings of the underground oil investigation, the Wehran project team will be prepared to develop remedial source control and treatment technologies applicable to the NSB site. In consideration of the existing situation, where fuel oil contaminants have been detected in manholes, trenches, and groundwaters around Building 79, Wehran has implemented a fast-track approach and evaluation program to accelerate a remedial response. The primary objective would be to identify any existing risk to public health and to recommend immediate remediation measures.

As site-specific data becomes availabe from the ongoing site investigation, the Wehran project team will identify prospective remedial technologies. A preliminary evaluation of the no-action alternative and its implications both on and off site, particularly the magnitude of risk posed by possible off-site contaminant migration, will be conducted during the investigation. All practical alternative remediation techniques will be evaluated in detail at the completion of the confirmation study. The comfirmation study evaluation will include:

- A description of appropriate treatment/containment technologies.
- Identification of specific engineering considerations required to implement the alternative (e.g., pilot treatment facility, additional studies needed to proceed with final remedial design).
- Assessment of environmental impacts and proposed methods for mitigating any adverse affects.
- Requirements for operation and maintenance, and for long-term monitoring.
- Off-site disposal and transportation needs.
- Temporary storage requirements.
- A description of how the technology could be phased into operable units.

Remedial technologies appropriate to site conditions will be recommended for detailed consideration and cost-effectiveness analysis during the Alternative Evaluation, Step II.

5.0 REPORTS

Monthly progress reports will be submitted for the duration of the verification step. These reports will be submitted to the EIC and the NSB point of contact and will briefly summarize the following:

1. Work accomplished during reporting period, including laboratory analytical results.
2. Problems encountered and unresolved.

3. Percentage of work completed.
4. Plans for the following report period.
5. Confirmation of technical items resolved with government technical representatives.

Upon completion of the site investigation and data analyses, a draft confirmation step report will be prepared which will include the following:

1. A brief restatement of appropriate IAS findings and conclusions.
2. Maps of the installation as required to define the work effort undertaken during the verification step.
3. Detailed description of the analytical findings. Quality assurance plans, sampling/analysis methods, sample record, and chain-of-custody records will also be included.
4. Evaluation of any contamination discovered, including any violations of Federal, State, and local regulations revealed by the study.
5. An assessment of the extent and magnitude of the subsurface oil including any specific recommendations for further investigations if warranted.
6. A detailed evaluation of candidate interim and long-range remediation measures.